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C

CAAING-WHALE—CABEZON DE LA SAL

CAAING-WHALE (*Globicephalus melas*), one of the Cetacea, in the dolphin family, belonging to a genus common in all seas, and oftener stranded than any other "whale." The length varies from 16 to 24 feet; the maximum girth is about 10 feet. It feeds chiefly on cuttle-fish. Many names are given to these common cetaceans; among the most popular are *pilot whale*, *blackfish*, *social whale* and *grindhoal*. (See WHALE, Vol. XXIV, p. 554.) The word *caaing* is not the Scottish form of *calling*, as has been supposed, but is a totally different Scotch word, which signifies *driving*. Caaing-whale appears to be originally an Orkney or Zetland name. Another species of the same genus (*G. rissoanus*), 9 or 10 feet long, the male of a bluish white color, the female brown, both sexes marked with irregular white lines and brown spots, is found in the Mediterranean.

CAB, a carriage with either two or four wheels, and drawn by one horse. The name is derived from the *cabriolet-de-place*, introduced into England from France at the beginning of the present century. (See CARRIAGE, Vol. V, p. 120.) In Paris the *cabriolet-de-place* was introduced about the middle of the seventeenth century by Nicholas Sauvage, whose residence in the Rue St. Martin, at the Hotel St. Fiacre, has given the name of fiacres to the public carriages of that city. The cabs of foreign countries and of our own chief towns have their peculiar features, and are governed by police or municipal regulations. The name is also applied to the covered part of a locomotive which shelters the engineer and fireman and shields the gauges and levers.

CABAL, a term now employed to denote a small, intriguing, factious party, united for political or personal ends. Previously used to denote a conclave and, during 1667–73, was applied to Charles II's infamous ministry. (See CABINET, Vol. IV. p. 550.) Derived from the Hebrew *Kabalah*.

CABALLERO, FERNAN, pseudonym of a Spanish novelist. See FABER, CECILIA, Vol. VIII, p. 729.

CABANEL, ALEXANDER, artist; born in Montpellier, France, Sept. 28, 1823; died in Paris, Feb. 23, 1889; first exhibited in 1844 at the Salon of Paris, and afterward produced many paintings, the finest of which are in the Luxembourg collection. He was elected to the Académie des Beaux Arts in succession to Horace Vernet in 1863, and was an officer of the Legion of Honor. Among his principal works are *The Death of Moses* (now in the Corcoran Art Gallery at Washington); *The Lost Paradise; John the Baptist; Venus;* and *Lucretia and Tarquin*.

CABATUAN, a town in Panay, Phil. Is., 19 miles N.W. of Iloilo. Country produces rice, sugar, coffee, corn and fruits in abundance. Pop., 1903, 16,497.

CABBAGE-BUTTERFLY, name of several species of butterfly, especially *Pieris brassicæ*, the larvæ of which devour the leaves of plants of the cabbage tribe. Wings, white with little black marks; antennæ short; flight, lazy and lumbering. In May and June they may be seen hovering over the cabbage and turnip beds to deposit their yellow, cone-shaped eggs on the under side of the leaves in clusters of 20 or 30. They hatch in a week, and the resulting caterpillars grow to a length of one or one and a half inches. They suspend themselves by their tails, and are transformed into shining pale green chrysalids, spotted with black, from which the perfect insect emerges, either the same season or after the lapse of a winter, no longer to devour cabbage leaves, but to subsist delicately upon honey. To the same genus belong the rape-butterfly (*Pieris rapæ*) and the Southern cabbage-butterfly (*Pieris protodice*).

CABBAGE-FLY, a fly of the same family with the horse-fly, flesh-fly, etc., of which the larvæ do great injury to the roots of cabbages and turnips. W.R.B.

CABBAGE-MOTH, a moth or butterfly (*Mamestra brassicæ*). The wings are brown, marked with pairs of darker spots. The greenish black caterpillar feeds upon the leaves of the cabbage and allied plants. The name is also applied to the white or yellow butterflies of the genus *Pieris*, which have been introduced into America from Europe. The larvæ of the various species vary in color from green to black. They are known as "cabbage-worms," and are similar to the larvæ of *Mamestra* in habits.

CABBAGE-PALM (*Areca oleracea*), a common palm of the West Indies. It has a slender stem and grows to a great height. This and others of the same nature are called "cabbage palms" on account of their young unexpanded leaves being used as a vegetable. To obtain this insignificant morsel these noble trees, some a hundred years old, are cut down. W.R.B.

CABER, TOSSING THE, a sport or game used among the Highlanders of Scotland. The caber is a pole or rafter used in house-building and scaffolding, and is generally the trunk of a small pine or fir tree, with the limbs trimmed off. The player balances the caber on its smaller end against his breast and throws it from him so that it will strike upon its larger end and fall from him. The caber generally used in the game is about twenty feet long. R.W.C.

CABES OR GABES OR KHABS, GULF OF, an inlet of the Mediterranean Sea, on the coast of Tunis, Africa. On its western shore is the city of Cabes, and near its mouth are the islands of Jerba and Karkenah. R.W.C.

CABEZON DE LA SAL, a town of north-central Spain, in the province of Valladolid, 7 miles N.E. of Valladolid City. It is situated on the Pisuerga, and is celebrated as the scene of one of the first battles of the Peninsular campaign in 1808, in which the Spaniards were defeated by the French. Population, 2,000.

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CABINDA OR KABINDA, Portuguese West Africa, an isolated district, separated from Angola (q.v.) on the south, by the district of the Congo Free State, at the mouth of the Congo River. Cabinda, a small seaport town, is the capital. See CABENDA, Vol. IV, p. 549. C.L.S.

CABINET, an advisory or executive council to the head of a government. In the United States the Cabinet is composed of the secretaries of the departments of State, War, Treasury, Navy, Interior, Agriculture, Justice, Post-office, and Commerce and Labor. It has no legal existence, and acts simply as an advisory board to the President. The heads of the departments, who compose the Cabinet, are appointed by the President, subject to the confirmation of the Senate, and can be removed only by the President, except in cases of impeachment. They generally hold office until their successors are appointed by a new President; and they must not be members of either house of Congress. They receive a salary of $8,000 a year. Washington's Cabinet was composed of four members, representing the departments of State, War, Treasury, and Justice. The Secretary of the Navy became a member of the Cabinet in 1798; the Postmaster-General, in 1829; the Secretary of the Interior, in 1849; Agriculture, in 1889; and Commerce and Labor, in 1903. See CABINET, Vol. IV, pp. 549 et seq.; also UNITED STATES, Vol. XXIII, p. 787. R.W.C.

CABLE, GEORGE WASHINGTON, an American novelist; born in New Orleans, Louisiana, October 12, 1844. His father dying in 1859, young Cable was forced to abandon his studies and enter mercantile life. He served in the Civil War, joining the Confederate army in 1863. At the close of the war he returned to New Orleans and resumed his commercial career. He also studied civil engineering and made his first attempt at authorship by writing for the local newspapers. He wrote humorous sketches for the New Orleans *Picayune* and eventually joined the editorial staff of that journal. Meanwhile he wrote articles on the Creoles for *Scribner's Magazine* and the *Century Magazine*. His first book, *Old Creole Days*, appeared in 1879. In 1880 he began devoting his entire time to novel writing, and in 1884 removed to Northampton, Massachusetts. His published works include *The Grandissimes* (1880); *Madame Delphine* (1881); *The Creoles of Louisiana* (1884); *Dr. Sevier* (1884); *The Silent South* (1885); *Bonaventure* (1888); *The Negro Question* (1888); *Strange True Stories of Louisiana* (1889); *John March* (1894); *Strong Hearts; The Cavalier* (1901); *Bylow Hill* (1902). W.M.C.

GEORGE W. CABLE.

CABLE RAILWAYS. In a number of large cities the cable railway has been introduced to carry the street-car traffic because it was cheaper than horse-cars, and because, for some reason, electricity was not available. Its installation and maintenance are more costly than that of the trolley road, and yet it has advantages that cause its continuance in many cases. The extensive lines in New York City, on Broadway, on Third Avenue, and on One Hundred and Twenty-fifth Street, have been operated satisfactorily for several years. Philadelphia, after some years' use, abandoned them for the trolley. San Francisco has maintained a line for many years. The average cost of installing a cable railway system has been placed at $350,000 a mile, and the average of available horse-power at the cars at 40 per cent of the indicated horse-power of the engines used. This is not a remarkable showing, and the opinion prevails among engineers that the cable roads for city surface travel will be superseded within a few years by the underground or conduit-trolley system.

The cable railway seems destined, however, to find a permanent employment on mountain lines, or where there are severe grades to be overcome. It is peculiarly adapted to such work, and is now employed on most of the mountain railways of the world, often in conjunction with electricity. Three of these interesting roads have been built in the Alpine region, in close proximity to each other, since 1890; the Burgenstock railway, the Monte Salvatore railway, and the Stanserhorn railway. They were at first fitted with wire cables having hempen cores, which prevented the breaking of the wire strands by internal friction; but latterly the hempen cores have been subject to rot before the cables wore out, and it has been found possible to construct them wholly of steel wires, tightly packed, and of graduated section, without cross-winding. This arrangement almost wholly overcomes the tendency to wear out by internal rubbing of the wires in bending.

The Burgenstock railway, opposite Lucerne, is half a mile long, and has an inclination of 45 degrees. A rack is used as a safety factor. The cable speed is 2.5 miles an hour. The Monte Salvatore railway is almost a duplicate of this, both roads being driven by dynamos that obtain power from waterfalls.

The Stanserhorn railway is the most remarkable of the Alpine trio, having a grade of 60 per cent, and attaining an altitude of 6,233 feet, and dispensing altogether with the rack, depending upon a safety-brake for clutching the rails in case of accident to the cable. The power is brought from an electric-power station several miles away, the price paid being only $20 per horse-power per annum. A fall of the river Aa furnishes power for the dynamos. The road cost only $300,000, notwithstanding the tremendous grade, and that a part of its route had to be tunneled out of a loose mass of fallen boulders.

The Otis elevated cable railway at Catskill, New York, built in 1892, is 7,005 feet long, and has a rise of 1,602½ feet. Trains are made up of two cars each, and run on a double track, so that they balance each other by the ascent of one while the other descends. The cable is supported by pulleys at 30-

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foot distances. The machinery is all controlled from an operating-tower by means of levers, one set admitting steam to the Hamilton-Corliss engines, another set reversing the engines, and another set operating the brakes. The passenger-cars seat 90 persons, and the speed made is nine miles per hour. The cost of equipping the road was $260,000.

A projected road at the Jungfrau, in the Alps, will be, perhaps, the most novel of any of the cable railways. Its grade is 45 degrees, and the entire route is to be tunneled, so that it will present the appearance of an inclined well. The tunnel is to be made circular, and the cars are surrounded by ring-like shields which fill the area of the tunnel in such manner that they may serve to compress the air in the tunnel. In case of a break to the cable, a powerful air-tight door at the bottom is closed automatically, and thus a cushion of air is introduced to break the force of the fall, which could not result in serious damage to the occupants of a car.

Much inventive ingenuity has been expended upon the mechanism of grips for cable-cars, the conditions under which they operate being very exacting. The supporting piece that goes through the slot must be very strong, though but five eighths of an inch thick. The hold must be taken on the cable gradually, and in such a manner as not to wear the outer strands, so that loose wires will project and catch the grips of cars that it is desired to stop. This last requirement is not wholly met, and runaways of cable-cars will continue until some improved device overcomes the difficulty.

CHARLES H. COCHRANE.

CABLE-WAYS. See ROPEWAYS, in these Supplements.

CABOT, GEORGE, an American statesman; born in Salem, Mass., December, 1751. In 1788 he sat in the State convention that adopted the Federal Constitution, and later represented Massachusetts in the U. S. Senate, in which position he was influential in framing the country's financial policy. In 1814 he presided over the Hartford Convention. He died in Boston, April 18, 1823. E.E.T.

CABORNE, WARREN FREDERICK, naval officer; born in England, July 5, 1849; was educated at private schools and entered the Royal Naval Reserve as sub-lieutenant in 1879; was promoted lieutenant in 1882. He was in command of a hired transport during the Burmah expedition in 1885–86. Later he served in the Egyptian Coast Guard Service; was retired in 1894.

G.J.H.

CABRAL, PEDRO ALVAREZ, was born of a noble Portuguese family about 1460, sailed in 1500 for the East Indies, but was instead carried to Brazil, which he claimed for the king of Portugal. Thence he proceeded toward the East Indies, landed at Mozambique, went to Calicut, and established commercial relations between Portugal and India. W.F.J.

CABRERA, DON RAMON, Carlist leader, son of a mariner; born at Tortosa, Aug. 31, 1810. In youth though dissolute, a reversion to a chaplaincy was secured for him, but he was refused consecration. In 1834 he joined a Carlist guerrilla band under Camicer, and was made a captain. His vindictiveness roused the supporters of Queen Christina, who, unable to capture him, seized and shot his mother. In revenge Cabrera massacred the wives of thirty officers. Upon his capture of Morella fortress, he was created Count de Morella by Don Carlos. He opposed the abdication of Don Carlos in 1845, and was defeated at Pasteral, Jan. 27, 1849. He went to England, where he married, and then lived in Naples. He instigated an abortive insurrection under Ortega in 1860; but afterward took no further part with the Carlists. He died at Wentworth, England, May 24, 1877. R.C.A.

CACAO-BUTTER, a yellowish-white fat obtained from cacao-seeds, which are deprived of their fat by being heated to 158° Fahr., and then pressed between hot iron plates to express the fat, which forms about 40 per cent. of the seeds. See COCOA, Vol. VI, p. 92 *et seq.* W.R.B.

CÁCERES, ANDRÉS AVELINO, soldier and statesman; was born in Peru and rose to prominence as a soldier under President Castilla, 1855–62. In the war with Chili in 1879 he showed great valor and ability, and afterward became a leader of the opposition to President Iglesias. In 1884–85 he was at war with Iglesias, and twice proclaimed himself president. The war was stopped by foreign intervention, and in 1886 Cáceres became president. He was made president a second time in 1894, but a year later was overthrown and compelled to quit the country.

W.F.J.

CACERES, NUEVA, a town of the Philippines, in the province of South Camarines, on the island of Luzon. It is situated on the river Naga, or Santa Cruz, between the Bay of San Miguel and the Gulf of Rogay, about 175 miles S. E. of Manila. Population, 1903, 17,943.

CACHALOT OR SPERM-WHALE. See WHALE, Vol. XXIV, p. 554.

CACHE, a hole in the ground for concealing and preserving provisions which it is inconvenient to carry, used by settlers and trappers in the western states and Canada and Arctic explorers. The making of a cache is a matter of great circumspection and ingenuity, to conceal the contents from Indians, or beasts of prey. A hole is dug several feet wide and deep and the articles being deposited therein. W.R.B.

CACHET, LETTRES DE. See LETTRES DE CACHET, Vol. XIV, p. 483.

CACHEXIA, a name applied by physicians sometimes to a group of diseases, and sometimes to the constitutional state accompanying a particular disease as the cancerous cachexia, gouty cachexia, etc. Cachexia has come to be chiefly employed with reference to diseases in which the general nutrition of the body is at fault, and in which the local disorders are supposed to be the result of a constitutional cause.

CACHICAMA OR TATOUPEBA, the nine-banded armadillo. See MAMMALIA, Vol. XV, p. 389.

CACHOLONG, a mineral, regarded as a variety

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of opal, and sometimes called pearl opal, or mother-of-pearl opal. (See MINERALOGY, Vol. XVI, p. 406.) It has a flat, conchoidal fracture, and it is found united with common chalcedony.

CACIQUE OR CAZIQUE, the designation given to the chiefs of Indian tribes in the central and southern parts of America. The title was first applied by Spanish discoverers to the native princes whom they found reigning in Mexico, Peru, Haiti and Cuba, and was formed from a native Haitian word.

CACODYL, the fuming liquor of Cadet. See CHEMISTRY, Vol. V, p. 501.

CACOUNA, a village in Temiscouta County, province of Quebec, Canada, about 120 miles below the city of Quebec, on the south bank of the St. Lawrence River. It is on the Intercolonial railroad. Population, 650. R.W.C.

CACTUS-WREN, the name given to several species of North and South American birds, but applying especially to *Campylorhynchus brunneicapillus*, which makes its nests in the cactus plants of southwestern United States. R.W.C.

CADASTRAL SURVEYS, any large and complete land survey which includes the making of detail maps. Used in surveying property for the assessment of taxes. The usual scale for a cadastral map is two feet to the mile. The survey usually includes descriptive books, giving areas and names of property owners. Cadastral surveys were used in Italy as early as 1677.

CADDIS-FLY OR CADDICE-FLY. See INSECTS, Vol. XIII, p. 158.

CADDOAN INDIANS, the name of a group of North American Indians, for a time thought to be distinct, but later identified with the Pawnees. When first known, they occupied the Indian Territory, Arkansas, Kansas, Nebraska and North Dakota. At present located by tribes as follows: the Pawnees in the northern part of the Indian Territory and Oklahoma; the Wichita in the south of the Indian Territory; the Arikara on St. Berthold reservation, North Dakota; and several scattering remnants on the Kiowa and Comanche reservations in western Oklahoma. They number about 2,100 souls, of whom 530 are still bearing the name *Caddo*. See INDIANS, Vol. XII, p. 864.

CADE, JACK, leader of an English rebellion in 1450, was an Irishman by birth. He went to England, murdered a woman in Sussex, fled to France, and served in the French army against England. Next he settled in Kent as a physician, assumed the name of Mortimer, and married the daughter of an English squire. In 1450 he organized a force of 15,000 insurgents against the government of Henry VI, called himself the captain of Kent, and marched upon London. For some time he camped upon Blackheath, intriguing with citizens of London and demanding of the king various reforms. The royal army presently drove him to Sevenoaks, where he turned, defeated the troops and killed two officers. He then marched into London, held it for two days, beheaded Lord Say, one of the king's favorite courtiers, and plundered a few houses. The citizens of London then rose against him, a promise of pardon from the king caused many of his followers to leave him, and he fled toward the coast, but was intercepted by Alexander Iden, a Kentish squire, who killed him at Heathfield, Sussex, on July 12, 1450. W.F.J.

CADELLE, a name given in France to the larva of a beetle of the family *Trogositidæ*. It commits great ravages in granaries, and is often imported with grain into countries where it is not indigenous.

CADENCE, a musical term used to denote the finish of a phrase of which there are three principal species; namely, the whole, the half, and the interrupted cadence. The whole cadence, which finishes on the harmony of the tonic, is always used at the end of a composition, and is frequently called the final cadence. In its most perfect use it consists of three chords, the one before the final being always dominant. The half-cadence is used to mark the termination of an idea or phrase, like the colon and semicolon, showing a considerable division, but, at the same time, that a continuation is necessary. The harmony of the half-cadence is the reverse of the whole cadence, as it falls from the tonic to the dominant. In the interrupted cadence another harmony quite strange is introduced, so that the ear is deceived. The more particular the preparation for the usual cadence is made, the more strange and unexpected is the interruption, which can be made in so many ways, that Reicha, in his *Traité de Haute Composition Musicale*, gives 129 interrupted cadences. In rhetoric, cadence signifies the sinking or falling of the voice, and the modulation of the voice in general.

CADER IDRIS ("Chair of Idris," a reputed giant), a picturesque mountain in the county of Merioneth (q.v., Vol. XVI, p. 43), Wales, 5 miles S.W. of Dolgelly. It consists of an immense ridge of broken precipices, 10 miles long and 1 to 3 miles broad, the highest peak reaching an elevation of 2,914 feet. It is composed of basalt, porphyry and other trap rocks, with beds of slag and pumice. The view from the summit is very extensive, including the Wrekin, in Shropshire, and St. George's Channel almost to the Irish coast.

CADET, a term applied in a general sense to the younger son of a noble house, as distinguished from the elder. The military use of the word arose from the practice of providing for younger sons, or cadets, by making them officers of the army or navy. (See NAVY, Vol. XVII, p. 303.) In the United States a military cadet is one who is receiving instruction and military discipline at the military or naval academies (q.v., in these Supplements). As to British military cadets, see ARMY, Vol. II, p. 512; for naval cadets, see NAVY, Vol. XVII, p. 303.

CADI OR KÁDI, an Arabic word signifying a judge or person learned in the law. See MOHAMMEDANISM, Vol. XVI, pp. 613, 614.

CADILLAC, ANTOINE DE LA MOTHE, a French soldier and colonial governor; born in Gascony in 1660. After entering the army he became a captain in Arcadia. Louis XIV sent him to America in 1699. In 1701 he founded the present city of Detroit, Michigan, which he

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called Fort Pontchartrain. From 1712 to 1717 he was governor of Louisiana. A silver mine which he discovered was named La Mothe and the town of Cadillac, Michigan, was named in his honor. He died in France in 1720. W.M.C.

CADILLAC, a city, capital of Wexford County, northwest lower Michigan; on Clam River, about 100 miles N. of Grand Rapids, on the Ann Arbor and the Grand Rapids and Indiana railroads. It is the seat of an extensive trade in lumber, and contains numerous lumber-mills, machine-shops and foundries, and manufactories of bricks, cigars, carriages and wagons. Population, 1900, 5,997.

CADIZ, a town, the capital of Trigg County, Kentucky, 9 miles from the Cumberland River, 55 miles S. E. of Paducah. It has manufactures of wagons, plows and furniture. Pop., 1900, 881.

CADIZ, a town, the capital of Harrison County, Ohio, in a fertile, hilly district, about 20 miles N.W. of Wheeling, on the Pittsburg, Cincinnati, Chicago and St. Louis railroad. It is the center of an important wool-growing industry. In the vicinity are valuable mines of bituminous coal. Pop., 1900, 1,755.

CADIZ, a Philippine town in Negros Occidental province, 1½m. N. W. of Sicaba. Pop., 1903, 16,429.

CADOUDAL, GEORGES, a Chouan leader; born in Auray, Brittany, Jan. 1, 1771; executed in Paris, June 25, 1804; the son of a miller; joined the royalist peasants and became their leader; was taken prisoner in 1794, but escaped from Brest; Bonaparte offered to make him lieutenant-general, which offer he refused; he entered into a conspiracy against Bonaparte, was taken prisoner, and executed. See CHOUANS, Vol. V, p. 597.

CADWALADER, JOHN, an American soldier; born in Philadelphia, Jan. 10, 1742. At the outbreak of the Revolutionary War he commanded a company of Philadelphia volunteers, but rose to the rank of brigadier-general of the Pennsylvania troops in 1777. He took part in the battles of Princeton, Brandywine, Germantown, and Monmouth. In the attack on Trenton he was prevented by the ice in the Delaware from crossing the river until the next day, when he pursued the army to Burlington. Provoked by the attacks of Gen. Conway upon Gen. Washington, Cadwalader wounded the calumniator in a duel. He died in Shrewsbury, Pa., Feb. 10, 1786. E.E.T.

CADWALADER, JOHN LAMBERT, lawyer; was born in Trenton, N. J., on November 17, 1836, a member of the historic family of his name, and was graduated from Princeton in 1856, and from the Harvard Law School in 1863. He was assistant Secretary of State of the United States, under Hamilton Fish, in 1874–76, and has since been a practicing lawyer in New York. W.F.J.

CADY, ALBEMARLE, an American soldier; born in New Hampshire in 1810. He was graduated from the United States Military Academy in 1829 and served in the Mexican War. In the Civil War he was in command of the volunteers in California and later had charge of recruiting headquarters in Connecticut. In 1864 he was brevetted brigadier-general and retired in 1865. He died in Washington in 1870. W.M.C.

CÆCILIA, a genus of serpent-like amphibians (see AMPHIBIA, Vol. I, p. 658), the typical genus of the family *Cæciliidæ*. These are worm-like, without limbs and with small eyes, in correspondence with a subterranean mode of life. The cæcilians live in South America and the East Indies. Their food consists of worms and insect larvæ.

CÆCILIUS STATIUS, a Roman playwright, came in the beginning of the 3d century B. C. as a slave to Rome. He was one of the foremost to popularize the later Attic comedy in Rome. Flourishing between Plautus and Terentius, he represents in his works the period of transition between both. Only fragments of his compositions are at present in existence. G.A.S.

CÆCUM OR "BLIND" INTESTINE. See DIGESTIVE ORGANS, Vol. VII, p. 198.

CAEN STONE, a fine oölite stone for which the neighborhood of Caen, in Normandy, France, has long been celebrated. The quarries are subterranean, and the stone is brought up in blocks eight or nine feet long and two thick, through vertical shafts.

CÆSALPINIA, a genus of trees of the order *Leguminosæ*. The sub-order *Cæsalpinieæ* contains over 1,500 species, which are notable for their purgative properties, as senna (q. v.); some produce eatable fruits, as the tamarind (q. v.), the carob, or locust-tree (q. v.); some yield resinous and balsamic products, as copaiba (q. v.), aloes wood (q. v.); some produce valuable dyewoods, as logwood (q. v.), Brazil-wood (q. v.), and camwood (q. v.); some astringent pods used in tanning, as divididi (q. v.); some are trees of great size, which are valued for their timber, as the purple-heart and the wallaba, trees of Guiana. Other species yield the Brazil-wood, Pernambuco wood, Lima wood, Nicaragua or peach wood and sappan wood (q. v.). W.R.B.

CÆSAR, the title of the Roman emperors and of the heirs to the throne, was originally the name of a patrician family of the *Julia Gens*, one of the oldest in the Roman state, claiming to be descended from Iulus, the son of Æneas. Octavian bore the name as the adopted son of the great Julius Cæsar, and handed it down to his own adopted son, Tiberius, after whom it was borne by Caligula, Claudius and Nero. Although the Cæsarean family proper became extinct with Nero, the word *Cæsar* was part of the style of the succeeding emperors; usually between imperator and the personal name, as, "Imperator *Cæsar* Vespasianus Augustus." When the Emperor Hadrian adopted Ælius Verus (136), the latter was permitted to take the title of Cæsar; and from this time in the Western, and afterwards also in the Eastern, Empire it was borne by the heir apparent to the throne, while Augustus continued to be the exclusive name of the reigning emperor. The name reappears in the *Czar* (or *Tsar*) of Russia, in the *Kaiser* of the "Holy Roman Empire," and the modern empire of Germany, and the *Kaisar-i-Hind*, or Empress of Hindustan.

CÆSAREAN OPERATION OR HYSTERECTOMY, so called from the belief that Julius Cæsar

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was brought into the world in this way. See SURGERY, Vol. XXII, p. 726.

CÆSIUM, a bluish-gray alkali metal. Chemical symbol, Cs. See POTASSIUM METALS, Vol. XIX, pp. 609, 610.

CAFFEIN OR THEINE ($C_8H_{10}N_4O_2$), a valuable alkaloid, the most important constituent of coffee, discovered by Runge in 1820. Caffein, which is identical with the theine of tea, crystallizes in colorless, or white, long, flexible crystals. It quickens gastric digestion, stimulates the secretion of bile and promotes the peristaltic motion of the bowels when used in moderation. It is an antidote to morphine and opium poisoning. Some forms of nervous headache are relieved by the use of coffee and tea. If used to excess its effects are poisonous. It produces contraction of the capillaries, insomnia, dyspepsia, constipation, sexual apathy, and atrophy. W.R.B.

CAGLIARI, a town of Italy and capital of the province of Cagliari and of all Sardinia. It is noted for its educational and charitable institutions. It exports metals, minerals, timber, spirits, hides, cereals, live-stock, etc., valued at $2,500,000 annually. Has large coast trade. Pop. 1901, 53,734.

CAGSAUAA, a town in the province of Albay, Luzon, Philippine Islands. It is in midst of fine hemp-growing district. Pop. 1896, 22,186.

CAHAWBA, a navigable river of Alabama. It rises in the northern central part of the State, in Jefferson County, flows southward for about 200 miles, and enters the Alabama at the old village of Cahawba, 10 miles below Selma, in Dallas County.

CAHIR, a town in the county of Tipperary, south-central Ireland, on the Suir, beautifully situated on the east end of the valley, between the Galtees and Knockmealdown Mountains. It has extensive flour-mills. Population about 2,500.

CAHOKIA, a village of St. Clair County, southwestern Illinois; so named from an extinct tribe of Indians; situated on the Mississippi, 4 miles from East St. Louis, on the Cairo and St. Louis railroad. It was settled by the French about 1682. The vicinity contains prehistoric mounds. Some coal-mining is carried on. Pop. about 200.

CAICOS, CAYOS OR KEYS, a group of islands belonging geographically to the Bahamas, of which they form the two southeastern groups; annexed in 1874 to Jamaica. The governing power is supervised by the governor of Jamaica, and consists of a commissioner and a legislative board of five, all appointed by the British ruler. The group consists of 30 islands, only 6 of which are inhabited. The largest island is Grand Caicos, 6 miles wide by 20 long. The capital is on Grand Turk. Together with Turk's Islands, they have an area of 223 square miles. Salt-making, sponge-fishing and cultivation of sisal grass for hemp are the chief industries. Population 1901, 5,287.

CAILLIAND, FREDERIC, a French traveler; born at Nantes, June 9, 1787; died there, May 1, 1869. He became a goldsmith and traveled over Europe, and in 1815 went to Alexandria. In examining the mineral resources of Egypt he rediscovered the ancient emerald-mines of Zebal Zobara, near the Red Sea, and his report of a journey to Siwah led to its annexation by Egypt in 1820. In 1821–22 he accompanied Ibrahim Pasha's expedition to the White Nile, and his *Voyage à Nîroé* (4 vols., Paris, 1823–26) contained the first trustworthy account of that district. In 1827 he became conservator of the Natural History Museum at Nantes. He published a *Voyage à Syouah*, and two volumes of researches on the life of the ancient Egyptians, Nubians and Ethiopians.

CAIN, WILLIAM, educator; born in Hillsboro, N. C., May 14, 1847; was graduated at the North Carolina Military and Polytechnic Institute in 1865; engaged in civil engineering in 1865–73, and in 1889 became professor of mathematics at the University of North Carolina. He wrote *Theory of Voussoir Arches; Bridges and Retaining Walls; Symbolic Algebra*, etc. G.J.H.

CAINE, THOMAS HENRY HALL, an English novelist and dramatist; born in Runcorn, Cheshire, May 14, 1853. He was educated in the Isle of Man and at Liverpool, studied architecture and contributed articles to the *Building News* and the *Builder*. He then became one of the editors of the Liverpool *Mercury* and began writing for the *Athenæum* and the *Academy*. During 1881 he lived in London with Dante Gabriel Rossetti, and in 1882 published his *Recollections of Rossetti*. In the same year he wrote his *Sonnets of Three Centuries*. In 1883 appeared his *Cobwebs of Criticism*, and in 1887 he contributed to the Great Writers series a *Life of Coleridge*. His first novel was *The Shadow of a Crime* (1885), followed by a *Son of Hagar*. *The Deemster* (1887) first brought him into notice. His subsequent novels include *The Bondman* (1890); *The Scapegoat* (1891); *The Manxman* (1894); *The Christian* (1897); *The Eternal City* (1901). W.M.C.

HALL CAINE.

CAINOZOIC PERIOD. See GEOLOGY, Vol. X, pp. 319–324.

CAIRD, EDWARD, a Scottish philosopher; born in Greenock, March 22, 1835. He was educated at the universities of Glasgow and Oxford. In 1864 he became a tutor and fellow of Merton College and from 1866 to 1893 he was professor of moral philosophy at Glasgow University. He then succeeded Prof. Jewett as master of Balliol College at Oxford. His published works include *Account of the Philosophy of Kant* (1878); *Social Philosophy and Religion of Comte* (1885); *Hegel in Blackwood's Series of Philosophical Classics* (1883); *Critical Philosophy of Immanuel Kant* (1892), and *The Evolution of Religion* (1893). W.M.C.

CAIRD, SIR JAMES, agriculturist and statesman; was born in Wigtownshire, Scotland, in 1816, and became an expert agricultural economist. He published in 1849 a work on *High*

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Farming as the Best Substitute for Protection, and in 1852 *English Agriculture in 1850–51*, besides several minor treatises and many contributions to the London *Times*. He was a member of Parliament in 1857–65, chairman of the royal commission on deep sea fisheries in 1863, a K.C.B. in 1882, and died on February 10, 1892. He secured the compilation and publication of the first complete agricultural statistics of the United Kingdom. W.F.J.

CAIRD, JOHN, preacher; was born at Greenock, Scotland, in 1820, and was educated at the University of Glasgow. Entering the ministry of the Scottish Church he was pastor of churches at Edinburgh, Glasgow, and other places, and ranked among the foremost preachers of his time. A discourse delivered by him before Queen Victoria at Crathie in 1855, afterward published under the title, *The Religion of Common Life*, was pronounced by Dean Stanley the greatest sermon of the 19th century. He was appointed professor of divinity at Glasgow in 1862, and principal of the University in 1873. He published a volume of sermons, and in 1880 *An Introduction to the Philosophy of Religion*, the latter a work of commanding importance. He received the degree of doctor of divinity in 1860, and died on July 30, 1898. W.F.J.

CAIRD, MRS. MONA, authoress; born in the Isle of Wight, at Ryde; gained a reputation chiefly by reason of her writing on marriage. Her published writings include *Whom Nature Leadeth; One That Wins; The Wing of Azraël;* contributions on *Marriage* and *Ideal Marriage* to the *Westminster Review;* to the *Daily Telegraph* on *Is Marriage a Failure?* and in the *Fortnightly* on *The Morality of Marriage*.

CAIRNS, HUGH MCCALMONT, DUKE, English statesman; born in 1819, died in 1885. Elected to Parliament in 1850; in 1858 Solicitor-General; in 1866 Attorney-General and finally Lord Justice of Appeal; leader of the Conservative party in the House of Lords since 1867 and Lord Chancellor in 1868 and 1874. G.A.S.

CAIRO, EGYPT. See AFRICA, in these Supplements.

CAIRO, the capital of Alexander County, Illinois, at the southernmost point of the state, and at the meeting-point of Illinois, Kentucky, and Missouri. Being at the junction of the Mississippi and Ohio rivers, and on the Cleveland, Chicago, and St. Louis, the Illinois Central, and the Mobile and Ohio railroads, it has a large river trade and is a railroad center of some importance. It is about 125 miles southeast of St. Louis, Mo., 200 miles south of Springfield, Illinois, and 150 miles north of Memphis, Tennessee. It is situated at the extremity of a long low point of land, and in 1858 was inundated and almost completely destroyed. Population, 1890, 10,324; 1900, 12,566. R.W.C.

CAITHNESS FLAGSTONES, dark-colored, bituminous schists, slightly micaceous and calcareous, valuable on account of their great toughness and durability for pavements. See GEOLOGY, Vol. X, p. 305.

CAJABAMBA, a town situated 102 miles S. of Quito, Chimborazo province, Ecuador, on the arid plateau of Topi, at an elevation of 9,480 feet. The first town of Riobamba, founded on this site in 1533, lost 30,000 lives in an earthquake in 1797.

CAJAMARCA. See CAXAMARCA, Vol. V, p. 242.

CALABASH OR GOURD TREE, a tree (*Crescentia cujete*) found in various countries of tropical America and the West Indies. It grows about 30 feet high, bears narrow leaves which grow in clusters, and many-colored flowers which develop into globular or oval gourd-like fruits. The wood of the tree is tough and flexible, and the shells of the fruit are so compact that they are used by the natives as water-bottles, kettles, musical instruments, and can even be used as vessels in which to boil liquids. The tree belongs to the order *Bignoniaceæ*, in which the yellow or green ebony of Jamaica is included. R.W.C.

CALAIS, a city in Washington County, southeastern Maine, on the west bank of the St. Croix River, at the head of tidewater. Lumbering and ship-building are the chief industries. Population, 1900, 7,655. R.W.C.

CALAIS, a city of France on the Strait of Dover. (See IV, 578.) Prior to the year 1892, the town of St. Pierre-les-Calais was incorporated within its limits and its waterways have been greatly improved. Inland canal traffic reached 464,066 tons in 1899. Pop., 1901, 59,893.

CALAMANDER-WOOD is an exceedingly hard and valuable cabinet wood of rich and varied colors, obtained from *Diospyros hirsuta*, of southern Asia. Its near relative, *D. Ebenum*, yields the well-known "ebony-wood," while the American representative is *D. Virginiana*, the "persimmon." The genus belongs to the family *Ebenaceæ*. See EBONY, Vol. VII, p. 535.

CALAMARY OR SQUID, a name applied to numerous forms of cuttle-fish, or *Cephalopoda*. See CUTTLE-FISH, Vol. VI, p. 648.

CALAMBUCO OR CALAMBOUR is a very durable timber tree of Luzon, somewhat resembling the teak, and much used in ship-building and in the manufacture of furniture and agricultural implements.

CALAMIANES, a group of islands in the Eastern Archipelago, in latitude about 11° 25′ to 12° 20′ N., and longitude 120° E.; between Palawan and Mindoro of the Philippines; area, 1,332 square miles. Calamian is the largest, being 15 miles wide and 35 long. See PHILIPPINES, Vol. XVIII, p. 766.

CALAMICHTUS, one of two living genera of ganoid fish that were very numerous in former times. It is found in Western Africa. W.R.B.

CALAMINE, an ore consisting essentially of silicate of zinc. It occurs in small, obtuse-edged crystals, also compact and massive. See ZINC, Vol. XXIV, p. 823.

CALAMINT (*Calamintha officinalis*), an aromatic herb frequently employed to make herb tea, as a pectoral medicine. Some species are known as mountain-balm, catmint, cat-nip, basil-balm and wild basil. They are widely diffused throughout Europe, parts of Asia, and North

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America. Catmint, or cat-nip (*Nepeta cataria*) is a common wayside weed, naturalized everywhere and attractive to cats. W.R.B.

CALAMITES, a group of fossil plants, which make their first appearance in the Devonian, occur abundantly in the Carboniferous, and seem to die out in the Permian strata. (See BOTANY, Vol. IV, p. 95.) There is some doubt as to the affinities of these plants; but they are generally admitted to be allied to the recent *Equisetaceæ*, or horsetails, from which, however, they differ in certain points. It has not yet been fully decided whether they should be considered as a peculiar form of *Equisetaceæ*, or classed as a distinct but allied order. The gigantic decorticated stem is longitudinally ribbed and transversely jointed; in some stems, long, narrow branchlets proceed from the transverse joints, and in others, branches bearing whorls of small branchlets or long, narrow, pointed leaves. Some of the species were provided with thick and others with thin bark. Calamites seem to have grown in dense brakes on low, alluvial flats, and perhaps even in water.

CALAMUS, the reed pen which the ancients used in writing. It was made of the stem of a reed growing in marshy places, of which the best were obtained from Egypt. The stem was first softened, then dried, and cut and split with a knife, as quill pens are made. Even now the Orientals write with a reed, which the Arabs call *Kalâm*. See PEN, Vol. XVIII, p. 493.

CALAMUS, the sweet flag (*Acorus calamus*), belonging to the order *Aroideæ* indigenous to Asia and North America. It was introduced into Europe in the 16th century and was widely naturalized in ditches and by the side of ponds. The root stock yields an aromatic stimulant and tonic which has fallen into disuse in medicine, but is still highly valued in the East. It is sometimes used to flavor beer and in the perfuming of powder and snuff. The plant was formerly used to strew the floors of cathedrals on festive days. See INCENSE, Vol. XII, p. 756. W.R.B.

CALANAS, a town of Andalusia, southwest Spain, situated about 27 miles N. of Huelva, and 13 miles N.E. of Tharsis, with which it was connected by rail in 1887. There is a large copper-mine in the vicinity. Population, about 10,000.

CALANCHA, ANTONIO DE LA, ecclesiastic; born in Peru, near the end of the sixteenth century. His strong inclination to archæology led him to visit the ruins and collect the ancient traditions of Peru. The ruins of the great temple of Pachacamac were twice visited by him. His work, *Cronica Moralizada del Orden de San Agustin en el Peru*, while diffuse in style has the merit of veracity, and contains much information gathered by him (Barcelona, 1639). G.J.H.

CALANDAR, CHARAF BOU ALI, a Mohammedan fanatic of the 13th century, now regarded as a saint. In his youth he was a profound student of the natural sciences, but later threw all his books into the sacred Indian river, Jumna, and devoted himself thereafter to religious works. He traveled extensively, but spent the closing years of his life at Delhi, where he was reputed to be a worker of miracles. His tomb is still a resort of devout pilgrims. W.F.J.

CALANDO, a term sometimes used in music to indicate a gradual lessening of the tone from loud to soft, and generally regarded as synonymous with *decrescendo* and *diminuendo*. According to some, however, it differs from these terms in that it indicates a retarding of the tempo as well as the tone. R.W.C.

CALANDRONE, a wind instrument on which Italian peasants play simple melodies, and also sometimes accompany their national songs. It has the holes of a common flute, but the intonation is produced as in the common pipe.

CALASIAO, a town in Pangasinan, Luzon, P. I., on right bank of Dagupan River, nine miles E. of Lingayen, on main highway to Manila. Population, 1903, 16,539.

CALATRAVA-LA-VIEGA, an ancient strongly fortified castle in the Spanish province of Ciudad-Real, now entirely desolated. In 1146 it was wrested from Cordova by King Alphonso VIII of Castilia, and given for defence to the Knights Templars, who held it down to 1157. G.A.S.

CALATRAVA, KNIGHTS OF, members of an order, founded just after the battle of Calatrava-la-Viega. It was sanctioned by the pope in 1164. The order was in connection with the Cistercian monks at first, but the knights separated from the monks, joining them again later. Their great military power, crushed in 1200, was partially regained in 1212. In 1489 the grand-mastership was transferred to the crown to prevent too much power falling to any other man. The present costume is a white mantle, with a red cross cut in the form of lilies upon the left breast. The cross of the order has the same symbol on a silver ground. Membership in the order is now conferred as a reward of merit.

CALBAYOG, a Philippine Is. town on the S.W. coast of Sámar near Sámar River. Steamers from Manila call fortnightly. Pop., 1903, 15,985. A.R.R.

CALBURGA OR KULBARGA, a city, capital of a district of the same name, in Hyderabad, India. It was once the capital of a powerful monarchy, and contained splendid palaces and temples, now in decay. W.F.J.

CALCAREOUS TUFA OR TUFA, a mineral in its chemical composition akin to limestone and marble, but has a spongy and cellular structure. Generally soft, brittle and friable, but sometimes sufficiently hard to be used in building (see ROME, Vol. XX, p. 825). Sometimes it incrusts animal and vegetable remains, as in "petrifying springs" (see GEOLOGY, Vol. X, p. 240), and it is sometimes used as a filtering-stone. The stalactites and stalagmites found in caverns are varieties of calcareous tufa.

CALCASIEU, a large river of southwestern Louisiana. It rises near the center of the state, and flows southward to the Gulf, passing on the way through Lake Charles and Lake Calcasieu. It enters the Gulf about thirty-five miles east of the mouth of the Sabine River. W.F.J.

CALCEOLARIA (Lat., *calceolus*, a little shoe), a genus of plants of the family *Scrophulariaceæ*, all natives of South America, chiefly of

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regions over 9,000 feet above sea-level. The flowers are remarkable for the inflation of the lower lip of the corolla, which resembles a bag. Yellow and purple are the colors of the flowers of the original species, but many varieties and hybrids have been produced by cultivation that exhibit other rich and delicate tints. W.R.B.

CALCIFEROUS EPOCH, an epoch in the Lower Silurian system of North America. The division is characterized by the presence of calcareous sandstones and limestones, portions of which are very hard and silicious, and contain geodes of quartz crystals. The Calciferous epoch immediately succeeds the Cambrian period.

CALCINATION OR CALCINING, the process of heating or roasting in furnaces the various metallic ores (see COPPER, Vol. VI, pp. 309–311) and of converting rock into cement by roasting. See CEMENTS, Vol. V, p. 285.

CALCITE. See MINERALOGY, Vol. XVI, p. 413.

CALCIUM, the metal present in chalk, stucco and other compounds of lime. See CHEMISTRY, Vol. V, pp. 455, 456.

CALCIUM CARBIDE. See ACETYLENE and CHEMISTRY, in these Supplements.

CALCULATING-MACHINES. Numerous crank-operating calculating-machines have been placed on the market for multiplying and dividing, and performing other arithmetical calculations. As a rule, they have several series of number-indexes, running from 0 to 9, with some form of pointers, adjustable by the crank. Among the best known of these are the machines of Thomas of France, which is manufactured in an improved form by Tate of England; Odhner of Poland; Baldwin of St. Louis; and Grant of Cambridge, Massachusetts. Grant's machine consisted of a cylinder bearing a set of rings on which are the numerals. These he terms adding-rings. A similar set of rings is placed on a shaft below, and these he terms registering-wheels. In order to multiply, the adding-rings are set to read the multiplicand, and the registering-wheels the multiplier. If the multiplicand were 387,432, the crank would be turned three times and a slide shifted, then eight times and a slide shifted, and so on. At the conclusion of the turning the answer could be read on the recording-wheels.

In 1889 Dorr E. Felt introduced a new form of calculating-machine, which has found large sale, and is used in Cornell University and other scientific institutions. It has a keyboard resembling that of a typewriter. The keys are numbered in two directions, from left to right and up and down. By striking the figures to be added, in the proper columns, the answer may be read at once. To multiply three figures by three figures, the operator has absolutely nothing else to do but to select three of the keys and strike them. This can be done in three seconds, as soon as one becomes familiar with the keyboard. The machine will also add, subtract, divide, square, and extract the cube root.

C. H. COCHRANE.

CALCULI, gall-stone. See Vol. XXIV, p. 205.

CALCUTTA, the metropolis and capital of India and the province of Bengal. It has had a remarkable expansion of trade in recent years. The U. S. Consular reports for the year ending Nov., 1899, estimated the value of foreign imports, exclusive of the coasting trade, at $100,000,000 and that of the exports about $140,000,000. The seagoing steamers entering the port 1897–98 numbered 1,102, tonnage 3,311,415; those leaving 1,077, tonnage 3,275,685; an increase of 1300 % over the years 1841–43. The most important class of articles imported was cotton fabrics. The most important export was jute, raw and manufactured, next to this, tea. Other exports were rice, opium, indigo, lac, silk, raw cotton, yarn and coal. Its manufactures are growing. Its university had 2,899 students in 1897. Pop., 1901, 1,121,664.

CALDECOTT, RANDOLPH, artist; was born at Chester, England, on March 22, 1846, and became a bank clerk in Manchester. In 1872 he removed to London and became a most successful illustrator of books and periodicals. His work for *Punch* and the *Graphic* was unsurpassed, and his own *Picture-Books*, and his illustrations of some of Washington Irving's works; of Mrs. Comyns Carr's *North Italian Folk;* of Blackburn's *North Breton Folk;* and of Mrs. Ewing's *Jackanapes* and other works, have become little short of classic. Unfortunately his health was always delicate, and was much impaired by his residence in London. He came to America for relief, but it was too late, and he died in Florida on February 12, 1886. W.F.J.

CALDERWOOD, HENRY, philosopher; was born at Peebles, Scotland, in 1830, was minister of a church at Glasgow from 1856 to 1868, and in the latter year became professor of moral philosophy at the University of Edinburgh. He was the author of *The Philosophy of the Infinite* (1854); *Mind and Brain* (1879); *Evolution and Man* (1893), and other works. He died on November 19, 1897. W.F.J.

CALDER, England, an affluent of the Aire River, Yorkshire, which it joins at Castleford after a winding eastward course of 40 miles from its source near Burnley, Lancashire. It forms part of the Aire and Calder Canal. C.L.S.

CALDERON, FRANCISCO GARCIA, statesman; was born at Arequipa, Peru, in 1834, became a professor of law, entered the Peruvian Congress in 1867, and was secretary of the treasury in 1868. After the Chilian occupation of Lima and the flight of President Pierola he became, in 1882, provisional president of Peru, but was seized by the Chilians and sent as a prisoner to Chili. After his release in 1886 he was president of the Peruvian senate. Died Sept. 21, 1905. W.F.J.

CALDERON, PHILIP HERMOGENES, painter; born of Spanish parentage, at Poitiers, France, in 1833. He studied in London and Paris, and regularly contributed to the Royal Academy from 1853, his subjects being chiefly historical or imaginative. He exhibited at the Paris international exhibitions of 1867 and 1878, receiving at the former the first medal awarded to English art, and at the latter a first-class medal and the Legion of Honor. In 1887 he was appointed keeper of the Royal Acad-

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emy. Among his paintings are *After the Battle; The Siesta;* and *Day of the Massacre of St. Bartholomew.* Died in London, May 1, 1898.

CALDERON, SERAFIN E. DE, poet and novelist; born in Malaga, Spain, in 1801. He became in 1822 professor of rhetoric and belles lettres in the University of Granada. He was appointed civil governor of Logrono in 1836, and of Seville in 1837, retiring to private life in 1838. He died in 1867. G.J.H.

CALDIERO, a decayed town of North Italy, about nine miles E. of Verona. Its thermal springs were popular from the first to the 16th century. On the heights of Caldiero, in 1805, the Archduke Charles of Austria repulsed the French under Messéna, after a desperate engagement.

CALDWELL, a city of Sumner Co., Kansas, about 20 miles S. of Wellington, on the Atchison, Topeka and Santa Fé, the Chicago, Rock Island and Pacifie, and the St. Louis and San Francisco railroads. It is the trade center of a fertile agricultural district, and contains grain-elevators and flouring mills. Pop., 1900, 1,574.

CALDWELL, a township of Warren County, New York, at the southern end of Lake George. Its chief village, railroad station and post-office is now known as LAKE GEORGE. The township includes several other villages or settlements, chiefly along the shore of the lake, which rank among the most popular summer resorts of that part of the country. Fort George, Fort William Henry, and other places famous in colonial and revolutionary history, are in that vicinity, and the whole region is one of rare beauty and attractiveness. The population of Caldwell was 1,465 in 1900. W.F.J.

CALDWELL, the capital of Noble County, Ohio, 30 miles E. of Zanesville and 35 miles N. of Marietta, on the Bellaire, Zanesville and Cincinnati and the Cleveland and Marietta Rys. It has a sash and door factory, and in the vicinity are found coal, iron, oil and salt. Pop. 1900, 927.

CALDWELL, a town, the capital of Burleson County, central Texas; 66 miles N.E. of Austin; on the Gulf, Colorado and Santa Fé railroad. A Normal Institute is located here. Pop. 1900, 1,535.

CALDWELL, CHARLES HENRY BROMEDGE, naval commander, was born at Hingham, Massachusetts, on June 11, 1823, entered the navy at the age of fifteen, and devoted his life to that service. He was on active duty in the Civil War, and distinguished himself in the passage of the Mississippi forts, in April, 1862, as the leader of the force that cleared away the chain boom and opened a passage for the Federal fleet. He also served at Grand Gulf and elsewhere in the war. In 1874 he was promoted to the now obsolete rank of commodore. He died at Waltham, Massachusetts, on November 30, 1877. W.F.J.

CALDWELL, HOWARD WALTER, an American historian; born in Bryan, Ohio, August 26, 1858. He has written *History of the United States* (1896), and other works. W.M.C.

CALDWELL, JAMES, an American clergyman; born in Charlotte County, Va., April, 1734. He graduated at the College of New Jersey in 1759 and became pastor of the Presbyterian Church at Elizabethtown, N. J. He was appointed chaplain in the militia, and entered heartily into the revolutionary spirit. On June 6, 1780, his wife was killed during a skirmish, and on the 23d, during an incursion of British troops, Mr. Caldwell was active in the fighting, and, according to tradition, served out the church hymn-books to the American soldiers for wadding. On Nov. 24, 1781, he was shot dead by a British sentry at Elizabethtown Point, N. J., near which a monument covers his remains. E.E.T.

CALDWELL, JOSEPH, an American educator; born in Leamington, N. J, April 21, 1773. He graduated at Princeton in 1791, and was tutor there till 1796, when he was appointed professor at the University of North Carolina, of which in 1804 he became president. He held this office for 38 years, during which period he devoted his energies to the organization of the institution, the selection of books for its library, and the collection of scientific apparatus, cabinets of specimens, etc. He died at Chapel Hill, N. C., Jan. 27, 1835. E.E.T.

CALDWELL, JOSEPH PEARSON, an American legislator; born in Iredell County, N. C., 1808. He was a member of the State House of Representatives in 1838, 1840, and 1842; and of the National House of Representatives, 1850–53, on Jan. 3, of which latter year he died. E.E.T.

CALDWELL, MERRITT, an American educator; born in Hebron, Me., Nov. 29, 1806. He graduated at Bowdoin College in 1828, and was for many years professor of metaphysics and political economy in Dickinson College, Pa. He died in Portland, Me., June 6, 1848. E.E.T.

CALDWELL, SAMUEL LUNT, educator, was born at Newburyport, Massachusetts, on November 13, 1820, and was educated at Colby University, Waterville, Maine, and Newton Theological Institute, Massachusetts. After being for some years a Baptist preacher and a professor at Newton Theological Seminary he became president of Vassar College in 1878, in which place he served for seven years. He was the author of many orations and lectures, which have been compiled and published, and was much esteemed as a preacher. While a pastor in Providence, R. I., he edited the publications of the Narragansett Club. He died on September 10, 1889. W.F.J.

CALEDONIA, a village, the capital of Houston County, southeast Minnesota, situated about 32 miles S. of Winona, on the Chicago, Milwaukee and St. Paul railroad. It contains manufactories of wagons and sleighs, and is the center of an important local trade, and the seat of Caledonia Academy. Population 1900, 1,175.

CALEDONIA, a village, the capital of Traill County, central eastern North Dakota, situated at the confluence of Goose River with the Red River of the North. It is an important shipping-point for grain on river steamers. Pop., township (1900) 993.

CALEDONIAN CANAL. See CANAL, Vol IV, p. 695.

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CALEDONIA SPRINGS, a village in Prescott County, province of Ontario, Canada, on the Vaudreuil and Ottawa branch of the Canadian Pacific railroad, about 50 miles east of Ottawa. Mineral springs are located here and the place is used as a summer resort. R.W.C.

CALENDER OR KALENDAR, a Persian word (meaning "greater") applied to members of an order of dervishes founded in the fourteenth century. The Calenders are wandering preachers, who hold that sin defiles the body only, and can be removed by ablutions. The members of the order, even during the lifetime of its founder, were remarkable for licentiousness and debauchery. See also GUILD, Vol. XI, p. 231.

CALENDS, the first day of each Roman month. See CALENDAR, Vol. IV, p. 590.

CALENTURE, an obsolescent term for a species of temporary fever occurring on board ship in hot climates, and probably due to the effect of exposure to the direct rays of the sun.

CALFA, AMBROISE, also known as Youssouf Bey and Prince Guy of Lusignan, an Armenian man of letters and naturalized Frenchman, was born at Constantinople on March 2, 1830. He settled in France as a professor in the Moorat College, Paris, and became a founder of the Armenian College at Grenelle. His title of Prince of Lusignan was declared void by the courts in 1880. He wrote a *Universal History* (1851); *Treatise on Arithmetic* (1853); *Guide to Conversation* (1854); *Armenian Calligraphy* (1854); an Armenian-French and French-Armenian *Dictionary*, and other works. W.F.J.

CALFA, CORÈNE, Armenian writer and scholar; brother of the preceding; born in Constantinople in 1835; educated by the Mekhitarists in Venice; editor-in-chief of the journal *Polyhistore;* followed his brother to Paris and became an instructor at the Murat College; soon took a high rank among the Armenian clergymen; was made bishop, and in 1875 archbishop. He published a book of poems under the title *La Colombe du Massis*, and later published an *Armenian Grammar;* a *History of Armenia;* a treatise on the *French Language, for the Use of Armenians*, and *Lectures on Religion.*

CALGARY, a town in the provincial district of Alberta, Northwest Territories, Canada, at the confluence of the Bow and Elbow rivers and on the Canadian Pacific railroad, about 840 miles west of Winnipeg. It has an elevation of over three thousand feet, and is the center of a coal-mining district. Population, 7,000. R.W.C.

CALHOUN, a town, the capital of Gordon County, northwest Georgia; 78 miles N.W. of Atlanta; on the Western and Atlantic railroad. A rich farming region surrounds it, and brick manufactories and a planing-mill are located here. Pop. 1900, 851.

CALHOUN, a town, capital of McLean County, western Kentucky, on the Green River, 65 miles N.W. of Bowling Green; the river is navigable the year around. Population 1900, 631.

CALI, SANTIAGO DE, a city of the Cauca state, Colombia, South America, situated on a tributary of the Rio Cauca, 3,300 feet above the sea. It is the most important city in Cauca. It is connected with Buenaventura by rail, and has considerable trade with that port. Population, 13,000.

CALIANO, a small town of the Austrian Tyrol, on the left bank of the Adige, about 9 miles S. of Trent. It figures in history as the place where the Austrian Archduke Sigismund won a signal victory over the Venetians in 1487. Being a place of considerable military importance, it was also contested in the campaigns of 1797 and 1809.

CALIBER OR CALIBRE, a technical name for the diameter of the bore of a firearm, whether a piece of ordnance or a small arm. If the weapon is rifled, its caliber is measured, not from the bottom of the grooves, but from the smooth surface between them, technically called the "bands." In the United States the caliber of a firearm is expressed in decimal parts of an inch; thus what is commonly called a 44-caliber rifle is one of 44-inch. The caliber of a cannon is expressed either by the diameter of its bore or by the weight of a solid round shot which it will carry. In Great Britain caliber is expressed as in the United States, with the exception of the heavy guns, which are denominated from their weight; as, a 38-ton gun, or a 100-ton gun.

CALICO-BASS, the common grass bass (*Pomonys sparoides*). It is found in the United States from the Great Lakes to the Gulf, and is prized as a game and food fish.

CALIFORNIA, a city, the capital of Moniteau County, central Missouri; in the midst of a rich agricultural and mineral-producing district; on the Missouri Pacific railroad. It contains a number of mills for the manufacture of flour, paper and woolen goods. Population 1890, 1,772; 1900, 2,181.

CALIFORNIA, a borough of Washington County, southwest Pennsylvania; on the Monongahela River, 50 miles S.W. of Pittsburg; on the Reading and Southwestern railroad; steamboats ply between it and Pittsburg; the Southwestern Normal School is located here. Population 1890, 1,024; 1900, 2,009

CALIFORNIA embraces within the boundary of the state proper an area of 155,980 square miles. It has a coast line on the Pacific Ocean of about 700 miles, following the indentations, and extends through nine and one-half degrees of latitude. The

STATE SEAL OF CALIFORNIA.

average breadth of the state is about two hundred miles. In addition to this territory of 99,837,200 acres, California also includes 4,760 square miles of lakes, islands, bays, navigable rivers, salt marsh and tide-lands, making the total area 160,740 square miles, or 102,873,600 acres. California is second among the States in size, and comprises 4.4 per cent of the entire area of the United States, and is greater in extent than the combined States of Connecticut,

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Delaware, New Hampshire, New Jersey, New York, Massachusetts, Maine, Rhode Island, Ohio and Vermont. The state is made up of mountain and valley land of great diversity of features. Its two chief mountain ranges are the Sierra Nevada, or Snowy Mountains, in the east and the Coast Range in the west, extending in a northwest-southeast direction. In the north these two ranges join indistinguishably, and in the south again, in the neighborhood of the Tejon pass, they become united into one chain, the San Bernardino Range. Santa Lucia, San Rafael, San Diablo, Santa Inez, and Palo Scrito mountains are some of the branches of the two great ranges. Besides the numerous fertile valleys contained between their spurs and lateral ranges, their foothills inclose the great central valley of California. The eastern crest of the Sierras rises from 6,800 to 15,000 feet, and the western crest from one single tide-level gap at Carquinez Straits to elevations of from 900 to 9,000 feet. The highest peaks of the Sierra Nevada are Mt. Whitney, 14,898 feet high, at the south terminus, and Mt. Shasta, 14,442 feet high, at the north terminus. Mt. Whitney is the highest point of land within the United States, and within seventy miles is Death Valley, the lowest. Other high mountains in the state are Lassen's Peak, in the northeastern part, at the meeting of Shasta, Lassen, Tehama, and Plumasi counties; and Matterhorn Peak, in Mono Co., in the eastern part of the state. The Coast Range is of much less altitude, varying from 4,000 feet in the north to 8,000 in the south end. (See Vol. IV, p. 617.) The northern part of the state is entirely covered by the interlocking spurs of the two ranges, which gives it a very rugged character. The south part is traversed by numerous broken ranges, and is extremely sterile, owing to the lack of water. A narrow belt along the coast of this southern portion is very fertile, greatly favored in respect to climate, and possesses much beautiful scenery. The most of the coast-line of the state is rocky, and good harbors are few. The Bay of San Francisco forms one of the best and most capacious harbors on the west coast of North America, and one of the finest in the world. It is nearly fifty miles in length, with a breadth averaging nine miles, with good anchorage, deep water and perfect shelter on all sides. Its entrance is a strait about five miles long and one mile wide, inclosed between high cliffs, and called the Golden Gate. Within the bay are numerous islands, among which is Mare Island, used as a navy-yard by the government. Humboldt Bay, on the north coast, is the best harbor in that part of the state. Southward from San Francisco are the bays of Santa Cruz, Monterey, San Luis Obispo, San Pedro and San Diego, of which the last, at the extreme south end of the coast, is next to San Francisco Bay, both for security and for advantageous geographical position. Of the islands off the coast, the rocky group called the Farallones, opposite the Golden Gate, have been the favorite resort for seafowl, whose eggs are collected there in great quantities. Off the south coast are several much larger mountainous islands, occupied as grazing-lands for large flocks of sheep; the largest one, Santa Catalina, furnishing several varieties of marble, valuable cement rocks and some metalliferous ores.

The principal rivers of the state are the Sacramento and the San Joaquin, the courses of both of which lie in the great central valley mentioned. The Sacramento rises in Mt. Shasta and flows south; the San Joaquin rises in the Tulare Lake, in the south end of the valley, and flows north. Near latitude 38° these rivers unite and flow west into the San Francisco Bay. Both have many small tributaries. The Sacramento, 370 miles long, is navigable for 120 miles from San Francisco; the San Joaquin, 350 miles long, is navigable for steamers for about the same distance. In the north, the Klamath River, which has its source in Oregon, flows west into the Pacific. The Colorado, which forms the southeast boundary of the state, is navigable for more than 500 miles from its mouth. Of the numerous rivers of the Coast Range, only one, the Salinas, flowing into the Bay of Monterey, is navigable. Some of the largest lakes are Tulare, in the south-central; Owen's, Mono, Tahoe, and Honey, in the east, and Clear Lake, in the western part of the state Upon the east slope of the Sierra are several large lakes, among them being Klamath, Goose, Honey and Owens, and other small lakes, many of which are alkaline and without outlet. Lake Tahoe, at the angle in the boundary between California and Nevada, is a beautiful body of pure water, about 20 miles long and averaging 1,500 feet in depth. It is one of the most elevated lakes on the continent. In the southeast there are many deep depressions, formerly lakes, similar to the noted Death Valley, which is 400 feet below the sea, and is a waterless, barren desert.

California has a great variety of climates, the wide range of temperature and climatic variations being due to differences in elevation and latitude and distance from the sea. These differences extend from the arctic temperature of 15,000 feet above to the semi-torrid climate of 400 feet below the sea-level. In 1895 the highest temperature recorded in the state was 124°, the lowest 23° below zero—an absolute range of 147°. The water of the ocean remains very equable, as regards temperature, throughout the year, varying but little from 52° to 54°. At San Francisco the freezing-point is not reached for entire years at a time, and a record of 17 consecutive years shows that but for 6 days of the time did the thermometer register 90°. The mean temperature of the coldest months, December and January, is 50°; that of the warmest month, September, 60°; the yearly mean, 55°. The normal annual temperature for the state is 60.1°. In the interior the climate varies indefinitely, every valley having a climate of its own. Sudden fluctuations of temperature are unknown throughout the state. The Colorado desert, in the southeast corner of the state, has a climate extremely hot and dry, and Fort Yuma is probably the hottest place in the United States. The warm and dry air of portions of southern California, where roses bloom every month of the year, is healthful and favorable to invalids, particularly consumptives. Monterey, San Diego, San Bernardino, Los Angeles and Santa Barbara have become winter sanatoriums,

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famed throughout the world. The death rate per thousand in 1900 was 15.71, which, while low as compared with other states, is still not a fair comparison, as so many invalids in the last stages of pulmonary diseases come into the state too late to be benefited, and add materially to the death rate. The northern part of the state, latitude 42°, is just within the extreme summer limit of the north temperate rain-belt. This limit in winter shifts a little south of the southern end of the state, and thus California has the full benefit of the winter rains and enjoys a summer comparatively rainless. The mean annual precipitation in the northwestern part of the state, and upon the exposed flanks of the Sierras and Coast Range is from 80 to 100 inches, while in the southeastern part there are comparatively rainless areas, receiving but from 2 to 4 inches annually. At San Diego and Monterey but 10 inches on an average fall, while at San Francisco the mean is close to 21 inches. Between these extremes of from 80 to 100 inches, and 2 to 4 inches, there lies every degree of average annual moisture. The rains are sudden and showery, as in the tropics, but thunder-storms are almost unknown. December is the month of greatest rain. Snow is rare, except in the Sierras, and hail falls only occasionally.

The distribution and variety of vegetation over an area of such extreme range of climatic and moisture conditions is marvelous and comprehensive. The cone-bearing trees excel in size and variety any other known area. The drier portions present a wealth of palm, cactus and yucca that bewilders the botanist. In sections the forest growth is sometimes so dense that more than a million feet of lumber can be cut from a single acre, while other areas are absolutely devoid of vegetation. Between extremes of such scope are found vegetations of every class and kind.

The agricultural products of California are many and varied, and agriculture is now the chief occupation of the people, as mining once was. The farming-lands of the state in 1900 covered an area of nearly 29,000,000 acres, of a value of about $796,530,000, producing about 4 per cent of the farm products of the United States. The growth of the cereals is extensive, and stands first in importance among the products of the soil. In the raising of wheat the state stands second. The yield in 1899 was 36,534,407 bushels, but by reason of the low price of that staple it did not bring as much as the crop of some former years, notably 1882, when the wheat harvest brought $43,000,000. The 53,930 acres planted to corn in 1899 produced 1,477,093 bushels, scarcely sufficient for home consumption; 153,734 acres sown to oats brought 4,972,356 bushels in the season of 1900; and the same year, 1,029,647 acres in barley gave a return of 25,149,335 bushels. Of this latter cereal California raises almost 30 per cent of the entire crop of the United States, standing first, and, with New York, producing about one-half of the whole amount raised in this country. In the production of beans California stands second, raising over 1,020,000 bushels annually, which constitutes about 23 per cent of the entire crop. For 1899 the crop of hops amounted to 10,124,660 pounds, bringing to the growers $925,319, and being fully 17 per cent of the product of the states and territories. Other crops are hay, rye, broom corn, tobacco, cotton, sugar-cane, sorghum, alfalfa, millet and hemp. The state stands foremost in the production of the leading fruits and vegetables raising especially fine peaches, apples, pears, grapes, plums, prunes, apricots, nectarines, cherries, figs, olives, oranges, lemons, quinces, limes, pomegranates, pomelos, persimmons, citron, bananas, guava, mulberries, raspberries, strawberries, blackberries, etc. In the growing of nuts the state stands first, raising and exporting large quantities of almonds, chestnuts, English walnuts, pecans, peanuts and filberts, which, from their excellent quality, find a ready market. California stands first in the production of grapes, having over 134,000 acres planted to vineyards, producing over 60 per cent of the wine made in the United States, and furnishing all of the raisins grown. The value of the orchard and tropical fruits grown in 1899 was nearly $22,000,000.

Beets, carrots, cabbages, cauliflower, celery, lettuce, melons, onions, parsnips, peas, potatoes, radishes, tomatoes and turnips are among the leading vegetables shipped to places with less favorable climate. Canaigre is raised for use in tanning leather, and licorice-root is being extensively cultivated, both proving profitable industries. Olives are raised for the purpose of the extraction of the oil, as well as for pickling, and the purity of the olive-oil produced has gained for it a demand greater than the supply. In the production of beet sugar the state stands first, the yield in 1899 being 356,535 tons, of the value of $1,550,346. (See BEET SUGAR, in these Supplements.) The hay and forage crop, in 1899, yielded in value nearly $20,000,000. Vegetables produced 2½ million dollars, and nuts nearly 1½ million.

Stock-raising is a profitable industry, as is dairy-farming, the climatic conditions being favorable to both. Nowhere else does live-stock multiply more rapidly and mature earlier without shelter or cultivated food than in the valleys of California. This is particularly true of the country west of the Sierra Nevadas, where the mildness of the winters is very favorable to every branch of stock-raising. Horses, cattle, sheep, swine, and Angora goats are all extensively raised, and the state is the home of some of the finest and highest-priced animals of the above kinds in the world. The state stands lower now in the number of sheep, and in the amount of wool produced, the clip of 1899 being only 13,680,495 pounds. Much attention is given to apiculture, and the honey produced amounts to about 10 per cent of the entire amount marketed in this country.

The mineral resources of California are varied and of much importance. The production of gold, in which the state stands second, shows that California produced 38 per cent of the gold mined in the United States. The production of the precious metal for 1901 amounted to $15,730,700, and estimates of the amount mined since its discovery in 1849 place its value at $1,400,000,000. The silver annually produced has also a large value. Quicksilver, mined nowhere else on this continent, yields

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a large annual return, that for 1885 being $1,337,131. Platinum, produced nowhere else in the United States, yields a large return, and the mining is constantly increasing. Borax, found only in California and Nevada, gives an annual yield of great value, that of 1894 being $807,800. This was the sole production of the United States, the Nevada mines not being worked. Asphaltum is found in large quantities, and the state furnishes 93 per cent of the amount produced in the United States. Macadam rock and rubble-stone are both largely quarried, and yield a handsome return from exports, as does clay for brick and pottery, these three products yielding a million and a half dollars annually, in addition to the amount consumed at home. Excellent granite, salt, limestone and bituminous rock are also largely shipped, as are antimony, asbestos, chrome, copper, gypsum, lead, magnesite, marble, mineral paint, onyx, paving-blocks and slate. The only deposits of chromic iron in the United States are found in California. In 1895 the production was valued at $16,795, and the mining of this valuable mineral is constantly increasing. Iron ore is found in some localities, but the little coal that is mined is of indifferent quality, and not only does the lack of proper fuel retard the iron industry, but seriously impedes other manufacturing enterprises. New fields are in course of development, and coal of better quality than that heretofore found is coming into the manufacturing centers. Mineral waters, natural gas and petroleum are other important substances in the realm of mineral industry, the last named being produced in large quantities, and new fields being from time to time developed. In the summer of 1896 excellent wells were discovered in Fresno County, nine miles north of Coalinga. Petroleum has afforded the southern part of the state a very cheap fuel, and has caused a number of mines and factories to be operated which would otherwise have remained idle. The petroleum product in 1899 amounted to $2,508,751, and in 1901 the production was increased 10 per cent, but the value was much decreased.

California has an abundant water-power, the configuration of the country making its utilization cheap, and the transmission of electricity from points of generation easy. It is estimated that the water-power available for the development of electrical energy is amply sufficient to furnish the power to drive every kind of machinery within the state. Among the manufactures of the state are mining and agricultural machinery, lumber, leather, woolen goods, flour, silk, sugar, chemicals, etc. The census of 1900 shows 12,582 establishments in operation, with a capitalization of $205,395,025, employing 91,047 operatives, and paying $47,425,947 for wages. The value of products was $302,874,761.

The forest trees of California are of numerous species, some of which, as the mammoth, or big tree, and the Monterey cypress, occur nowhere else out of the state (see Vol. IV, p. 623). The narrow belt of redwood which covers the west slope of the Coast range is very productive, and no other great body of timber in North America is so accessible and so easily worked. Single trees afford as much as 75,000 feet of lumber, and a yield of from 1,000,000 to 2,000,000 feet per acre is by no means rare. Other varieties of timber are ash, beech, black live-oak, English oak, black oak, white oak, blue oak, cedar, elm, sycamore, hemlock, locust, maple, walnut, willow and poplar. Considerable amounts of lumber are shipped to all parts of the world, much being sent to seaports in Europe, Australia and South America.

In 1900 the value of the chief manufactured products of the state was: sugar and molasses-refining, $15,909,988; slaughtering and meat packing, $15,717,712; lumber and timber, $22,572,337; fruit and vegetable canning, $13,081,829; foundry and machine shop products, $12,047,149; and flouring and grist mill products, $13,100,944.

One of the greatest points of interest in the state is the beautiful Yosemite Valley. (See Vol. IV, p. 619.) Near the Yosemite Valley, and in the same county, is the Mariposa Big Tree Grove, containing about 500 of these mammoth trees (*Sequoia gigantea*). (See Vol. IV, p. 624.) June 30, 1864, Congress passed an act donating the Yosemite Valley and the Mariposa Big Tree Grove to the state of California, to be held for public use, resort and recreation, inalienable for all time. A commission was appointed by the governor, and it, with its successors, have expended considerably in excess of $300,000 in making all points accessible to the public, in preserving and protecting the natural scenery and in general improvements. The grant of the Yosemite Valley was described as "the cleft or gorge in the Granite Peak of the Sierra Nevada Mountains, . . . with its branches and spurs, in estimated length 15 miles, and in average width one mile back from the main edge of the precipice on each side of the valley." The grant of the Big Tree Grove embraced less than the area of four sections of land, or about 2,500 acres.

The grizzly, black and brown bear now are scarcely found except in the mountain fastnesses. Seven species of the fox are known. The California land-otter and sea-otter, the wolverine, skunk, lynx, jaguar, wolf, coyote, wildcat, fox, badger, raccoon, marmot, hare, rabbit, and the gray ground-squirrel are all natives of the state. Inhabiting some of the islands off the coast are numbers of seal, otter, beaver, etc. The elk is still found in the forests of the northern counties, and the white and black tailed deer are found in some localities, the latter being the more common. Antelopes are being rapidly exterminated. In the mountains of the Sierra Nevada the bighorn, or mountain-sheep, is found. All the birds usually found in temperate climates are well represented, there being 350 species native to the state. Grouse and quails or partridges, robins, larks, curlews, pelicans, geese and ducks abound. The state is well supplied with fish, and a large business is done in the exportation of dried and canned fish of several kinds. The product in 1890 was valued at $4,463,369, furnishing employment for over 5,000 persons. The oyster industry is a considerable one, amounting to about $750,000 annually. Whales are found along the coast in large numbers, and their product, together with that of seals, amounted in 1890 to the sum of

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$2,490,373. Many reptiles and the rattlesnake are also found in the state.

Much of the land in the southern and southeastern part of the state is arid from lack of water, and for some years much attention has been given to irrigation. In 1899 there was under irrigation 1,445,872 acres; 1,158,178 acres were in crops and 287,694 acres were pasture and crops not maturing. (See IRRIGATION, XXVII, 414.)

The school system of the state is admirably modeled and well conducted, being under the direct control of a state board of education, consisting of five members, with the governor as *ex officio* president of the board. The average annual attendance of children at the state schools is about 240,000. There are about 3,600 school districts, 60 high schools, 1,900 grammar schools, 2,800 primary schools, 3,565 public school buildings and about 8,160 teachers. The annual expenditure for school purposes about $6,175,000. The principal institutions for superior instruction are the University of California and the Leland Stanford Junior University. (See CALIFORNIA, UNIVERSITY OF; and also LELAND STANFORD JUNIOR UNIVERSITY, in these Supplements.) There are normal schools located at Chico, Los Angeles and San José, the three having a total attendance of about 2,000 students, and receiving state aid to the amount of about $100,000 annually. In addition to the three state normal schools the city of San Francisco also supports an institution of this kind. The University of California and Leland Stanford Junior University also have departments of pedagogy. The text-books used in the state schools are printed under the supervision of the state board of education and furnished to pupils at actual cost.

STATE CAPITOL, SACRAMENTO.

The state library at Sacramento contains about 95,000 volumes, and is liberally sustained by legislative appropriation. In 1880 an act was passed providing for the establishment of free public libraries and the maintenance of the same, with reading-rooms attached. Under this law about 30 of these institutions have been organized and are actively operated, with over 300,000 volumes on their shelves. In addition are many other libraries free to the public, supported by societies or subscription.

The central portion of the state is thickly netted with railroads, some of the most important of which are: The Southern Pacific; the Southern California; the California Northwestern; the Northern Pacific; the San Francisco and San Joaquin Valley; the California and Nevada, and the Santa Fé Pacific. The number of miles of railroad in operation in California exceeded, in 1900, 5,600.

According to the census of 1890, there were 11 religious denominations represented in the state, with 1,542 organizations, having 1,493 churches and halls, a membership of 255,869, and the value of the church property given as $10,656,376.

The charitable and educational institutions include the California state institution for the deaf and dumb and the blind, located at Berkeley, about four miles north of the city of Oakland. Some 250 afflicted persons are inmates, and the cost to the state is about $60,000 annually. The Industrial Home of Mechanical Trades for Adult Blind at Oakland has about 100 inmates, the current expenses of operating the home being about $20,000 annually. The California Home for Feeble-Minded Children, located at Glen Ellen, has about 300 inmates, requiring nearly $50,000 annually for their maintenance. The state provides five asylums for the care of her insane. They are located, respectively, at Napa, Stockton, Agnews, Mendocino and San Bernardino. These institutions are admirably conducted, and so liberal is the manner in which the unfortunate insane are cared for that California ranks second among the states in the comparative cost of maintaining asylums. At Yountville is located a veterans' home, where over 400 ex-sailors and soldiers are cared for, and the institution ranks first among the similar institutions of the kind in the United States in point of economical management, and fourth in point of benefits conferred.

California stands second in rank in the comparative cost of prisons. The largest of these correctional institutions is the state prison located at San Quentin, about 10 miles north of San Francisco, on the waters of the bay. About 1,200 prisoners are here confined, and about 700 are kept at Folsom, a town about 20 miles northeast of Sacramento, on the American River. About half a mile from the village of Ione, in Amador County, is the Preston School of Industry. It is not conducted on the plan of a penal institution, but rather, as its name indicates, as an industrial school, designed to be a place of reformation for boys whose habits of life and environment are leading them toward a criminal career. There is also a Reform School for Juvenile Offenders located at Whittier, some 15 miles southeast of Los Angeles, which has on an average 250 boys and 50 girls, all of whom are taught some useful trade or occupation to fit them for contact with the world.

California has a national guard, with an average strength of 5,000 officers and men. The annual appropriation for the maintenance of the guard is near $100,000, and from the general government sums ranging from $10,000 to $20,000 have been annually received, mostly in the way of arms and accoutrements. The state stands fourth in the comparative cost of the maintenance of its militia force.

In 1890 the sum expended for the support of the state and local governments reached $24,000,000,

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giving the state the rank of sixth in this connection. Within the past few years this has been much decreased, retrenchment and economy prevailing with the officials having the power to regulate expenditures.

The assessed value of all kinds of property for the year 1904 was $1,550,511,761, constituting about 4 per cent of the entire property of the United States. This valuation gives a *per capita* ownership of $2,097, the largest of any of the states. The total state debt was estimated at $2,282,500.

The number of newspapers and other periodicals published in the state, in 1905, was 738, divided as follows: Daily, 128; tri-weekly, 2; semi-weekly, 22; weekly, 462; bi-weekly, 2; semi-monthly, 9; monthly, 104; semi-quarterly, 1; bi-monthly, 2; quarterly, 6.

The principal cities and towns of California are as follows, the populations given being according to the census of 1900: San Francisco, 342,782; Los Angeles, 102,479; Oakland, 66,960; Sacramento, 29,282; San José, 21,500; San Diego, 17,700; Stockton, 17,506; Alameda, 16,464; Fresno, 12,470; Vallejo, 7,965; Santa Barbara, 6,587; Berkeley, 13,214.

The population of California has increased rapidly since 1850, the date of the admission of the state to the Union. It was then 92,597. In 1860 it had increased to 379,994. The increase during the next ten years was not so great, the census of 1870 giving the population as 560,247. In 1880 the number had increased to 864,694, and in 1890 to 1,208,130. Of the population in 1900, 1,402,727 were white; 45,753 were Chinese; 15,377 were Indians; 11,045 were negroes, and 10,151 were Japanese. Total population 1,485,053. The census of 1900 disclosed the fact that California had over two per cent of the entire population of the United States, thus ranking twenty-first. The per cent of increase for the last decennial period was 22.9, which exceeded that of the whole country. Of fifty-seven counties, all but eleven increased in population. There were 9.5 individuals to the square mile.

The following is a list of the governors of the state since California was admitted to the Union:

Peter H. Burnett	1849-51	Romualdo Pacheco	1875
John McDougal	1851-52	William Irwin	1875-79
John Bigler	1852-56	George C. Perkins	1879-83
J. Neely Johnson	1856-58	George Stoneman	1883-87
John B. Weller	1858-60	Washington Bartlett	1887
Milton S. Latham	1860	R. W. Waterman	1887-91
John G. Downey	1860-62	H. H. Markham	1891-95
Leland Stanford	1862-63	J. H. Budd	1895-99
Frederick F. Low	1863-67	Henry T. Gage	1899-1903
Henry H. Haight	1867-71	George C. Pardee	1903 —
Newton Booth	1871-75		

See CALIFORNIA, Vol. IV, pp. 615 et seq.

Revised by R.W.C. and A.R.R.

CALIFORNIA, UNIVERSITY OF, at Berkeley, California; established in 1868 by act of the legislature; founded in reality 13 years previous as the College of California, which first organized classes in 1860. The Agricultural College is a part of the University. The University is supported by legislative appropriation in the form of an annual state tax. The Agricultural College receives aid from the United States government. Within the last few years large private benefactions have been received. Benjamin Ide Wheeler, Ph.D., LL.D., was chosen president in 1899. There were, in 1904, 434 instructors in all departments, with 4,150 students. It has a library of 110,000 volumes. It has graduated 5,000 students. Its productive funds exceed $3,000,000.

CALIPPIC PERIOD. See CALENDAR, Vol. IV, p. 593.

CALISTHENICS is the Greek name for exercises promoting gracefulness and strength, and comprises the more gentle forms of gymnastics, especially for girls. It now constitutes an important part of the physical training of girls at American colleges. A notable system of physical culture has been inaugurated at Wellesley College, near Boston, Massachusetts. In that institution a fine gymnasium, elaborately equipped, was erected in the fall of 1891, and three hours per week of attendance, under competent instructors, were required of every member of the freshman class. The results, which have been watched with much interest, have proved very satisfactory, not only in the development of physique and a marked improvement in the carriage and vigor of the girl students, but in their increased capacity for mental application, and similar departments have been organized in all of the larger educational institutions of the United States. See GYMNASTICS, Vol. XI, p. 311.

CALISTOGA, a town of Napa County, central eastern California, situated near the petrified forest, about 65 miles N. of San Francisco, on the Southern Pacific railroad, 3 miles from the base of Mt. St. Helena. It is noted for its mineral springs, and is a popular summer resort. Wine-making and mining are its principal industries. Pop. 1900, 690.

CALIVER, a matchlock or firearm about midway in size and character between an arquebus and a musket, used in the sixteenth century. It was small enough to be fired without a rest or support.

CALIXTINES, the more moderate sections of the Hussites in Bohemia. See HUSSITES, XII, 423.

CALLA, an aquatic or marsh-loving genus of *Araceæ*, of a single species, *Calla palustris*, the water arum. It has white spathes, cordate heart-shaped leaves, flowers crowded up to the extremity of the spadix, and red berries. It is widely distributed through the cold marshes of Europe and North America, and acquires some economic importance in Lapland and parts of Russia, from the fact that a starchy matter can be extracted from its root-stock, used in bread-making. The well-known and beautiful *Richardia*, the calla of house-cultivation, is an allied genus. See HORTICULTURE, Vol. XII, p. 273.

CALLANDER, a town in the southwestern part of Perthshire, Scotland, on the Teith. It is situated in the midst of beautiful scenery, and near the famous TROSSACHS (q. v. in these Supplements). Population, 1,538. R.W.C.

CALLAO, the chief port of Peru, in the province of Lima. The population increased from 14,800 in 1866 to 48,118 in 1898, with a corresponding increase of traffic. See CALLAS, IV, 626.

CALLENDER, JOHN, an American clergyman and author; born in Boston, Mass., in 1706. He graduated at Harvard in 1723, and then preached for the Baptist society in Swansea, Mass. In 1731 he went to Newport, R. I., as a colleague with the Rev. William Peckham in the

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pastorate of the Baptist Church there; and, on the death of Mr. Peckham, became pastor. In 1738 he delivered a sermon on the history of Rhode Island, which was published in 1739 and was reprinted in the *Collections* of the Rhode Island Historical Society in 1838 He also collected many papers and data relating to the history of the Baptists, which were used by Rev. Isaac Backus in his *History of New England, with Special Reference to the Baptists.* He died in Newport, Jan. 26, 1748. E.E.T.

CALLERNISH, a district on the west coast of the island of Lewis, of the Hebrides group, 16 miles from Stornoway, remarkable for its prehistoric stone circles, of which there are four, at no great distance apart. Similar circles are found at Stonehenge, England, described under RUDE STONE MONUMENTS, Vol. XXI, p. 57; see also ARCHITECTURE, Vol. II, p. 336; LEWIS AND HARRIS, Vol. XIV, p. 492.

CALLICHTHYS, a genus of fishes found in South America. They are characterized by two rows of bony plates on either side, which extend the entire length of the body. See SILURIDÆ, Vol. XXII, p. 75.

CALLIGONUM, a genus of plants of the family *Polygonaceæ*, having a quadrangular fruit winged at the angles. The best-known species is a succulent shrub found on the sandy steppes near the Caspian Sea, where its acid shoots and fruit often serve to allay thirst. The roots afford a nutritious gum.

CALLIGRAPHY. See PALÆOGRAPHY, Vol. XVIII, pp. 147 et seq.

CALLINGER OR KALINJAR, one of the hill forts of Bundelcund, India, district of Banda, 112 miles N.W. of Allahabad; elevated 1,200 feet above the adjacent plain. From its position and size it must at one time have been a place of great strength. At the base of the rock stands a town of the same name, which, though much decayed, still bears testimony of its ancient grandeur. See BANDA, Vol. III, p. 267.

CALLITRIS, a genus of the *Coniferæ*. See MOROCCO, Vol. XVI, p. 859; also SANDARACH, Vol. XXI, p. 269.

CALLUS, a botanical term with the following applications: 1. A parenchyma tissue which covers wounds preceding the formation of cork. From these callus-cells adventitious roots and buds may arise. The term is applied in horticulture to the cap formed over the end of a cutting. 2. A peculiar substance which covers both surfaces and lines the pits of the "sieve-plates" (q.v.), and in some cases periodically closes the pits in autumn. 3. Very loosely applied to any hard excrescence upon a plant.

CALMS OR CALM LATITUDES, those parts of the ocean near the equator which are subject to total absence of wind for long periods at a time. See METEOROLOGY, Vol. XVI, pp. 148, 149.

CALONNE, ALPHONSE BERNARD DE, VISCOUNT, French writer; born at Béthune, May 17, 1818; engaged in political writing and art criticisms. His politics caused him trouble with the government, and on account of his severe criticisms he was compelled to fight several duels. Since 1870 he has written the reviews and art criticisms for *Le Soleil.* Among his writings are *Bérangère*, a novel; *La Politique de la France dans les Affaires d'Allemagne et d'Italie;* and *Les Ophidiennes.*

CALOPHYLLUM (Gr., *kalos*, beautiful, *phyllum*, a leaf), a genus of large-growing timber trees, so-called from their beautiful leaves. They are natives of the tropics. *C. angustifolium* of Penang yields valuable timber, while *C. calaba*, of the West Indies, yields oil from its seeds and is a serviceable timber tree. *C. inophyllum* of the East Indies is both a beautiful and commercially valuable timber tree. W.R.B.

CALORIMETER. Among recent forms of calorimeter the Junker gas-calorimeter, designed for laboratory work, testing gas-engines, etc., is worthy of mention. Much error has resulted from judging of gas by its candle-power, which may vary materially from its heat-giving qualities. In this instrument the heat generated by a flame is transferred to a current of water flowing at a constant rate, and measurements are taken of the quantity of gas burned, of the quantity of water passed through, and of the increase of temperature of the outgoing water over the incoming water. It is made like an upright boiler, with copper tubes, through which the heated gases rise, while the water runs downward outside the tubes. The spent gases are allowed to escape from a throttle, at atmospheric pressure.

M. Mahler's calorimeter consists of a graduated vessel for holding a specific quantity of water, and of an inverted glass bell, from which the gaseous products of combustion are compelled to flow and pass through the water. There is also a platinum crucible forming the combustion chamber for the fuel to be tested, and a steel bottle of compressed oxygen connected by tubes with the crucible.

The calorimeter of MM. Le Chatelier and Cornu is of the optical pyrometer type, being designed for use in tempering and similar operations. It consists of a telescope to shut off outside light, and an oil-lamp as a standard of comparison, and renders visual test of heat by the color of the flame much more accurate than where ordinary means of observation are used. See HEAT, Vol. XI, pp. 496, 497.

C. H. COCHRANE.

CALORIMOTOR (Lat., *calor*, heat, *motor* mover), that form of galvanic battery by which its plates, few in number, but of great size are made to evolve an intense degree of heat, making metallic wires red hot and igniting inflammable bodies. The first battery of this kind was constructed by Dr. Robert Hare, professor of chemistry in Philadelphia. W.R.B.

CALOTTISTS (*La Régiment de la Calotte*), a society founded at the beginning of the 18th century by some fine wits of France for the purpose of exercising moral censure under the mask of foolery. Their name was borrowed from *calotte* (cap), which formed the symbol of the society. Any public character, guilty of a ridiculous blunder, received from the society a patent granting membership (*calotin*), and the privilege of wearing a *calotte*. When these mockers became too bold, their society was suppressed by Minister Fleury. G.A.S.

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CALOVIUS OR KALAU, ABRAHAM, the chief representative of controversial Lutheran orthodoxy in the seventeenth century; born at Mohrungen, in East Prussia, April 16, 1612; died at Wittenberg, Feb 25, 1686. He was successively professor at Königsberg, preacher at Danzig, and professor at Wittenberg. He waged war incessantly on Arminian, Socinian, Reformed and Catholic doctrines, and was very bitter agaiust Calixtus. He was six times married, the last time, in his seventy-second year, to a young daughter of his colleague, Quenstedt. Calovius's chief writings are his *Systema Locorum Theologicorum* (12 vols., 1655–77) and *Historia Syncretistica.* (1682).

CALOYERS OR CALOGERI, meaning literally "handsome old men," is a general name for the monks of the Orthodox Greek Church, chiefly of the Order of St. Basil. They have long had a famous group of convents upon the promontory of Mount Athos, and others in various parts of the Morea. At these convents they conduct admirable schools, at which the clergy of the church are largely recruited. Among them there are some who prefer to live alone or with one or two companions as hermits, but most of them live in communities W.F.J.

CALPE, one of the pillars of Hercules, identified with Gibraltar. See GIBRALTAR, Vol. X, p. 523.

CALPENTYN, a long and narrow peninsula on the west side of Ceylon, in lat. 8° 14′ N., long. 79° 53′ E. The neck is so low as to be overflowed during the northeast monsoon, so that it is transformed into an island.

CALTABELLOTA OR CALATABELLOTA, Italy, a town of Sicily, 9 miles northeast of the seaport town of Siacca on the southwestern coast. It is a town of great antiquity occupying the site of the Roman Tricala. An old castle on a rock rising from the Caltabellota River (the ancient Crimisus) dominates the town. The present name is of Saracen origin. Pop., 6,200. C.L.S.

CALTANISETTA, province and city of central Sicily; the province lies west of Girgenti and south of Palermo. Its southern side is washed by the Mediterranean. There are manufactures of chemicals and iron, marble-quarries, and olive and grape yards. Area, 1,263 square miles. Population in 1901, 330,972. The city, capital of the province, is fortified, and is situated 28 miles N.E. of Girgenti. Sulphur springs and works are here. Population in 1901, 44,600.

CALTHA (Gr., *kalathos*, a goblet), a plant of the order *Ranunculaceæ*, so-called in allusion to the likeness of the form of the corolla to a golden cup. The marsh-marigold, of which the *C. Palustris* of the British marshes, is a typical species. It has large kidney-shaped shining leaves, with large, yellow flowers. It is often called "cowslip" in the United States. W.R.B.

CALTROP, a four-pronged piece of iron, each prong about four inches in length, formerly used in war to check the approach of cavalry over a plain, or of besiegers in the ditch of a fortification. See HERALDRY, Vol. XI, p. 628. W.R.B.

CALTROP, a name applied in botany to certain plants with spiny heads or fruits, such as the common caltrop, *Centaurea Calcitrapa* (a thistle, with spiny heads); species of *Tribulus*, with spiny fruit; *Trapa natans*, with spiny fruit; *Cenchrus tribuloides*, whose spiny spike is usually called a "sand-bur"; etc.

CALUMBA OR COLUMBO, used in medicine, is the root of *Jateorhiza Calumba* (*J. palmata*), a menispermaceous climber of eastern Africa. Its bitterness and other properties are ascribed to the presence of columbin, berberin and columbic acid. It is a useful, mild tonic and stomachic. American calumba root, or columbo, is obtained from *Frasera Walteri*, a gentianaceous biennial, and has properties like those of gentian.

CALUMET, a village of Houghton County, Michigan, situated in the copper region, near the northernmost point of the upper peninsula, on the Hecla and Torch Lake railroad, 15 miles from Houghton. It contains the copper-mine, Laurium, said to be the richest in the world. Population 1900, 5,643.

CALUMET OR PEACE-PIPE. PIPE, XIX, 120.

CALUMPIT, town of Philippine Is. in Bulacán, Luzon, well built and in a plain made fertile by the frequent overflow of two rivers. Pop. 1896, 15,712.

CALVARY, MOUNT. See MORIAH, XVI, 850.

CALVÉ, EMMA, operatic vocalist, was born in France about 1866. Her father was a civil engineer and died during her girlhood. She received lessons from Signora Marchesi. Her *début* was in Gounod's *Faust*, at the Théatre de la Monnaie, Brussels, in 1882. In Paris, in 1884, she played various parts, and afterward made a tour of Italy. She was very successful at Covent Garden, in 1892, in *Cavalleria Rusticana* and *L'Amico Fritz*, and appeared in both, by command, before the Queen, in July, 1893. She made an American tour in 1894 and another in 1896, both highly successful.

EMMA CALVÉ.

CALVERLEY, CHARLES STUART, English parodist; born Dec. 22, 1831; died at Folkestone, Feb. 17, 1884. He was educated at Harrow, Oxford and Cambridge, and in 1865 was called to the bar, and settled in London, but a fall on the ice in the winter of 1866–67 put an end to what promised to be an exceptionally brilliant career. One of the most gifted and scholarly men of his time, and unrivaled as a humorist, Calverley will be remembered by his two little volumes, *Verses and Translations* (1862) and *Fly-Leaves* (1872).

CALVERT, GEORGE (Lord Baltimore). (See CALVERT, Vol. IV, p. 631).

CECIL CALVERT, an English colonial governor; born in 1603. He removed to America in 1634 and founded the colony of Maryland. (See MARYLAND, Vol. XV, p. 610).

FREDERICK CALVERT, an English colonist; born in 1706. In 1751 he was proprietary governor of Maryland. He died at Naples, in 1771.

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LEONARD CALVERT, an English colonial governor; born in 1607. In 1634 he was sent to America and became governor of Maryland. He died in 1676. W.M.C.

CALVERT, GEORGE HENRY, author; was born in Maryland on January 2, 1803, a descendant of George Calvert, first Lord Baltimore. He was educated at Harvard and Göttingen, and became editor of the Baltimore *American*. About 1850 he removed from Maryland to Rhode Island, and in 1853 was mayor of Newport. He devoted much attention in the rest of his life to writing books, magazine articles, and plays. Among his books were a *Life of Rubens*, an *Introduction to Social Science*, and *Biographic Æsthetic Studies*. Several of his plays were highly successful. He died at Newport on May 24, 1889. W.F.J.

CALVERT, a city, the old capital of Robertson County, central Texas, about 85 miles N.E. of Austin, on the Houston and Texas Central railroad. It contains manufactories of cottonseed-oil, and is the business center of a fertile agricultural district. Population, 1890, 2,632; 1900, 3,332.

CALVI, FELIX, COUNT, Italian historian; born in Milan, Dec. 16, 1822. His first work was a novel, *Unchâteau dans la Campagne Romaine*. In a short time he abandoned novel-writing and devoted himself to the study of history. In 1871 he founded the Historical Society of Lombardy, of which he has since been president. Among his many writings the most important are *Di Ansonio Franchi e della Filosofa Contemporanea; Curiosità Storiche e Diplomatiche del Secolo XVII;* and *Bianca Maria Sforza Visconti Regina dei Romani*.

CALVO, CARLOS, an Argentine lawyer, diplomat and author; born in Buenos Ayres, Feb. 26, 1824; in 1860 minister to Paris and special representative to London; in 1885 minister to Berlin; an officer of the Legion of Honor, and correspondent of the Historical Institute of Paris and of the Academy of Sciences. He has published *An Account of the Treaties, Conventions and Other Diplomatic Acts of the Latin-American States; Theory and Practice of International Law;* and *Dictionary of Diplomacy and Private and Public International Law*.

CALX, a Latin term for quicklime. As quicklime is produced by burning limestone, the alchemists applied the term *calx* to the substance of a metal or mineral that remains after being subjected to extreme heat and calcination.

CALYCANTHUS (Gr., *kalyx*, a calyx, *anthos*, a flower), a genus of *Calycanthaceæ*, a tribe of the family of *Mominiaceæ*, aromatic tree and shrubs of the tropics and south temperate zone. The calycanthus is a sweet scented shrub, native to North America. Its magnificent flowers of a reddish brown color exhale an odor of *pomme de reinette* and of melon. W.R.B.

CALYCIFLORÆ, a term introduced by De Candolle to include those natural orders of dicotyledons in which the sepals and petals are separate, as in *Thalamifloræ*, but in which the stamens, instead of being hypogynous are perigynous or epigynous. It includes the *Leguminosæ*, *Rosaceæ*, *Saxifragaceæ* and other related orders.

CALYDONIAN BOAR, in Grecian mythology a frightful animal sent by the goddess Artemis to lay waste the fields of Œneus, king of Calydon, because he had omitted a sacrifice to her. The king being absent on the Argonautic expedition, no one dared to face the monster, until Meleager, the son of Œneus, with a band of heroes, pursued and slew him.

CALYMENE, a palæozoic fossil crustacean, a species of trilobite. It ranges from the earliest Archæan rocks to the Devonian system, *C. platys*, being the last American species, four inches in length. See GEOLOGY, Vol. X, p. 296. W.R.B.

CALYPSO BOREALIS, a beautiful orchid of the northern hemisphere, extending in the United States from the north Atlantic states to Colorado and Oregon, and throughout British America. It is a low, bog herb, with a single thin ovate or cordate radical leaf, a scaly stem, and a solitary drooping rose-colored flower mottled with purple, appearing in early spring.

CALYPTRÆA, a genus of mollusks, sometimes popularly known as chambered cup-and-saucer, bonnet or slipper limpets. It is the typical genus of the family *Capulidæ*. The shapes vary considerably. Some ten living species are known, mostly from warmer waters. See MOLLUSCA, XVI, pp. 673, 674.

CALYX, in botany the external envelope of the flower. See BOTANY, Vol. IV, p. 118.

CAM OR GRANTA, a river of England, which rises near Henham in Essex and flows northeast through Cambridge and there joins the Ouse. In its course it passes through the handsome park of the Nevilles, Barons Braybrooke, at Audley End, and completes the picturesque scenery of the "backs" of the colleges of Cambridge University. See CAMBRIDGE, Vol. IV, pp. 643, 644.

CAMAIEU (Gr., *kamatos*, work), monochrome painting. Painting in a single color, varied only by the gradations of the single color by light and shade. Drawings in India ink, sepia, etc., are classed as works *en camaieu*. This style is largely used in the decoration of monuments. The term also refers to engravings in several tones of the same color. W.R.B.

CAMARGUE, a triangular island at the mouth of the River Rhone. See BOUCHES-DU-RHONE, Vol. IV, p. 154. G.A.S.

CAMARILLA, a Spanish word for "a little chamber," in general use since the time of Ferdinand VII, king of Spain, for designating a party of courtiers and favorites who influence the actions of a monarch in a manner detrimental to the common welfare, or in opposition to his legitimate advisers. G.A.S.

CAMASSIA, a bulbous genus of the family *Liliaceæ*. The white or blue flowers are in racemes on a naked scape rising from a cluster of linear flat leaves. *L. esculenta* of the mountains of the northwestern United States is the "camass," or "quamash," of the Indians, the bulb being largely collected by them for food. *C. Fraseri* (*Scilla Fraseri*) is a species of the Atlantic states, often called "wild hyacinth." The genus is closely related to *Scilla*, or "squills," of Europe.

CAMBERWELL BEAUTY (*Vanessa Antiopa*), a

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butterfly almost world-wide in range. In America it ranges from Alaska to Brazil, and in the Old World from Lapland to Africa. The wings are purplish brown above, with yellow border marked with blue spots, and black beneath, with scattered yellow scales. The caterpillar, black, with red and white spots on the back, lives on the foliage of the willow and poplar.

CAMBIST, an Italian word for money-changer, or one who is versed in the operation of exchange; also used figuratively as the title of a book in which moneys, weights, measures, etc., of various nations are given in the equivalents of some particular one

CAMBIUM, an embryonic meristem tissue, composed of thin-walled cells rich in protoplasm, and lying between the wood and bast. By its activity new wood and bast are formed, increasing the member in diameter. It is characteristic of the stems of dicotyledons and gymnosperms, resulting in the production of the growth-rings (annual rings). When bark is peeled off, the line of easy separation is furnished by the cambium.

CAMBON, JULES-MARTIN, French administrator and diplomat; born in Paris, April 5, 1845. Studied law in Paris and became an advocate in 1866. Served with valor in the Franco-Prussian War, as captain of Mobiles of Seine-et-Marne. Entered the public service in 1871 and was made auditor of the provisional committee formed to replace the council of state. In 1874 he was appointed to the staff of the director-general of Algiers. In 1878 he was prefect of Constantine, and in 1879 secretary-general of the prefecture of police, Paris; and of the Rhône, 1887. In 1891 he was sent as governor-general to Algiers, where he rendered excellent service, especially in suppressing piracy. He was transferred to Washington, as ambassador to France; where, during the war with Spain, he represented the latter country, and, in August, 1898, was intrusted with the task of ascertaining what terms of peace this country would offer Spain. In 1902 he was succeeded in his Washington post by M. Jusserand (q. v., in these Supplements). M. Cambon is a commander of the Legion of Honor. His brother, PAUL PIERRE, held the post of French ambassador at London. R.C.A.

CAMBODIA OR CAMBOGIA, French Indo-China, an ancient Asiatic Kingdom (see Vol. IV, p. 640), since 1863 under the protection of France, and forming with Anam, Tongking and Cochin-China, the colonial aggregation known as French Indo-China (q. v.), south of China. C.L.S.

CAMBRIA, the Latin name of northern Wales where the aboriginal Cimbri or Cymri took refuge at the invasion of England by the Anglo-Saxons in the 5th century. G.A.S.

CAMBRIAN PERIOD, in geology a period not clearly defined, but lying between the Archæan and the Lower Silurian. See GEOLOGY, Vol. X, pp. 291–293.

CAMBRIC, a general term applied to the finest and thinnest of linen fabrics. It is said to be derived from Cambray (q. v. Vol. IV), a city of France, formerly of Flanders, where the goods were first manufactured. Scotch cambric is really a muslin, being made of cotton with the fiber twisted very hard, to imitate real or linen cambric.

CAMBRIDGE, a village, capital of Henry County, northwest Illinois, 30 miles E. of Rock Island, on the Rock Island and Peoria railroad. Pop., 1900, 1,345

CAMBRIDGE, a town, capital of Dorchester Co., Md., on the Choptank River, about 50 miles S.E. of Annapolis; is an important shipping-point for oysters, herring, and shad; contains several canning factories and tobacco, flour, and stave factories, and two excellent academies. Pop., 1900, 5,747

CAMBRIDGE, a large and historic city of Middlesex County, Mass., lying just west of Boston and on the north shore of the Charles River. Within its limits are Cambridge, proper, the seat of Harvard University; Cambridgeport, an important manufacturing and commercial district; East Cambridge, the site of most of the municipal institutions; North Cambridge, West Cambridge, and Cambridge Station. At the southwestern corner of the city lies Mount Auburn Cemetery, the first great suburban place of burial established in America. Cambridge is memorable as the place in which the first printing press in North America was set up, and also as that in which Washington assumed command of the American army at the beginning of the Revolution. Its parks, streets and buildings are often very beautiful, and it is a favorite place of residence. See also CAMBRIDGE, Vol. IV, p. 647. W.F.J.

CAMBRIDGE, a village, capital of Isanti County, central eastern Minnesota, 44 miles N.E. of Minneapolis. Population, 1900, 737.

CAMBRIDGE, a village of Washington County, central eastern New York, about 35 miles N.E. of Albany, on the Delaware and Hudson railroad. It contains manufactories of machinery, flour, leather, and lumber, and is the seat of Cambridge Washington Academy. The Cambridge valley agricultural fair, annually held here, is one of the most complete agricultural exhibits in the state Pop., 1900, 1,578.

CAMBRIDGE, a city, capital of Guernsey Co., Ohio, in an agricultural and mining region, about 60 miles N. of Marietta, on the Baltimore and Ohio and the Cleveland and Marietta railroads. Coal and natural gas are found in the vicinity, and the town contains important manufactories of flour, iron, pottery, and roofing. The general offices and shops of the Cleveland and Marietta railroad are located here. Pop., 1890, 4,361; 1900, 8,241.

CAMBRIDGE, GEORGE WILLIAM, DUKE OF, born March 28, 1819, in Hanover. He commanded as lieutenant-general the 1st Division at Alma and Inkerman, and was, in 1856, made commander-in-chief of the British army, and in 1862 field-marshal. He retired in 1895, and died March 17, 1904. G.A.S.

CAMBRIDGE CITY, a village of Wayne County, east-central Indiana, on the Whitewater River, 15 miles W. of Richmond, on the Cleveland, Cincinnati, Chicago and St. Louis, the Lake Erie and Western, and the Pittsburg, Cincinnati, Chicago and St. Louis railroads. It contains extensive factories of railroad cars, machinery, furniture, sashes and

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blinds, flour and lumber. It is the northern terminus of the Whitewater Canal. Population, 1900, 1,754.

CAMBRIDGE GREENSAND, a name given to certain "coprolite beds" met with in Cambridgeshire, which were at one time supposed to represent the upper greensand. The beds in question are now ascertained to occur on the horizon of the base of the chalk marl. See COPROLITES, Vol. VI, p. 313.

CAMBRIDGE PLATFORM, a system of church government adopted by the synod of New England churches at Cambridge, in the colony of Massachusetts Bay, June, 1648. It reaffirmed the Westminster Confession of Faith with modifications relating to church government and discipline, which now practically prevails in the churches of the Congregational denomination. W.R.B.

CAMBUSLANG, a large mining village of Lanarkshire, Scotland, 4 miles S. E. of Glasgow. Here a revival, known as the "Camb'slang Wark," was held under Whitefield in 1741. Pop., 5,538.

CAMDEN, a town, capital of Wilcox County, southwest Alabama, 4 miles S. of the Alabama River, 36 miles S.W. from Selma. An academy and seminary are located here. Pop., 1900, 478.

CAMDEN, a city, capital of Ouachita County, central southern Arkansas, situated at the head of low-water navigation on the Ouachita River, 100 miles S.W. of Little Rock, on the St. Louis, Iron Mountain and Southern and the St. Louis Southwestern railroads. It is a shipping-point for cotton and an important center of trade. Steamboats ply between here and New Orleans. It contains several establishments for the manufacture of flour. Population, 1890, 2,571; 1900, 2,840.

CAMDEN, a town of Kent County, central Delaware, three miles S. of Dover. It is the seat of an academy. The chief industry is the canning of fruits. Population, 536 in 1900.

CAMDEN, a village of Knox County, southern Maine, on the west shore of Penobscot Bay, about nine miles N. of Rockland. It contains manufactories of railroad cars, car-wheels, pumps, spikes, anchors and woolen goods, and is engaged in commerce, ship-building, and the exportation of lime.

CAMDEN, New Jersey, the county seat of Camden County, and one of the chief cities of the state of New Jersey. It lies on the eastern bank of the Delaware River, directly opposite Philadelphia, with which city it is connected by a railroad bridge (north of the city) and several ferries. It is the terminus of seven railroads, belonging to the Pennsylvania and the Philadelphia and Reading systems. It thus forms the gateway of Philadelphia toward Atlantic City, Cape May, and other resorts on the New Jersey Coast. Camden is an important manufacturing center, having iron foundries, car shops, shoe factories, paint and oil works, and a number of ship-building establishments. It is also a popular place of residence for many people having business interests in Philadelphia. Its population was 58,313 in 1890 and 75,935 in 1900. W.F.J.

CAMDEN, a village of Oneida County, central New York; about 18 miles N.W. of Rome, on the Rome, Watertown and Ogdensburg, and Elmira, Cortland and Northern railroads. It contains important manufactories of leather, furniture, woolen goods, rakes and iron, and has several vegetable and fruit canning factories. Population, 1900, 2,370.

CAMDEN, a town, capital of Camden County, northeast North Carolina, on the Pasquotank River, 42 miles S. of Norfolk, on the Norfolk and Southern railroad. Population about 350.

CAMDEN, South Carolina, a town of De Kalb Township, in Kershaw County, in the north central part of the state. It lies in a nearly level agricultural country, on the east side of the Wateree River, and is memorable as the scene of the disastrous battle of Camden, on August 16, 1780, in which General Gates permitted the American army to be routed by Lord Cornwallis. It is reached by the Charleston, Cincinnati and Chicago and the South Carolina railroads. Its population was 2,441 in 1900. W.F.J.

CAMDEN, a town, capital of Benton County, west Tennessee, 87 miles W. of Nashville, on the Nashville, Chattanooga and St. Louis railroad. Population, 1900, 399.

CAMDEN HOUSE, the house of William Camden, the historian (1551–1623), at Chiselhurst, the residence of Napoleon III from 1871–73. G.A.S.

CAMDEN SOCIETY, named in honor of William Camden, the historian, and founded in 1838 in London for the purpose of publishing old English manuscripts. G.A.S.

CAMELFORD, a village in the northwest of Cornwall, England, 11 miles N.E. of Bodmin, near the source of the Camel, 14 miles from Launceston. It lies in a high and hilly tract, and is said to have been the scene of a battle between King Arthur and his nephew, Mordred, A.D. 542, in which both were slain. Population, 800.

CAMELOPARDALIDÆ. See GIRAFFE, Vol. X, p. 552.

CAMELOT, Eng., a hill in the parish of Queen Camel, Somerset, 6 miles north of Ilchester, associated with the legends of the Celtic hero, King Arthur. See ARTHUR, Vol. II, p. 568. C.L.S.

CAMELS, hollow vessels, like boxes or barrels, made of wood or iron, which are used for the raising or floating of ships in shallow waters or over sand-bars. The operation itself is very simple. A number of camels are filled with water and fastened to the ship below its waterline. Their content is then emptied by pumping and the vessel raised by their buoyancy. The same results are obtained by large rubber balloons which are fastened, when empty, beneath the vessel and pumped full of air. The inventor of the camels is the submarine engineer Wilhelm Bauer. G.A.S.

CAMEL'S HAIR, the reddish-brown ground-hair of the camel. It is long, smooth, very fine and soft, but mixed with long coarse bristles, and furnishes a valuable material for the manufacture of worsted goods. The waste hair, containing the bristles, is made up in carded yarn. The words "camel's hair" is sometimes, but erroneously used to signify Angora wool. G.A.S.

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CAMEL'S THORN, a name primarily applied to species of *Alhgai*, a genus of plants of the family *Luguminosæ*, containing a number of herbaceous or half-shrubby species. These plants are of great importance on account of the food which they afford for camels, as they are natives chiefly of the deserts of the East. (See MANNA, Vol. XV, p. 500.) *A. Maurorum* exudes a sweetish substance, which is one of the numerous "mannas" of the Oriental deserts. The name is also said to be applied in Persia and India to a species of *Zizyphus* used as fodder for sheep and goats, and in South Africa to various species of *Acacia* browsed upon by giraffes.

CAMEMBERT, a famous French soft cheese, made first in 1791 in Camembert, in the department of Orne, by Marie Fontaine. G.A.S.

CAMENÆ, the name of old Latin deities dwelling in springs. The Roman poets often associated the name Camenæ with that of the Greek muses. G.A.S.

CAMERAS. The changes which have been made in cameras consist principally in adjustments and attachments, and have had for their object the securing of compactness, portability, convenience and efficiency. The principle of the camera obscura remains unchanged.

The introduction of the "square" form of camera for outdoor work marks one of the chief advances. It was common to construct cameras so that the view presented upon the ground glass would be "horizontal." If a "vertical" view—say, of a tree or a tall building—was preferred, the camera had to be removed from the stand or tripod and readjusted. This required time; and while it was being done, the light upon the scene might change or the best chance pass entirely away.

The newly constructed square camera is provided with a reversible front (or back, according to style), which permits the quick reversal of the plate-holder from a "vertical" to a "horizontal" plane, and *vice versa*, as the circumstances require. To secure the advantages of such a contrivance, the bulk of the camera must be increased; but that is no great disadvantage. The "revolving-back" camera accomplishes similar advantages, but it is more expensive, and not so desirable practically.

Modifications have been made in the single and double swing attachments, which secure greater lightness and speedier action. The construction of the front board upon which the objective is fixed, so that it may be raised or lowered at will, has also been so altered as to provide greater facility and less cumbersomeness. By the use of the sliding front the operator regulates the height of the horizon in a landscape or the measure of foreground, and insures more artistic balance. The folding platform is sometimes supplemented by an added extension for use with objectives of very long focus.

The turn-table camera-base is an important improvement, having for its object the displacing of the loose tripod head. Using this invention, two metal flanges, one revolving inside the other (the inner flange being fitted with projecting pins which receive and hold the legs of the tripod) are inserted in the base-board of the camera. This arrangement secures portability, does away with the troublesome tripod screw, and enables the operator to instantly turn the camera toward any desirable point, where it may be held rigid by fastenings provided.

The introduction and evolution of the hand-camera presents one of the most interesting phases of photographic practice. "Its name is legion." It has contributed much, in careful hands, to photographic growth and improvement, yet it is responsible for much that degrades and disgusts the true photographer and his art. Only the most skilled can have good success with the "hand" or "snap-shot" camera, unless it be by accident, for it requires the best judgment as to light and composition.

Broadly speaking, hand-cameras may be divided into three classes: First, those constructed for glass plates, to be used in the common plate-holder or in magazine; second, those adapted for cut films also; and third, those fitted for a roll-holder, adapted for the use of bands of film sufficiently long for a number of exposures.

The modification of the camera and its parts for special uses in the various scientific and industrial applications of photography offers an interesting study. The panoramic camera, the photo-microscopic camera, the telescopic camera, the stereoscopic camera, the bicycle camera, the multiplying camera and the pinhole camera (used without a lens) are all ingenious in mechanism, and supply admirably the wants of the workmen for whom they have been designed. See PHOTOGRAPHY, Vol. XVIII, pp. 853, 854. EDW. L. WILSON.

CAMERON, a hamlet, capital of Cameron Parish, southwest Louisiana, on the east bank of Calcasieu River, 2 miles from the Gulf of Mexico and 90 miles N.E. of Galveston. Pop. 1900, 1,323.

CAMERON, Missouri, a city of Clinton County, in the northwestern part of the state. It is an important railroad center, lying at the intersection of the Chicago, Rock Island and Pacific, and the Hannibal and St. Joseph systems, and is the seat of various industries and much trade. Its population was 2,979 in 1900. W.F.J.

CAMERON, a city, capital of Milam County, central Texas, 60 miles N.E. of Austin, on the Gulf, Colorado and Santa Fé and the San Antonio and Aransas Pass railroads. Has two colleges, one for men and the other for women. Pop. 1900, 3,341.

CAMERON, ANGUS, an American legislator; born in Caledonia, N. Y., July 4, 1826. He settled in La Crosse, Wis., in 1857. He was a member of the Wisconsin Senate, 1863–64, 1871–72; member of the Legislative Assembly, 1866–67, and speaker, 1867; United States Senator in 1875–85, when he resumed his practice. He died in La Crosse, March 30, 1897. E.E.T.

CAMERON, ARNOLD GUYOT, educator, was born at Princeton, New Jersey, on March 4, 1864; was educated at Princeton University and in European institutions. He became professor of modern languages successively in Miami University, in the Sheffield Scientific School of Yale University, and in the John C. Green School of

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science at Princeton. Since 1900 he has been professor of French in Princeton University.

W.F.J.

CAMERON, Sir Charles Alexander, chemist and sanitarian; was born in Dublin, Ireland, on July 16, 1830, and was educated there and in Germany. He has been municipal analyst of Dublin, professor of hygiene in the Irish Royal College of Surgeons, and head of the health department of the city of Dublin. He was knighted in 1886, and is a member of many learned societies in Great Britain and Ireland. He has published a *History of the Royal College of Surgeons in Ireland;* a *Manual of Hygiene and Sanitary Laws*, and various other works and reports. He ranks among the best sanitarians of his time.

W.F.J.

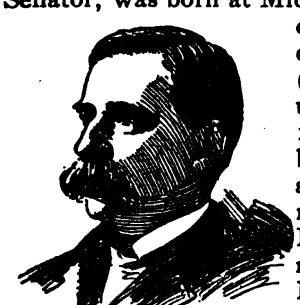
CAMERON, Henry Clay, an American clergyman and educator; born in Shepherdstown, Virginia, September 1, 1827. He was graduated from Princeton College in 1847 and from the Princeton Theological Seminary in 1855. He has been identified with the department of Greek at Princeton since 1862. He entered the Presbyterian ministry in 1859. He has written *History of the American Whig Society*, *Old Princeton*, and other works.

W.M.C.

CAMERON, James, editor, lawyer and soldier, was born at Maytown, Penn., on March 1, 1801, and became a printer, editor and lawyer. At the outbreak of the Civil War he became commander of New York 79th Regiment. In the battle of Bull Run, on July 21, 1861, he fell mortally wounded at the head of that regiment, in a most heroic charge.

W.F.J.

CAMERON, James Donald, capitalist and Senator, was born at Middletown, Pennsylvania, on May 14, 1833, the son of Simon Cameron (q. v.). He was graduated at Princeton in 1852, and engaged in business as bank clerk and cashier, and railroad manager and president. He was appointed Secretary of War in 1876. He was chosen to succeed his father as United States Senator from Pennsylvania in 1877, and remained in the Senate until 1897. He was chairman of the national committee of the Republican party in 1880. He is largely interested in railroads, banks, and coal and iron mines and manufactories.



JAMES D. CAMERON.

W.F.J.

CAMERON, John Hillyard, statesman, was born in France in 1817, and was educated in Ireland and Canada. He became a lawyer and, in 1846, a member of the Parliament of Upper Canada (Ontario). He was one of the commissioners for revising the statutes of Upper Canada in 1840 and again in 1856. His death occurred in 1876.

W.F.J.

CAMERON, Malcolm, statesman, was born at Three Rivers, Quebec, Canada, in 1808, and worked in early life as a stable-boy. By his own almost unaided exertions he educated himself and rose to an influential place in political life. He went from Quebec to Ontario in early manhood, and in 1836 became a member of the Ontario Parliament. He died in 1876.

W.F.J.

CAMERON, Simon, statesman, was born in Pennsylvania on March 8, 1799, and was left an orphan at the age of nine years. He became a printer and editor, and in 1821 conducted at Harrisburg, Penn., a Democratic paper strongly devoted to the political interests of Andrew Jackson. He became a banker in 1832, and a railroad president, and was adjutant-general of the state. He was elected United States senator in 1845, to succeed James Buchanan, resigned, and served until 1849. At that time he acted with the Democratic party. Upon the repeal of the Missouri Compromise he became a Republican. He returned to the Senate in 1857, in 1860 was a candidate for the Republican Presidential nomination which was given to Abraham Lincoln, became Secretary of War in 1861, went as minister to Russia in 1862, returned to the Senate in 1867, and served there until he resigned and was succeeded by his son, James Donald Cameron, in 1877. He died on June 26, 1889.

W.F.J.

CAMERON, Verney Lovett, an English African explorer; born July 1, 1844, at Radipole; died March 26, 1894, at Leighton-Buzzard. After having served in the navy from 1857–72, he was in the latter year appointed leader of an expedition sent out to the relief of Livingstone by the London Geographical Society. On March 24, 1872, he, accompanied by Lieutenants Murphy, Moffat, and Dr. Dillon, started from Bagamayo, reached, in August, Unyanyembe, where he met the servants of Livingstone bringing his remains to the coast. Here Cameron was obliged to proceed alone, when he reached Ujiji, Feb. 21, 1874. He sailed around the Tanganyika Lake and discovered its outlet, the Lukuga River, flowing to the Lualaba, a tributary of the Congo. Starting west, in order to explore to Lualaba down to the Congo, he was forced to leave the river at Nyangwe, and reached, on a new route to the southwest, Benguela, arriving at Loanda, Nov. 19, 1875. His journey across Africa from east to west, the first one ever accomplished by an European, stamped him one of the most successful of modern explorers. Raised to the rank of a naval commander in 1878, he traveled in that year in Asia Minor and Persia. He wrote *Across Africa* (2 vols., 1876); *Our Future Highway* (2 vols., 1880), and *In Savage Africa* (1887).

G.A.S.

CAMERON, William Evelyn lawyer, was born at Petersburg, Virginia, on November 29, 1842, and received a collegiate education. He was a soldier in the Confederate army all through the Civil War. After the war he became an editor and lawyer. He was mayor of Petersburg, Virginia, in 1876–82, and in 1882–86 was governor

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of the state. He has written a life of General Lee and other works. W.F.J.

CAMERONIAN REGIMENT is of historic interest as being named from the Cameronians (see succeeding article), who in 1688 were induced, against many scruples, to organize into a military body, for the purpose of completing the "religious" work of the revolution. Young Colonel Cleland raised the company which went into the North to repel the insurrection against William III, and, at Dunkeld, Aug. 21, 1689, defended themselves heroically against a force of about 5,000 Highlanders. Cleland was killed. This was the beginning of the many brave traditions of this regiment, which saw much foreign service, and became absorbed as an incorporate part of the line—*viz.*, the 26th regiment of British infantry. R.C.A.

CAMERONIANS, "reliques of the stern covenanters, resolute maintainers of the reformed church," in Scotland; the name being from Richard Cameron, a fervent field preacher, who suffered martyrdom for the cause of religious freedom. The opposition to the attempts to establish episcopacy by Charles I, in Scotland, culminated, June 22, 1680, when Cameron, with a small band, marched with "swords and pistols" to Sanquhar, where they promulgated a declaration disowning the king. This little band was hounded down, and at Ayrsmoss cut to pieces, Cameron being one of the slain. Some extremists refused to swear allegiance to William III, and these became known as the Reformed Presbyterians, or Old Presbyterian Dissenters. In 1743 they formed themselves into a presbytery and later into a synod of five presbyteries. They had synods in Ireland and congregations in England and America. In 1863 they split on the franchise question and the main body became united with the Free Church; the minority remaining, therefore, alone as representing the original rigid sect, which still exists as a distinct but "tenacious" body. Long persecuted on account of their maintenance of the principle of forswearance of "allegiance to the king," this peculiarity came to be tolerated, being non-political. See PRESBYTERIANISM, Vol. XIX, p. 703; CAMERON, RICHARD, Vol. IV, p. 656; also Vol. XXI, p. 538. R.C.A.

CAMEROON, a German colony on the West Coast of Africa, extending along 15° E. long. from the Cross River to the mouth of the Rio del Rey, below 3° N. lat. The name is derived from the Cameroon River, which enters the Bight of Biafra, opposite Fernando Po, by an estuary over 20 miles wide. The stream is for a considerable distance nearly a mile broad, has at some seasons a current of five miles an hour, and its yellow waters may be traced far out at sea. The country is very fertile, abounding in ebony, redwood and palm trees, and a variety of tropical fruits, while the production of cotton and ivory is very considerable. More recently plantations of tobacco and cacao have been established. The climate is very trying to Europeans, and traders generally live in hulks, and only store their goods on shore. The natives belong to the Bantu group. Their kings, Bell and Akway, practically wholesale merchants, made considerable trouble by their refusal to permit the natives of the interior to trade directly with Europeans. As England declined to assume the protectorate, the Germans were appealed to, and on July 14, 1884, the German flag was hoisted at Cameroon, and a governor appointed. An agreement was concluded in April, 1893, settling the boundary between the territory and the Niger Coast Protectorate. In the same year a German expedition, under Baron Uechtritz, arrived at Yola, on the River Benué, and were received by the Emir in the most friendly manner. The district covers an area of about 190,000 sq. miles, and the population is estimated at about 3,500,000. In 1897 there was 253 whites, of whom 181 were Germans. In 1895–96 the revenue was about $280,000; expenditure about $332,000. The chief town is Cameroon. See CAMEROONS, Vol. IV; also AFRICA, in these Supplements.

CAMILING, a town in the province of Tarlac, 19 m. N. W. of Tarlac town in Luzon, Phil. Is. Products, rice, corn, sugar, indigo and lumber. Pop. '03, 25,243.

CAMILLA, a town, capital of Mitchell County, Georgia, 26 miles S. of Albany, on the Savannah, Florida and Western railroad. Pop., 1900, 1,051.

CAMLET, a name originally applied to some beautiful and costly eastern fabric, afterwards to imitations and substitutes, the nature of which has often changed. A kind of stuff made with wool and silk, sometimes mixed with cotton or linen yarn, especially velvety, or plushy. W.R.B.

CAMOMILE-FLOWERS. (CHAMOMILE V, 334).

CAMORRA, the name of a secret society of lawless malcontents, called "Camorristi," that existed in the former kingdom of Naples. It was a system of organized extortion which survived the Bourbon rule. It was tacitly recognized by King Ferdinand for its political support, but was practically destroyed by Francis II. The organization, while not purely political like the Carbonari nor so murderous in its methods as the Mafia, virtually lived on plunder which it levied under terrorizing methods, not hesitating to commit murder. It had central agencies in every large provincial town and twelve in the city of Naples. They aided the Garibaldians in expelling the Bourbons from Naples. The profits which the officials of the Camorra divided were enormous. The Camorristi were the personification of power and heroism to the Neapolitan. The organization still retains a nominal existence, but is of no importance. W.R.B.

CAMPANULA (*Campanula*, a little bell), a showy herbaceous variety of hardy plants, of the order *Campanulaceæ*, distinguished by a bell-shaped corolla with five broad short segments, like the bluebell (*C. rotundifolia*). W.R.B.

CAMPANULARIA, a common genus of hydroids and type of a family, *Campanularidæ* (see HYDROZOA, Vol. XII, p. 595). The delicate stem bearing the colony of polyps may be simple or branched; the nutritive individuals are surrounded by transparent, bell-shaped sheaths, within which they may be retracted. The genus is common in north European seas and in the Mediterranean.

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CAMPARDON, Émile, French author; born in Paris, July 18, 1834; since 1884 chief of the bureau of legislature and judiciary in the office of the Archives of the Empire; received the decoration of the Legion of Honor in 1888. His writings relative to the eighteenth century and the French Revolution are the most important of his works. Among these are *Histoire du Tribunal Révolutionaire de Paris; Madame du Pompadour et la Cour de Louis XV; Voltaire, Documents Inédits; L'Académie Royale de Musique au XVIII^e^ Siècle;* and, in conjunction with M. Boutaric, *Les Mémoires de Frédéric II.*

CAMPBELL, an ancient and illustrious Scottish family, to which genealogists have chosen to assign an Anglo-Norman origin, deriving its surname from the Latin *De Campo Bello.* According, however, to the Duke of Argyle, it is purely Celtic, of Scoto-Irish origin; and *Cambel,* as the name was always formerly written, is just the Celtic *cam beul,* "curved mouth." See Argyleshire, Vol. II, pp. 439–441.

CAMPBELL, Alexander, theologian, founder of the church known as "Disciples of Christ," "Disciples," or "Campbellites"; was born near Ballymena, County Antrim, Ireland, in 1786, the son of a Presbyterian minister, and relative of the poet Campbell. In 1807 the family came to America, the subject of this sketch following the others in 1809, meantime finishing his course at the University of Glasgow. Alexander Campbell became a Presbyterian minister in Washington County, Pennsylvania, but in 1810 seceded, with his father, from that church, and adopted many of the principles and practices of the Baptists. On June 12, 1812, the two ministers, with all their congregations, were baptized by immersion, and were received into the Baptist Church. From that body, however, they were separated in 1827, when they formed an organization of their own, called "Disciples of Christ." This denomination, of which Alexander Campbell was the leader, grew rapidly in numbers, until in 1904, it comprised 6,567 ministers, 11,157 churches, and 1,235,798 members. Dr. Campbell founded *The Christian Baptist,* afterward renamed *The Millennial Harbinger,* in 1823, and founded Bethany College, West Virginia, in 1840. He died on March 11, 1866. See Disciples of Christ, this volume, p. 422*a*.

W.F.J.

CAMPBELL, Alexander, statesman, was born in England in 1822, removed to Canada and became a lawyer. Upon the union of the Canadian Provinces into the Dominion of Canada in 1867 he became a Cabinet officer under Sir John Macdonald, being the first Postmaster-General of the Dominion, and afterward Minister of the Interior. He remained in public service all the rest of his life, holding various Cabinet places. He was governor of Ontario in 1887, and died on May 24, 1892. W.F.J.

CAMPBELL, Bartley, dramatist, was born in Allegheny City, Pennsylvania, on August 12, 1843. In boyhood he became a writer of stories and poems for the newspapers, and afterward became a reporter and editor in Pittsburg and New Orleans. He wrote a play entitled *Through Fire* in 1871 which was so successful as to move him thereafter to devote himself to such work. With the production of *My Partner* in 1879 he became one of the most popular play-writers of his time. His *Galley Slave, The White Slave, Siberia,* and other plays, chiefly melodramatic, attained great popularity in America and Europe. Unhappily his mental health failed, and after several years of retirement he died in an asylum for the insane on July 30, 1888. W.F.J.

CAMPBELL, Douglas, lawyer; born in Cherry Valley, New York, in 1839; died in Schenectady, New York, March 7, 1893. He was graduated at Union College in 1860; took part in the Civil War, attaining the rank of major; began the practice of law in New York City in 1866.

CAMPBELL, Douglas Houghton, botanist; was born in Detroit, Mich., on December 16, 1859, and was graduated from the University of Michigan in 1882, afterward studying at Bonn, Tübingen, and Berlin. He was professor of botany in the University of Indiana in 1888–91, and since 1891 has been professor of botany in Leland Stanford, Jr., University. He has written *Elements of Structural and Systematic Botany; Structure and Development of Mosses and Ferns; Lectures on the Evolution of Plants,* and *A University Text-Book of Botany.* W.F.J.

CAMPBELL, Frank L., lawyer and public servant, was born in West Virginia on August 26, 1843, and was educated at Washington and Jefferson College and the Columbian University. He served in the Federal army in the Civil War, was an assistant attorney for the Interior Department for twenty years, Assistant Secretary of the Interior for three years, and since 1903 has been Assistant Attorney-General of the United States. W.F.J.

CAMPBELL, Sir George, statesman and author; was born in England in 1824, and was long in the service of the East India Company. He was chief commissioner for the central provinces, and lieutenant-governor of Bengal; and in 1875 returned home and entered Parliament. He wrote *Modern India* (1852); *White and Black in the United States,* and *The British Empire* (1889). He died at Cairo, Egypt, on February 18, 1892. W.F.J.

CAMPBELL, George Washington, an American statesman; born in Tennessee about 1768. He was a member of the U. S. House of Representatives, 1803–09. In 1811 he was chosen Senator, and served (with an intermission, 1814, during which he was Secretary of the Treasury) until 1818, in which year he was appointed envoy extraordinary and minister plenipotentiary to St. Petersburg, Russia. He died Feb. 17, 1848. E.E.T

CAMPBELL, Helen Stuart, author and lecturer, was born at Lockport, New York, on July 4, 1839. On reaching womanhood she became a writer of books, at first for children but afterward fiction for adults and treatises on social reform and philanthropy. She became a lecturer at the University of Wisconsin, and a professor in the

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Kansas State Agricultural College, from which latter place she retired in 1899. She was married to Mr. Campbell in 1860. W.F.J.

CAMPBELL, JABEZ PITT, clergyman; was born in Delaware in 1815, the son of a negro slave. He went to Philadelphia in his childhood, and was educated for the ministry. He was one of the chief organizers of the African Methodist Church, and became a bishop of it in 1864, in which capacity he visited nearly all parts of the world. He was a fine scholar, and an eloquent preacher. He died on August 9, 1891. W.F.J.

CAMPBELL, JAMES, jurist and Postmaster-General; was born in Philadelphia, Penn., in 1813, the son of an Irish immigrant, and was educated for the bar. He rose to eminence in his profession; from 1842 to 1850 was a judge of the court of common pleas in Pennsylvania, and in 1852 was attorney-general. In 1853–57 he was Postmaster-General of the United States. He died on January 27, 1893. W.F.J.

CAMPBELL, JOHN ARCHIBALD, jurist; was born at Washington, Ga., on June 24, 1811, was graduated from the University of Georgia at the age of fifteen, and was admitted to the bar before attaining his majority, by special act of the legislature. He settled in Alabama, rose to eminence at the bar, was repeatedly elected to the legislature, and in 1853 was appointed a justice of the Supreme Court of the United States. He opposed secession as a policy but upheld it as a right, and at the outbreak of the Civil War resigned his place on the bench and became assistant Secretary of War of the Confederate government. He participated in the Fortress Monroe peace conference with Lincoln and Seward in 1865, being accompanied by A. H. Stevens and R. M. T. Hunter. After the war he was arrested and imprisoned for a time, and then paroled. He died on March 12, 1880. W.F.J.

CAMPBELL, JOHN FRANCIS, folklore scholar; was born in Scotland on December 29, 1822, and was educated at Eton and at the University of Edinburgh. He filled various public offices, at court and in the lighthouse and coal commissions, but is best known for his studies of folklore. He was an enthusiastic Highlander, and one of the most accomplished Gaelic scholars of his time, and in his *Popular Tales of the West Highlands* (4 vols., 1860–62) he made one of the most important contributions in the world to the science of what he aptly called "storiology." He also edited some Gaelic texts, and wrote several books on natural history, and a series of letters on a tour around the world. He died on February 17, 1885. W.F.J.

CAMPBELL, JOHN MCLEOD, theologian; was born in Argyllshire, Scotland, in 1800, and was educated at the University of Glasgow. In 1821 he became a minister of the Presbyterian Church, but ten years later was deposed for heresy on account of his views on the personal assurance of salvation and the universality of the Atonement —in which he inclined to the beliefs of his friend Edward Irving. He bore his expulsion with saint-like meekness, declined to form a new sect, and spent the rest of his active life in evangelistic work, without remuneration, among the poor of the Highlands, and as unpaid pastor of an independent congregation at Glasgow. His health failed in 1859, and he retired to Roseneath, where he wrote several books, and died on February 27, 1872. He was one of the most spiritual-minded men of his time, and his *Christ the Bread of Life* (1851); *The Nature of the Atonement* (1856), and *Thoughts on Revelation* (1862) are works of inestimable value. See SCOTLAND, Vol. XXI, p. 563. W.F.J.

CAMPBELL, LEWIS, Greek scholar; was born in Edinburgh on September 3, 1830, and was educated at Glasgow and Oxford, becoming a fellow and tutor at the latter university. He became an Anglican clergyman in 1858, was professor of Greek at St. Andrews in 1863–92, and was a lecturer there for several years afterward. He has written a number of biographical works, and had edited many Greek classics. He has also contributed much to periodical literature, and was the author of the articles on *Plato* and *Sophocles* in the ENCYCLOPÆDIA BRITANNICA. W.F.J.

CAMPBELL, THOMAS W., clergyman; was born at Three Rivers, Quebec, Canada, on September 24, 1851, and was graduated from Victoria University in 1879. In that year he became a minister of the Methodist Church, and for two years was an editor of *The Christian Guardian*, a Methodist Church paper, at Toronto. After some years in the Methodist ministry he joined the Reformed Episcopal Church, in 1891 was elected bishop of that church in Canada, and in 1894–97 was its presiding bishop. In 1898 he withdrew from the Reformed Episcopal Church and entered the ministry of the Presbyterian Church, and since 1899 has been settled in a pastorate in Brooklyn, New York. W.F.J.

CAMPBELL, WILLIAM WALLACE, astronomer; born April 11, 1862, in Hancock, Ohio, was from 1886–88, professor of mathematics at the State University of Colorado; 1888–91, instructor of astronomy at Ann Arbor, and became in 1891 director of the Lick Observatory. He led the expeditions for the observation of the eclipses of the sun in India (1897–98) and in Georgia (1900). He published *Elements of Practical Astronomy*, and wrote treatises on comets, eclipses of the sun, the spectrum of comets, etc. G.A.S.

CAMPBELL-BANNERMAN, SIR HENRY, English statesman; born at Kelvinside, Scotland, 1836, studied at Glasgow and Cambridge. He was, in 1868, elected to the House of Commons; was from 1871–74 and 1880–82, financial secretary at the War Office; from 1882–84, Secretary to the Admiralty; from 1884–85, Chief Secretary of Ireland; in 1886 and 1892–95, Secretary of State for War, and was, in 1899, elected leader of the Liberal party in the House of Commons, and, in December, 1905, made Premier. G.A.S.

CAMPBELLITES. See DISCIPLES OF CHRIST, in these Supplements.

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CAMPBELL ISLAND, a lonely spot of volcanic origin to the south of New Zealand, discovered in 1810 by the captain of a whaling-vessel, who gave it the name of the owners of his vessel. It is in lat. 52° 34′ S., and long. 169° 62′ E. It was used as an observatory during the transit of Venus in 1874. Though it is mountainous, portions rising to a height of 1,498 feet, and measures only 36 miles around, it has valuable harbors and a rich and rare flora.

CAMPBELL'S STATION is a small village of Knox County, near Knoxville, Tennessee. It was the scene of one of the minor battles of the Civil War. It is near the Tennessee River. W.F.J.

CAMPBELLSVILLE, a town, capital of Taylor County, central Kentucky, 18 miles S. of Lebanon, on the Louisville and Nashville railroad. Tobacco warehouses are here. Population, 1900, 1,341.

CAMPBELL WEB PERFECTING PRESS. See PRINTING-PRESSES, in these Supplements.

CAMPHENE ($C_{10}H_8$,) a term applied to the oil of turpentine when distilled over chloride of calcium to render it free from rosin. It may also be obtained by distilling camphor with anhydrous phosphoric acid. The pure oil has been much used for purposes of illumination, and is a very brilliant light. It has been almost entirely superseded by kerosene oil. W.R.B.

CAMPHILENE, an artificial variety of camphor obtained from turpentine, by acting thereon with the dry vapor of hydrochloric acid, and keeping the whole at a low temperature by immersing the vessel in a freezing mixture. A solid substance is produced, which separates in white crystalline prisms, and has the taste and agreeable aromatic smell of common natural camphor.

CAMPI BISENZIO, a town in the province of Florence, Italy. It has a fine castle. Population, 1900, 14,000.

CAMPIDANO, a historic plain in the Italian island province of Sardinia, extending from the Gulf of Oristano on the west coast to the Gulf of Cagliari on the south coast. It is about 50 miles long and from 6 to 10 miles broad. It is traversed by several rivers, contains a number of towns, and is a fertile, populous and attractive region. W.F.J.

CAMPINAS, SAN CARLOS DE, a city of southern Brazil, situated on a fertile plain, 44 miles N.W. of São Paulo. There are large coffee and sugar plantations in the surrounding district. Pop., 35,000.

CAMPION, the common name of plants belonging to the genera *Lychnis* and *Silene*, of the family *Caryophyllaceæ*, to which family belong, also, the common "pinks." The common "campions" of the United States are *S. stellata*, "starry campion," and *S. inflata*, "bladder-campion."

CAMP-MEETINGS were organized more than a hundred years ago by the Methodist Episcopal Church in America as summer-time gatherings of people, generally in sparsely settled regions, for a week or more of practically continuous religious work, including preaching and prayer-meetings. The practice has been continued to the present time, with modifications, some of the "camps" having been developed into elaborate and extensive communities, housed in permanent buildings instead of tents, and the services including lectures and entertainments, as well as purely devotional exercises. W.F.J.

CAMPOAMOR, DON RAMON DE, a Spanish poet, philosopher and statesman; was born at Navia in 1817 of a noble Asturian family. He was civil governor of Alicante and Valencia, and had a distinguished career in the Cortes. In the revolution of 1868 he was a royalist, and upon the accession of King Amadeus he became Minister of the Interior. Under Alfonso XII he was a Councilor of State. He was the author of many volumes, including lyrical poems, poetical dramas, philosophical essays, and political discussions. His best known prose works are *Filosofia de las Leyes; El Personalismo Apuntes para una Filosofia, Polemicas con la Democracia; Lo Absoluto*, and *El Idealismo*. He died on February 11, 1901. W.F.J.

CAMPOBELLO is an island in the Bay of Fundy at the entrance to Passamaquoddy Bay, Maine. Though geographically a part of Maine, it belongs to the Canadian province of New Brunswick, of which it forms the southeastern extremity. It is a favorite summer resort, especially of those devoted to yachting and fishing. Its area is about 20 square miles, and its permanent population is nearly 1,500. W.F.J.

CAMPO DE CRIPTANA, Spain, a town in the province of Ciudad Real, 58 miles by rail southeast of Toledo. It has old established manufactures of textiles and an agricultural trade. Population, 7,000. C.L.S.

CAMPO FORMIO, a village of northern Italy, in the province and near the city of Udine. It was the scene of the treaty-making between France and Austria in 1797. See AUSTRIA, Vol. III, p. 114, and NAPOLEON, Vol. XVII, p. 206. W.F.J.

CAMPOS, ARSENIO MARTINEZ. See MARTINEZ-CAMPOS, in these Supplements.

CAMPOS, SÃO SALVADOR DOS, a city in the province and near the city of Rio de Janeiro, Brazil, at the head of navigation of the Parahyba River, 30 miles from its mouth. It is a well built and attractive city, with extensive commerce, and a population of 20,000 in 1890. W.F.J.

CAMPUS MARTIUS, now the most crowded part of modern Rome. See ROME, Vol. XX, p. 825; also MARS, Vol. XV, p. 577.

CAMPVEER, a fortified town of the Netherlands, in the province of Zealand, in Walcheren Island, four miles N.E. of Middleburg. It has a port on the Veersche Gat, a tract of water separating Walcheren from North Beveland. The town is now in a state of deplorable decay, but it still possesses a splendid cathedral and remnants of its early prosperity. It has one calico factory. Historically it is one of the most interesting of Dutch towns. Here William III, Prince of Orange, was first proclaimed stadholder. Population, 900.

CAMTOOS OR GAMTOOS, a river dividing Cape Colony into an eastern and a western section,

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150 miles in length, is formed by the conflux of the Gareka and Zout rivers at Beers Vallei. It flows through the district of Uitenhage, separating the Great Zwarte Berge and Kougo Berge from the Great Winterhook and Little Winterhook mountains and empties into Francis Bay.

G.A.S.

CAMUS, ARMAND GASTON, a bibliographer, prominent during the French Revolution; born in Paris, April 2, 1740; died Sept. 2, 1804. On account of his superior knowledge in ecclesiastical law he was elected advocate-general of the French clergy. He was a zealous and ascetic Jansenist, and possessed of extraordinary firmness of character. In 1789 he was elected to the States-General. He gained possession of and published the so-called *Red Book*, giving accounts of court expenditure, which was highly disadvantageous to the court and its ministers. In 1793, when he was commissioned to make prisoners of Dumouriez and other generals suspected of treason, he was taken prisoner with his colleagues and delivered to the Austrians. After an imprisonment of two years and a half, he was exchanged for the daughter of Louis XVI. On his return to Paris he was elected to the Council of Five Hundred, became its president in 1796, resigned a year later, and devoted his time to literature and the classification of books and libraries.

CAMWÓOD OR BARWOOD, a dyewood which yields a brilliant but not permanent red (see DYEING, Vol. VII, p. 498). It is the wood of *Baphia nitida*, a tree of the natural order *Leguminosæ*, suborder *Cæsalpiniæ*, a native of Angola and Sierra Leone.

*CANADA. The political, economical and social progress of Canada in the past two decades, together with the development of her institutions and the increase of her resources, call for important additions to the article on the Dominion to be found in Vol. IV, pp. 675–691 of this ENCYCLOPÆDIA. Almost thirty years have elapsed since the Confederation Act created the Canadian Dominion, and knit into a federal union the older provinces of the crown in British North America. Already, most of the "Fathers of Confederation" have passed away, including the conspicuous figures, Sir John A. Macdonald and Sir G. Etienne Cartier, the respective English and French leaders of the Tory government of the period, with most of the chiefs of the Liberal party that had coalesced with the Conservatives to bring about the union and remove the dead-lock of that time in the legislative machinery of the colony. Their great work, nevertheless, remains, and though all that was expected of the labor of their hands has not been realized, the young nation has since made great material advancement, and seen much accomplished in the strenuous work of unifying the once isolated and widely separated peoples that now constitute the Canadian Dominion.

The British North America Act went into force July 1, 1867, and two years afterward Canada extended her domain by the acquisition of the northwest, which for two centuries had been under the sway of the Hudson Bay Fur-Trading Company. Out of this vast tract she created the prairie province of Manitoba, and, later on, organized, under legislative machinery of its own, part of the great stretches of the northwest territory. In 1871, British Columbia, on the Pacific, and, in 1873, Prince Edward Island, in the Gulf of the St. Lawrence, became provinces of Canada, and completed the chain from ocean to ocean of the Confederated British American Colonies. Newfoundland (in 1896) still maintains its separate crown-colony organization, and, under it, exercises jurisdiction over the bleak coasts of Labrador. In area, though Canada has thus assumed the proportions of an empire, yet it is to be noted that while her southern boundary line is nearly 4,000 miles in length, the habitable portion of the country is necessarily limited by the rigor of the climate on the north. To this there is, however, an exception in the northwest, where the isothermal lines, in their westward sweep, widen the cultivable region in the newer portions of the Dominion. This latter fact, while it opens enormous areas for colonization, adds millions of square miles to the zone of grain-cultivation and cattle-raising, qualified, however, by the risks of early and late frosts and the expense of transportation to market.

With Canada, as with the United States, the question of transportation to and from the new and remote districts has been a serious one, since great is the cost of hauling, first to the through lines of railways, and then by the latter to tidewater, and in the case of Britain, of conveying to that distant market. In the northwest, the vast grain and herd raising region of the Dominion, indispensable facilities have been extended to it by the transcontinental enterprise, the Canadian Pacific railway, which was constructed between the years 1881 and 1886 at an outlay of one hundred and fifty million dollars, nearly one half of which was furnished by the Canadian government. This railroad, which forms a great national and imperial highway from sea to sea, has, with its connected systems (1900), a mileage of 6,874 miles, and, with the Intercolonial, Grand Trunk, and other railways, gives the Dominion a total transport service of 17,824 miles. This vast network of railways is, in the main, the product of the last twenty years, for at confederation Canada had a railway mileage of only 2,258 miles, and in 1875 of less than 5,000 miles. The operations of the Intercolonial and the Grand Trunk railroads are chiefly confined to the older provinces. The Intercolonial is a government road, 1,511 miles in length, connecting the province of Quebec with the maritime provinces of Nova Scotia and New Brunswick. The Grand Trunk, which absorbed the old Northern and Great Western railroads, is a corporate organization, with ramifications throughout Ontario, a trunk line to Quebec, and a branch through United States territory to the seaboard at Portland, Maine. It has a total track of 3,153 miles. In addition to this extensive railway system, Canada has a valuable trans-

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port service in her canals, on which she has expended, on works and maintenance, close upon $75,000,000, two thirds of which have been disbursed since confederation. These canals, 75 miles in length, overcome the obstacles to navigation on the St. Lawrence system. The main expenditure on the canal has been incurred in enlarging the Lachine and Welland, and in constructing the new Sault Ste. Marie locks. Great as has been the cost of these undertakings, they have been, and still are, of incalculable material service to the country, and a valuable offset to reciprocal privileges enjoyed by Canada in the United States.

The improved waterways of Canada have naturally extended her inland shipping and coasting trade, while the enterprise of her people and their increased wealth have developed, also, her commercial marine, which now ranks fourth among the chief trading nations of the world. Shipbuilding has always been a large branch of industry in Canada, and her hardy sons in the maritime provinces have made the best of sailors. Since the construction of iron-built vessels, Canada's trade in wooden ships has somewhat fallen off, but despite this, and the extension of the railways, the tonnage of her vessels engaged in the coasting, inland and sea-going trade is large. The total number of vessels on the registry books of the Dominion on the 31st of December, 1900, was 6,735, with a net tonnage of 659,534 tons. In 1896 she began to improve her sea-going mail and postal service across the Atlantic; and of late years she has, through the enterprise of the Canadian Pacific railroad, established an admirable line of passenger steamships between Vancouver and China and Japan, and Vancouver and Australia. The Canadian Pacific railway has also a good steamship service between Owen Sound, on the Georgian Bay, and Port Arthur, at the head of Lake Superior.

While the material strides of the colony have to be admitted, the dispassionate onlooker who really knows Canada has, however, to keep his enthusiasm in check when dealing with what is gratifying in the country's progress, since there are many features of the situation which discount the advancement that has been made, and qualify one's estimate of the present status and immediate future of the Dominion. These, at the outset, may briefly be glanced at, since they explain why Canada, with the vast extent and great resources of the country, and with a thrifty and industrious though sparse people, has not made still greater gains. The chief drawback from which Canada obviously suffers is her rather rigorous northern climate, her political and economical isolation from the continent of which she is a part, and her proximity along 3,000 miles of inviting frontier, to the attractions of a populous, wealthy and progressive nation. Of these retarding influences, Canada's contiguity to her great southern neighbor, which makes heavy annual drains upon the flower of her population, is doubtless the most serious, aggravated hitherto by an artificial, and for a limited population an unwise, policy of protection, which imposes a high tariff, and vastly increases the burden of taxation. Other manifest drawbacks are the large and rapidly mounting debt of the Dominion, due in part only to expenditure on public works, and the fact that the country, which is not only under-populated but over-governed, is becoming a dear one to live in. These matters, as we have hinted, have to be taken into account in appraising Canada's present circumstances, and in seeking intelligently to understand the political and economical situation, which in time, doubtless, she will happily outgrow.

Another disadvantage from which Canada, in addition to being over-governed, in some respects suffers lies in the divided and unassimilated race and religion which make up her population, and introduce into her politics the sinister elements of discord and even conflict. The effect of this is seen in the Jesuits' Estates imbroglio, and in the recent strife in Parliament and the country over the Manitoba separate schools question, as it has been seen all along in the history of the two nationalities, and their opposing interests of race and creed, back to the era of the Conquest. Party antagonisms and the fierceness of the political game intensify the bitterness between the two races, and increase the difficulty, as they enhance the cost,—often by corrupt means,—of governing. This untoward state of things natually retards the progress, as it postpones indefinitely the unification, of the Dominion, and more particularly so when the guiding hand at the helm of affairs is not strong and the art of governing is either impolitic or unskillful. In spite, however, of these anti-national phases in the political life of the country, Canada has made great constitutional and material strides, and accomplished much in setting the colony on its feet and smoothing the path of progress. With an added million or two to her population, if meantime the country does not swamp herself with debt, the national outlook will be less grave, and the aspiration of her people become more hopeful and buoyant. Her debt, however, is large for her small population (in 1901 the population was only 5,639,666); and though there is much to show for the debt, still the growth of population is slow, and a net debt which has grown from $75,000,000 at confederation to over $265,493,806 in 1900, is, with annual deficits and an inelastic revenue, a seriously retarding burden.

The total area of the Dominion is 3,653,946 square miles, of which close upon 606,000 square miles are water surface, while 250,000 square miles (approximately) consist of heavily timbered forest, besides large tracts of young woodland. From the forest resources of the country, which consist chiefly of spruce and pine, and in British Columbia of yellow cypress, Douglas fir and giant cedar, Canada derives an annual revenue, inclusive of the wooden products of the factory, of nearly thirty million dollars. This vast aboreal wealth, which use and waste must, however, soon diminish, finds its way mainly to the markets of England and the United States. A further im-

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portant source of wealth in Canada is agriculture, including the products of the dairy and the farm. This wealth is derived from some twenty million acres under crop, out of a total of thirty million acres of improved lands. In addition to this, there were at the census of 1891 over fifteen million acres in pasture, and half a million acres in gardens and orchards. Relatively to the whole area of Canada, the area under crop and in pasture was, in 1891, about 10 per cent. In the agricultural pursuit, 45 per cent of the population, despite the hiving in cities in recent years, find a means of subsistence, as well as opportunities for accumulating wealth. The value of Canadian exports of wheat, flour and other breadstuffs was, in 1900, a little over nineteen million dollars—a decrease in value of some million dollars, owing partly to the low price of wheat and partly to the loss of the American market for barley, in consequence of the high tariff. The McKinley tariff also affected the export to the United States of horses, though the loss has approximately been made good by the large exports to England of live cattle and sheep—a trade which has sprung up in the last ten years with the fitting out of steamers suited to the carrying trade, plying between Montreal and British ports. The returns for the year 1899 show a total export of 12,384 horses, 211,847 cattle, and 405,322 sheep, of the total value of $10,961,755. For the reason above stated, the egg and poultry trade with the United States has of recent years greatly declined, though the loss has been counterbalanced by a large increase in the exports to Britain of bacon, hams, pork, and lard. There has also been a phenomenal increase in the cheese exports to England, the yield from which has doubled in the last seven years. The returns from the export of this commodity in 1900 were in value $19,856,324. The value of the butter shipments was, for the year 1900, over $5,122,156, and that of eggs $1,457,902. Of hay there is also a considerable export, amounting in the year last named to over $2,500,000. Fruit of the hardier sort is also a considerable source of wealth, the export of apples being for the year 1897 over $2,500,000. The grape crop, which, however, is mainly gathered in Southern Ontario, was in 1891 over twelve million pounds' weight.

The Canadian fisheries, as is well known, are the most extensive in the world, and are now assiduously and profitably cultivated. The commercial value of the whole catch, embracing cod, herring, lobsters, mackerel, haddock and salmon, was for the year 1899 nearly twenty-two million dollars, or just double the value of the yield twenty years before. Roughly speaking, about half of the catch is exported. The fish trade of British Columbia, which is mostly of canned salmon, shows the greatest increase over that of all the other provinces. The value of the catch in the Pacific Coast province was, in 1899, a trifle over $4,500,000. In 1899 the value of the whole fish catch of Canada was $21,891,706.

The mineral ores of Canada form another, and so far as they have been developed a valuable, source of economic wealth. Besides coal, petroleum, mineral manures, and minerals used as pigments, for building purposes and in certain chemical manufactures, the ores consist chiefly of iron, copper, nickel and lead, with some silver and gold. The two latter precious metals are being found more plentifully in Canada; the gold-bearing quartz lodes are limited in their area to the Yukon and to Nova Scotia and British Columbia, while silver finds its main area of production, so far as is yet discovered, in the region lying to the north and northwest of Lake Superior. The value of the annual output of these two great commodities in 1900 was: gold, $27,916,752; silver, $2,730,598. That of the entire mineral production of Canada was for the year 1900 $63,775,090, about one-fifth being the value of the coal yield. This, it will be seen, is quite a modest showing; but the mines of Canada, it must be remembered, have only recently begun to be developed, and that chiefly in Ontario, while the absence of a near market for iron ores, and the lack of facilities for smelting, have hitherto been retarding circumstances.

Colonization and the utilizing for agricultural purposes of the waste places of the country have seriously interfered with the peltry trade, which in Hudson Bay Company hands was formerly a great and valuable source of revenue. The area of the fur preserve is, however, yet large, though the extinction of animals whose furs are fashionable points to the ultimate doom of the trade. How large and profitable the trade still is may be seen from the following list, representing the chief peltry catch in Canada for the year 1894: Bear, 9,173; beaver, 46,779; fisher, 4,024; red fox, 15,810; lynx, 12,813; marten, 108,997; mink, 51,163; musquash, 648,687; otter, 7,444; seal, 44,086; wolf, 2,037.

Manufactures have of recent years become an extensive source of wealth in Canada, particularly since the adoption by the Dominion government, in 1879, of a protective tariff, otherwise known as the "national policy." The census of 1891 shows the number of industrial establishments of all kinds in the Dominion to be 75,968, with a gross working capital of $181,500,000. The value of the manufacturing output for the year 1891 was $476,000,000. The industries chiefly represented in these figures are: Brewing, sugar-refining, cheese-making; fish, meat, and fruit canning; flour, grist and saw milling; machines, tools, implements, boot and shoe making, clothing, cotton and woolen milling, furniture and house-building supplies, brick-making, ship-building, stove-making, and the construction of sewing-machines, pianos, organs and other musical instruments. The manufactured exports of Canada for the year 1900 amounted in value to $39,397,277, Great Britain and the United States taking the bulk of this, in about equal proportions.

Perhaps the best indications of the prosperity of Canada in the past twenty-five years are to be

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derived from the growth of the people's deposits, as shown in the chartered and savings banks statements. In the chartered banks the total deposits in 1868 were under $34,000,000; in 1900 they were over $305,000,000. Within the same period Canada's bank capital had expanded from $30,000,000 to over $65,000,000, with liabilities, in 1900, of $356,394,095, and assets of $459,715,065. The deposits in the government, post-office, and other savings banks have since confederation increased still more. In 1868, the total deposits were only $5,000,000, while in 1900 they had amounted to close upon $68,600,000, or $12.75 per head of the population. Comparative statements of the capital invested during the last two decennial periods in the native loan and building societies also show a gratifying increase in public wealth. In 1874 the paid-up capital of these institutions was only $8,000,000; twenty-five years later (1899), the paid-up capital had expanded to $47,337,544. The total assets, at the latter period, of these institutions amounted to $148,664,120, with like liabilities. The statistics of the insurance companies of all kinds indicate similar progress, the total amount of premiums received by companies doing business in Canada for all forms of insurance having risen from $8,000,000 in 1882 to $26,680,000 in 1900, or over 300 per cent increase. The proportional shares in this increase are: Canadian companies, 48.4 per cent; United States companies, 27.8 per cent; and British companies, 23.8 per cent. The annual income from life-insurance premiums in Canada, for all companies, has risen from $1,250,000 in 1869 to $14,845,693 in 1900. Of these life premiums the Canadian companies received on an average 59 per cent; the United States companies, 31 per cent; and the British companies, 10 per cent. The native life companies doing business under Dominion charters returned in their statements for 1900 assets of $59,522,077 with $54,477,642 of liabilities.

The growth of the postal system since confederation is a further indication of progress, both in the area of settlement and in the volume of business expansion. In 1868 the number of post offices was 3,638; in 1899, the number had increased to 9,420. The government expenditure on the service increased within the same period from $1,000,000 to nearly $5,000,000, being at the latter date (1899) almost $400,000 in excess of the revenue. Canada's telegraphic facilities show like favorable extension; only eight countries in the world having, as statistics prove, a greater telegraphic mileage than the Dominion. Already extensive and rapidly developing is her system of cable communication. Canada, as the birthplace of the telephone, is also well equipped with this useful auxiliary of commerce. In 1900, she had 16,000 miles of wire for each million of her people, as against 12,000 miles for each million inhabitants of the United States.

We have said that the population of Canada, for its area, is still sparse, and that its growth is slow. The chief increase is in the prairie province of Manitoba, which of recent years has grown largely from the older settled portions of the Dominion. Of the total population in 1901, of 5,371,051, it is estimated that 100,000 are Indians, one-half of whom find their habitat in British Columbia, Manitoba, and the Northwest Territories. These native tribes, it is calculated, have reached the stationary limit in the census returns, save in the case of those who have become civilized and have taken to agricultural or other settled pursuits. Disease and the struggle for existence, now that colonization has narrowed their hunting grounds, knell the doom of the nomads. Of the whole population, 86.6 per cent are native-born, the percentage being largest in the older provinces. About 1,650,000 are French-speaking folk, and of the Roman communion. The religious denominations, as a rule, keep their relative numbers, the Roman Catholics having a membership equal to 41.21 per cent of the population. The Methodists come next in the race, with 17.54 per cent; the Presbyterians, with 15.63 per cent; the Church of England, with 13.37 per cent; and the Baptists, with 6.29 per cent.

At confederation, Canada established a Department of Militia and Defense, under a minister of the crown, with a British officer acting as adjutant-general. The Dominion is divided into 11 military districts, each under a permanent military staff. Besides a government military college (at Kingston, Ontario), there are small permanent corps and schools of instruction in the different arms of the service. The strength of these permanent corps is 1,000 men. In the several provinces there is an active militia land force of about 38,000 raised by voluntary enlistment. These are trained and drilled annually, at convenient seasons, the period of drill being from eight to sixteen days per annum. The reserve militia, which exists practically only on paper, includes all the able-bodied male inhabitants of Canada between the ages of 18 and 60. In the Northwest Territories there is an embodied mounted police force, 1,000 strong, for the preservation of peace and order, and the confiscation of intoxicating liquors held contrary to law. The annual militia expenditure is in the neighborhood of $1,846,178.

Under the Confederation Act each province of the Dominion manages its own educational affairs. The school statistics, therefore, where there is occasion to deal with them, will be found under each province.

The aggregate trade of the Dominion, which in 1900 was a trifle over $381,517,236, has varied much in the last twenty years, many of the years exhibiting a serious decline, while the increase within the period has been about 46 per cent. The total imports for the year 1900 were in value $189,622,513, while the total exports for the same year were $191,894,723. A little more than half the Canadian exports went to Britain, and about 60 per cent of the imports came from the United States. The volume of import trade almost invariably exceeds the value of the export trade. Only four times since confederation has

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this rule been reversed. The average annual value, per head of population, during the 30 years of confederation has been: Of imports, $25.03; of exports, $22.07; or $47.10 per head of a total annual trade. The percentage of dutiable goods, as against free goods, has within the same period varied from 59 to 82 per cent of the imports. The total duty collected throughout the Dominion on imports for the year 1900 was close upon $29,000,000. Of this, 25 per cent was collected on British imports, and 60 per cent on American. The difference is accounted for by the fact that nearly 51 per cent of American imports were free goods, principally raw material, while only 29 per cent of the imports from Britain were on the free list. The total trade of the colony with Great Britain in 1900 amounted to $152,526,098, and with the United States to $178,463,401, a fact which shows that proximity of market is almost as much a factor as sentiment.

The Dominion revenue, which, in the main, is derived from customs duties and excise imposts, has grown from $13,687,928 in 1868 to $51,029,994 in 1900. The expenditure in 1900 was $47,975,279, showing a considerable surplus for the first time in several years; though, taking the total amount since confederation, there has been an excess of revenue of over $20,000,000 in the whole era. The debt of the country has within the period advanced with giant strides, owing chiefly to expenditures on capital account, incurred for railway and canal construction and the assumption of provincial debts. Nearly $200,000,000 have been disbursed or raised by loans on these accounts the gross debt of Canada, June 30, 1900, was $346,206,980, or, less the Dominion assets, $265,493,807 net debt, being $50.94 per head of population. This amount, it is true, is much less than the debt per head of the English people, and only about one-fifth of the debt per capita in the Australian colonies; but it is more than double the per-capita debt of the people of the United States, whose resources and money-making power are infinitely superior to those of Canada.

With the dissolution (midsummer, 1896), seven Parliaments have run their course since confederation, with seven successive ministries, though with but three changes of government. One of these changes occurred in 1873, when the Macdonald government, discredited by corrupt relations with a company of contractors who had offered to build the Canadian Pacific railway, was supplanted by a reform or Liberal administration, under the Hon. Alexander Mackenzie. The Mackenzie administration held office until 1878, when it was overthrown on a tariff question which then agitated the country. This was the question of protection to native industries, foreshadowed in what came to be called the "National Policy" of the succeeding Liberal-Conservative administration of Sir John Macdonald, though that redoubtable politician died in 1891, and has been succeeded in the premiership by four successive Tory chiefs. In June, 1896, the Conservative government of Sir Charles Tupper was beaten at the general elections by the Liberal party, headed by Sir Wilfrid Laurier, who became Premier. The cause of defeat was the opposition of the country to the policy declared by Sir Charles Tupper's administration to coerce Manitoba into restoring separate schools to the Catholic minority of that province. A significant feature of the change of party administration was the revolt of the electors of the French and Papal province of Quebec against the Roman Catholic priesthood, who, at the bidding of the bishops, had commanded their flock to vote for Conservative as against Liberal candidates, and this in spite of the fact that Sir Wilfrid Laurier, the leader of the Liberal party, was himself a Frenchman and a Catholic.

The more notable incidents in the annals of the era since confederation, in addition to those already referred to, are as follows: Early in the seventies, after the imperial government had transferred to the Dominion Rupert's Land and the Northwest Territories, the franchises of the Hudson Bay Company being purchased by Canada for $1,500,000, England handed over to the colony all fortifications and military and crown lands, excepting those at Halifax (Nova Scotia) and Victoria (British Columbia), at the same time withdrawing the imperial troops from the country. By an order in council in 1880, England also made over to the Dominion the islands of the arctic archipelago lying to the northward of Canada. In 1884 the boundaries between Ontario and Manitoba were defined by a decision of the Judicial Committee of the Privy Council of England; and, five years later, the Imperial Parliament extended and defined the boundaries of Ontario on the north, east, and west. In 1876 the Northwest Territories, which at first were placed under the jurisdiction of Manitoba, were given a separate government, consisting of a lieutenant-governor and council, with the seat of government at Regina. In 1882, the Territories were divided into the four districts of Assiniboia, Alberta, Saskatchewan, and Athabasca, and in 1886 were given representation in the federal Parliament. In the organization of the Territories, the sensitiveness of the native half-breeds was touched, and in 1885 the latter rose in revolt, under Louis Riel, and set up a provisional government. The rebellion was, however, suppressed by an armed expedition from the older provinces, consisting of Canadian militia, though at the cost of considerable blood and treasure, and Riel, the leader of the *émeute*, was hanged.

The hanging of Riel was bitterly resented by the French-Canadians, whose sympathies were actively with their misguided rebel countryman, and for a time there was a strained feeling between the two races and much political disaffection. Crises of this sort are unhappily not uncommon in the Quebec province, where the French nationalist feeling, incited by ambitious leaders, such as the Hon. Honoré Mercier, has of recent years been a menacing development. Racial antagonism and jealousies have been intensified

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by Romish aggression and by the stimulus which the Ultramontane Church in Quebec has of late given to French ambition. The extent of the ecclesiastical domination was seen throughout the controversy over the Jesuits' Estates claims which added $400,000 to the financial burdens of the French province, already almost swamped with debt, owing to the political corruption that has prevailed and the easy morals of men such as MM. Mercier, Senecal, and Chapleau. The feeling was further in evidence during the agitation all over the country on the Manitoba separate schools question, though the French hierarchy, in its attitude toward the discussion, had, in the recent election of M. Laurier, whom the Church frowned upon in the contest, a significant rebuke. Nothing more advantageous to the country could well have happened than this rebuff received by the Church, and it is to be hoped that, with the purifying of politics in the French province, as well as in the Dominion at large, the event heralds the dawn of a better day.

In 1872, dual representation in the Dominion and the provincial Parliaments was abolished. In 1892, the legislative council of New Brunswick was wiped out of existence, and in the following year the legislative council and assembly of Prince Edward Island were merged into one body. In 1875 the supreme court of Canada was constituted. In 1880 the Royal Canadian Academy of Arts, and in 1881 the Royal Society of Canada, were founded. In 1877 the Halifax Fisheries Commission awarded $5,500,000 to England, to be paid by the United States for reciprocal rights in the fisheries; and eight years later, the United States terminated the fisheries clauses of the Washington Treaty. In 1893, the court of arbitrators respecting the seal fisheries in Bering Sea convened and declared their award. In 1895 the unorganized and unnamed portions of the Canadian Northwest were, by proclamation, given the following designations as provisional districts of the Dominion: Ungava, Franklin, Mackenzie, and Yukon.

The administration of Sir Charles Tupper having resigned in July 1896, in consequence of an adverse vote at the polls, a new ministry (the eighth in order since Confederation) was formed under the Liberal French-Canadian leader, the Hon. Mr. (now Sir Wilfrid) Laurier, who became First Minister and President of the Privy Council. Canada under a Liberal administration has prospered greatly, and in spite of some shortcomings incidental to party government in Canada, Sir Wilfrid Laurier has proved acceptable to the people. This has just been signally shown in the general elections of Nov. 1900, when Sir Wilfrid has once more wrested victory at the polls from his aggressive adversaries, the Conservatives, led by the veteran statesman Sir Charles Tupper. The personal popularity of Sir Wilfrid in both French and English provinces, combined with his tact as a leader and his eloquence in debate, has won for his Government the renewed confidence of the electors, with a further lease of power. The Premier's well-known fairness may be trusted on this side the boundary line when the questions between the United States and Canada as to the Alaskan boundary, the Bering sealing question, etc., etc., come up anew for diplomatic parley and international adjustment. His good sense and judgment may also be relied upon when the question of preferential trade and other delicate matters are once more brought forward for settlement between the colony and the mother country. His tariff legislation in 1897, giving Great Britain the benefit of preferential trade with Canada, was a politic stroke and did not a little to cement the bonds of Empire. This the people of England recognized when Sir Wilfrid visited London to take part in the jubilee festivities of Queen Victoria. He was then appointed a member of the English Privy Council and made a G. C. M. G.

In Nov. 1898, the Earl of Minto (well known in Canada as Viscount Melgund) succeeded Lord Aberdeen as Governor-General of the Dominion. In the following month, Canada joined other portions of the Empire in adopting the inter-imperial rate of postage on letters, reducing the rate from five to two cents per half ounce. The postage rate on letters within the Dominion was at the same time reduced from three to two cents per ounce. The reduction, though welcomed by the commercial class, entailed a loss of revenue to the P. O. department of $300,000 for the year following the change. In Aug. 1898, Canada also inaugurated the Postal Note system for use within the Dominion. At the end of 1899, the St. Lawrence Canal traffic was greatly benefited by the opening of the Soulanges Canal, 14 miles in length, which replaces the shallow Beauharnois Canal, and by the completion of the work of deepening the whole series of the St. Lawrence Canals. There is now a 14 feet channel-way throughout the system, instead of one 9 feet only in depth. In continuing the system of giving subsidies to railway lines within the Dominion, a departure which dates from 1883, the Canadian Government is doing much to enhance the facilities of travel and the transit of goods. The sums voted and paid to the railways between the years 1883 and 1899 by the Dominion aggregate $46,000,000, the chief beneficiary being the Canadian Pacific R. R., which has now in operation from the Atlantic to the Pacific 6,681 miles of track. The Grand Trunk System operates (1899) 3,147 miles of track. The Intercolonial R. R. (1,314 miles in length), which operates in the Eastern provinces of the Dominion, with connections from Montreal to the Atlantic ports, is owned and run by the Government. The earnings of the road for 1899 ($3,780,805) just balance the annual expenditure. On. Dec. 31, 1899, there were 34 electric railways in operation in the Dominion, with a paid up capital of $21,736,000, and 632 miles of track.

Prosperity and expansion have in an especial degree marked of late years the manufacturing industries and trade of Canada. The growth of the home markets has also benefited agriculture. The foreign trade of the country for 1900 was in value

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$381,517,236, the exports alone for the year amounting to $191,894,723. Classified under products, the year's exports, June 30, 1900, were as follows (total value, $191,894,723):

Farm products and animals and their products	$83,326,921
Manufactures	13,692,773
Forest Products	30,050,018
Mine Products (total year's production)	63,775,090

At the same period, the revenue of the Dominion for the year was $51,029,994, and the expenditure $42,975,279. The revised population in 1901 was for the entire Dominion 5,369,666. The net debt, deducting assets, was in 1900 $265,493,807. The assets of the chartered banks, whose paid-up capital amounts to sixty-five and a quarter million dollars, was for 1900 $459,715,065, with liabilities amounting to $356,394,095. The gold production for the year was in value $27,916,752, of which the Yukon district yielded $16,000,000. The latter figures are an increase of six millions over the Yukon yield in 1898.

A wave of imperial sentiment passed over Canada at England's embroilment with the Boer Republics in South Africa. This took practical form in the offer to the mother country of military contingents which were organized and despatched to the Cape, and which have done splendid service throughout the campaign. Of special value were the services of the Strathcona Horse, a mounted body raised in the Canadian Northwest, and which was equipped and forwarded to South Africa at the expense of Lord Strathcona, Lord High Commissioner for the Dominion in Great Britain. The moral effect of this patriotic action on the part of Canada in taking a share at a critical juncture in the burdens of Empire, was great, and in connection with similar action taken by the other chief colonies of the Crown evoked immense enthusiasm. Owing to the valor in the field of the Dominion troops the casualties of the campaign in the two contingents have been large.

After the Conservative defeat in the recent Dominion elections, it was stated (Nov. 1900) that the veteran Tory statesman, Sir Charles Tupper, intended to retire from political life.

Despite many disadvantages under which the country suffers, only optimistic can be the chronicler of Canada's recent development. On her people devolves the care of half a continent, whose resources are illimitable and whose capabilities are untold. In population, if Canada has not as yet the numbers that betoken progress, she has a country vast and productive enough to rear numbers. In her Northwest she has a belt of land which could provide sustenance, with plenty, for thirty or forty millions. In Manitoba and the organized districts of Assiniboia, Alberta, and Saskatchewan there are close upon 239,000,000 acres, which have been brought to the uses of the farmer and the ranchman to the extent of 7,832,200 acres. Included in this statement are the ranching grounds, which, in 1895, covered 904,187 acres, distributed among 185 lessees. In Ontario alone, twice the present population of the whole Dominion could be comfortably housed and fed. Nor has the progress only been material. Besides the advance in wealth, and all that wealth has brought in its train, there has been a steady rise in the moral and intellectual status of the people. The gain in this direction is perhaps not all that the ardent patriot could wish, but the progress has been upward, and the ascent has not been that of a class merely, but of the people as a whole. In the national outlook there is, as Canadians themselves admit, not a little still to perplex and bewilder, but there is also much to encourage and inspire. G. MERCER ADAM.

CANADA BALSAM (*Picea balsamea*), the balm of Gilead fir, a tree of the family *Coniferæ*, native of Canada and other parts of North America. Its leaves are silvery white on the under side. The name also refers to the turpentine obtained from the cones of the tree, which is used for mounting and preserving microscopic objects. It is a transparent liquid, almost colorless, with an agreeable odor and acrid taste. When fresh, it is of the consistence of thin honey, but soon becomes viscid and finally a solid. It is prepared by dissolving the resin in essential oil. It was formerly used in medicine as a stimulant for the cure of mucous discharges, and for the treatment of ulcers, but is now rarely used as a remedy. The balsam is much used in photography, in mounting objects for the microscope, and as a cement for connecting achromatic lenses, being perfectly transparent, and having the same refractive power as that of glass. See BALSAM, Vol. III, p. 253. W.R.B.

CANADA GOOSE, the common wild goose of North America (*Bernicla canadensis*).

*CANADIAN LITERATURE. Although the Dominion of Canada, in age, physical characteristics, race and spirit has had much in common with her great neighbor the United States, she has as yet produced no national literature. Writers she has had in abundance, some of them of rare excellence, but she has had no great, distinctively Canadian writer, no sharply defined literary movement, no northern school of poets or novelists or historians. Amid a great wealth of literary material, surrounded by the grandest of natural scenery, and looking back over a history full of romantic episode, especially in the early French period, the Canadian has had little encouragement for literary effort. He has never had the inspiration of a firmly united, independent fatherland. "A dependency can never be a nation"; and it is an axiom that literature can flourish only where the idea of independent nationality is firmly established.

In addition to this element of dependence there have been other serious impediments in the way of literary development. Despite the fact that the provinces are united in a confederacy under one executive and legislative head, much as are the United States, there is no real centralization. The Dominion lies in four widely separated sections: the maritime provinces; old Canada, including Quebec and Ontario; the prairie region, including Manitoba and the northwest territories:

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and British Columbia. While each of these communicates freely with the sections of the United States directly south of it, there is, owing to natural barriers, but little communication between the contiguous sections. The territory west of Ontario is as yet in its formative period, and is still too new for literary development. A history of Canadian literature must confine itself to the St. Lawrence valley and to the maritime provinces. But even within this restricted area there are almost impassable barriers to literary development. The provinces of Quebec and Ontario are separated by an antagonism both of race and of religion. Quebec is literally "a new France in the heart of English Canada," with a spirit, a religion, a language and a literature wholly unlike anything else in America. Its outlook, both in thought and literature, is toward France. Thus the Canadian writer can expect no audience of his countrymen outside of his own province. The book published in Toronto seldom reaches the maritime provinces, since Quebec lies as a barrier between, and there is no demand for it in the new northwest. These conditions have made it hitherto impossible for the literary magazine, that most important factor in literary development, to flourish. All Canadian writers, who have become at all known outside the limits of their own province, have been compelled to seek publishers in the United States, in England or in France.

Canada is as yet in her song period. Poetry is not widely popular among the masses of Canadian readers, yet from the first the bulk and the best of the literary product has been in verse. Aside from a few narratives chiefly valuable as sources of history, the Dominion is known to the literary world wholly from its lyrics. The earliest voices came naturally from the older sections about Quebec and the Lower St. Lawrence,—simple chansons sung by the French peasantry, lullabies and nonsense verses, rollicking boat-songs sung by hardy *voyageurs* and raftsmen, tender ballads of the *ancienne mère-patrie*, rippling love ditties, and wild drinking-choruses. The most popular of all these old chansons is *À la Claire Fontaine*. "All the people in Canada sing the *Claire Fontaine*. One is not French-Canadian without that."

Aside from a few historical narratives, the French have produced no valuable literary work outside the realm of song. There have been a few true poets, but no great original singer. All of them have kept carefully in tune with the voices of old France. The earlier poets, like Turcotte, Barthe, Derome and Garneau, were simply the Canadian exponents of the French school of 1830. The later group has been more national in its themes and its tones, and almost all of its members have belonged to the romantic school. Among its best representatives may be mentioned Octave Crémazie, Pierre Chauveau, Pamphile Le May, Louis Honoré Fréchette and Benjamin Sulte. Fréchette, who is easily the leading singer of French Canada, has taken his themes almost wholly from the national history. His sweet lyrics, published in collections, bearing such poetical titles as *Les Fleurs Boréales* and *Les Oiseaux de Neige*, won for him in 1880 the laurel crown of the French Academy.

English-Canadian literature is of comparatively recent date. Commencing with Mackenzie's narrative of his travels in British America, published in 1802, there have been published, from time to time, many native books dealing with the exploration and the history of the northwest and of Lower Canada. The stormy times preceding the union of 1840–41 called forth not a few trenchant political brochures, and many valuable studies of important periods in Canadian history have been made from time to time, but native works of a purely literary nature were almost unknown until after the confederation of 1867. Following this union, which had in it the promise of a united fatherland, there came a sudden outburst of literary activity, especially in the region known as Upper Canada, now Ontario. The first true English-speaking poet was Charles Heavysege, who published, in 1857, at Montreal, *Saul*, a drama, "one of the most remarkable English poems ever written out of Great Britain." Eight years later he published *Jephthah's Daughter*, a work full of imagination and feeling. Heavysege was not a native of Canada, and is Canadian neither in spirit nor in theme. It remained for Charles Sangster, a true poet of nature, to sing the first genuine songs in English of the Canadian woods and fields, of "the St. Lawrence and the Saguenay." He was followed closely by Alexander McLachlan, "The Canadian Burns," whose *Idylls of the Dominion* are fragrant with odors of forest and meadow, and musical with the heart-songs of his people. In the great choir of later singers a more extended mention should be given to Charles Mair, "The Northwest Poet," author of a drama entitled *Tecumseh*, and the singer of wild life on the prairie and the war-path; to Isabella V. Crawford, who died too early to reap the rich reward which her strong powers should have brought her; to E. Pauline Johnson, a young poet of rare promise, already the strongest singer that the Indian race has produced; to Archibald Lampman, who brings to his pictures of northern woods and pastures a rare classical spirit and culture; to K. Seymour McLean; to Ethelwyn Wetherald; to "Seranus" (S. F. Harrison); to Duncan Campbell Scott; and to many another. Another English-speaking poet worthy of mention is John Reade of Montreal, whose *Merlin and Other Poems* has the Tennysonian grace and sweetness, combined with a striking originality.

Of the maritime provinces, New Brunswick has become of late the literary center. The little school of poets headed by Charles G. D. Roberts, Bliss Carman, Barry Stratton and William W. Campbell is one of the most promising groups in literary America. Roberts, with his sweet, perfect lyrics, full of pictures of the marshes and uplands of his native coast, is now the unchallenged leader of northern song. His best work is in his *Orion and Other Poems* (1880) and his *In Divers Tones*, books distinctively Canadian in spirit and

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scene. The leading singer of Nova Scotia is perhaps Arthur J. Lockhart, while Prince Edward Island has for its laureate John Hunter-Duvar, the author of many graceful lyrics of island life and scenes.

Notwithstanding the fact that the Dominion, with its varied population and conditions, has in its history, its social life and its scenery a rich mine of materials for fiction, there has as yet been produced no Canadian novel of even second rank. James De Mille, a native of New Brunswick, and author of the widely popular *Dodge Club in Italy*, wrote little that was distinctly Canadian. Five or six names exhaust the list of writers who have written novels that are read outside of Canada. The leading novelist of French Quebec is M. Joseph Marmette, whose historical romances, *L'Intendant Bigot* and *Le Chevalier de Mornac* have found considerable favor in France. Among other French historical novels may be mentioned De Gaspé's *Les Anciens Canadiens*, and Bourassa's *Jacques et Marie*, a story treating of the expulsion of the Acadians. Of English novelists, only the names of Major Richardson, Miss Machar ("Fidelis"), William Kirby, John Lesperance, Gilbert Parker, and the joint authors of *An Algonquin Maiden* need be mentioned.

In the field of historical literature Canada has produced several notable names, chief among which are those of Judge Haliburton, better known under his humorous sobriquet of "Sam Slick," whose *Historical and Statistical Account of Nova Scotia* is a standard work; James Hannay, whose *History of Acadia* has taken a leading place, and Goldwin Smith, who, with many works, both historical and political, has made himself the leading prose writer of Canada.

Dr. William Kingsford has lately written at considerable length a *History of Canada*, which is a painstaking and detailed narrative, though lacking in the attractive qualities of literary style. Eight volumes of the work have appeared, which bring the annals down to the War of 1812. Another work, useful for consultation, and of which a new edition has recently been published, is Macmullen's *History of Canada.* It is written from the Liberal standpoint. Dent's *Canadian Rebellion;* the same writer's *Last Forty Years;* Goldwin Smith's *Canada and the Canadian Question;* Parkin's *The Great Dominion;* Grant's *Picturesque Canada;* and Adam's *The Canadian Northwest*, are worthy additions to historic literature. Biography has also made additions of more or less merit to native letters, the more notable works dealing with political memoirs and reminiscences. Science has also enlisted its writers, as have education, law and religion.

The future of Canadian literature is hard to predict. It depends on the future history of the Dominion itself. The weakness of its past has come from its sense of dependence, its lack of self-reliance, its want of centralization. With a firmly united, independent government there would come at once an outburst of literary activity, for which the literature of the past has been but the preparation, and Canadian literature would soon take an established place beside that of the United States. F. L. PATTEE.

CANADIAN RIVER, one of the principal tributaries of the Arkansas River, has its rise in the mountains of northeastern New Mexico, and flows eastward for 900 miles, through Texas, Oklahoma and the Indian Territory. W.F.J.

CANAJOHARIE, a township and village of Montgomery County, New York, in the east central part of the state. It lies on the south bank of the Mohawk River, and is the seat of numerous and varied industries. It is 55 miles from Albany, and is reached by the West Shore railroad. The population of the village was 2,101 in 1900. W.F.J.

CANAIGRE, a species of dock (*Rumex hymenosepalus*) indigenous to western Texas, Arizona and New Mexico. Its root is used in tanning. These roots vary in weight from a few ounces to a pound. In its habit of growth it resembles the sweet potato.

*CANAL. The construction of canal systems as the controlling instrument in internal transportation was characteristic of the development of this country during the first half of the century. The opening up of the railway period checked further construction, especially in new territory, and occasioned the abandonment of a considerable mileage of canals, much of which was badly located and of limited capacity; still, many works were carried to completion, some new enterprises were entered upon, and the capacity of old canals increased, and the completion of some of the old systems was strongly urged as late as 20 years ago. It is probable that had railway development been deferred 20 years, canals would have so far determined industries and localized commercial routes, that they would have persisted better and been enlarged with the growing necessities of commerce, as has actually occurred with the earlier canals, and ere this their unification in a general system, with a standard type of prism and lock, would have been under way.

Such has been the history of the canal system of France, the unification of which was undertaken by the government in 1876, and although by no means completed, the growth of traffic and the development of industries has fully justified the large expenditures made. At the present time there are in process of improvement and development some eight thousand miles of internal water routes, about one third the railway mileage, on an area equivalent to the combined areas of Michigan, Indiana, Illinois and Wisconsin, and less adapted to water routes. However, the old type of canal may be said to have become obsolete within the last 20 years, and the present very active thought in regard to water transportation is along quite different lines, though hardly yet formulated in any generally accepted conclusions. The end will doubtless be better than to have developed by mere departures from old precedents in the improvement of canal systems, originally conceived under very different economic condi-

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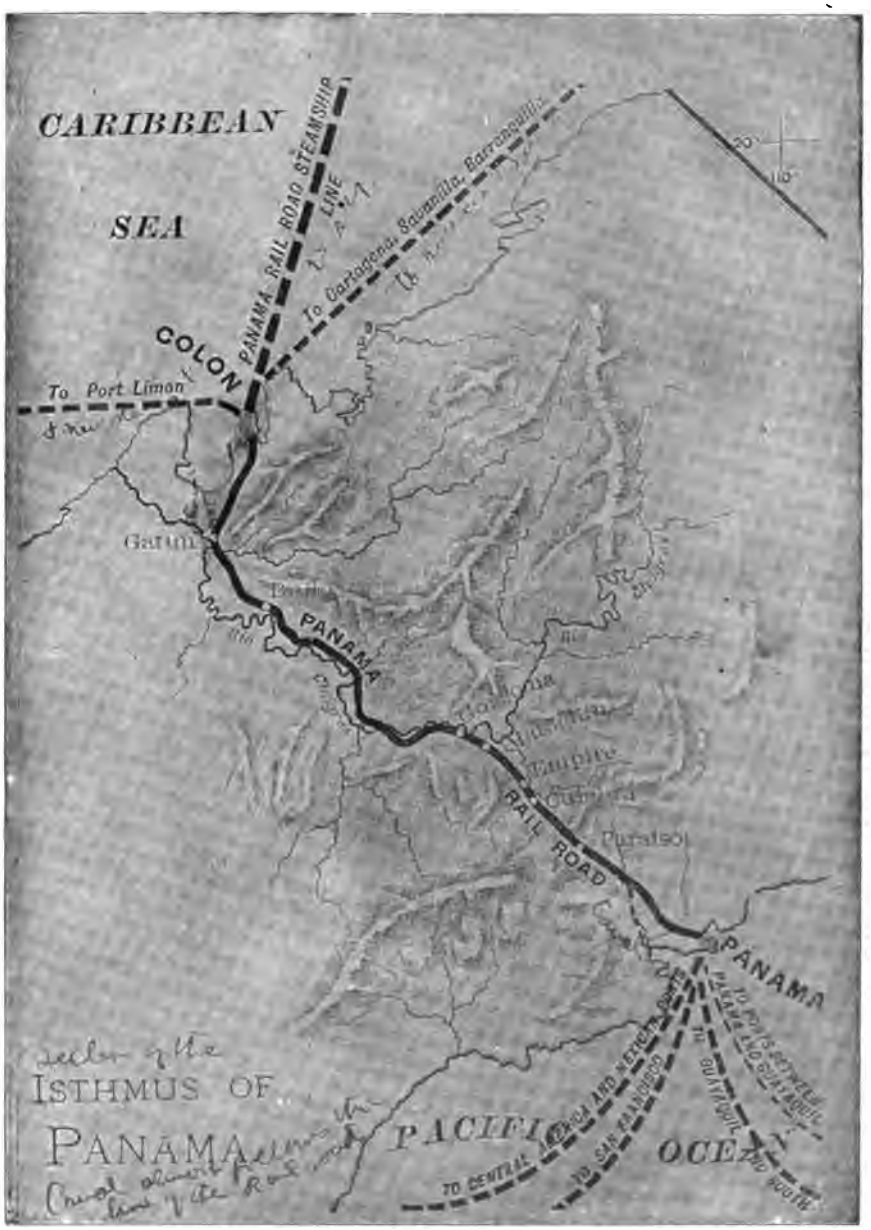

ROUTE OF THE PANAMA ISTHMIAN CANAL.

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tions, and when engineering resources were relatively meager. The same topographical conditions that located the original canal will largely determine its modern successor, and the same resources in mineral and vegetable products will govern its usefulness. It will be well, therefore, to review briefly canal development in this country.

This development was largely confined to the territory lying between the seaboard and the Great Lakes and upper Ohio River, and again to the region lying between the lakes and the Ohio and Mississippi rivers. New York's topographical situation favored canal location, and she led the way, with canals reaching from tidewater of the Hudson to Lake Erie at Buffalo, Lake Ontario at Oswego, and Lake Champlain at Whitehall, and, by the Richelieu River, the St. Lawrence between Quebec and Montreal. The lakes of the central part of the state were brought into the system, and laterals were built into the Black River valley north from Rome; into the Susquehanna valley via the Chenango canal from Utica to Binghamton and by the Chemung canal from Seneca Lake to Elmira; and into the Ohio valley by the Genesee canal from Rochester to the Allegheny River at Olean. Extensions were going on as late as 1870 to unite the system with that of Pennsylvania. With the exception of the Delaware and Hudson canal, the canal system was built and operated by the state. In its maximum extension, including the central lakes and interior rivers, it aggregated 1,188 miles. The non-paying laterals were abandoned in the 70's, and the system now aggregates 851 miles. Between 1838 and 1862 enlargement of the main canals took place, effecting 567 miles, and by popular vote in November, 1895, it was determined to expend nine million dollars in further enlargement. The system has been free since 1882.

Following New York's example, the territory to the south, including the states of Pennsylvania, New Jersey, Delaware, Maryland and Virginia, entered actively upon canal construction. Deep bays and tidal arms, as Chesapeake Bay, Delaware Bay and New York Bay, invited canals of a semi-maritime type, as the Delaware and Raritan, the Chesapeake and Delaware and the Albemarle and Chesapeake, and the enlargement of these for strategic purposes and the coasting trade is advocated. The mineral resources carried canals up the valleys far into the recesses of the mountains. Three lines were intended to reach the Ohio, and Pennsylvania actually constructed a line from Philadelphia to Pittsburg, by a combination of railway, canal and portage railway, by which boats were carried 50 miles, in sections, across the Alleghany Mountains from Hollidaysburg to Johnstown. This line gave rise to the Pennsylvania Railway Company, which still operates a part of the original canal system. The Chesapeake and Ohio canal extended up the valley of the Potomac to Cumberland, and a project was matured for an extension to the Ohio at Pittsburg as late as 1876. This canal was nearly destroyed by a flood a few years since, but was considered sufficiently valuable to be rebuilt. The James River and Kanawha canal extended to Buchanan, and plans for its extension across the mountains were matured in 1877. The canal has since been abandoned. The canal up the valley of the Susquehanna was designed to connect with the New York system and give a route from Chesapeake Bay to the northern lakes. This connection was never made, although the final link was under way in 1870.

The Morris canal extended from Jersey City across northern New Jersey to Phillipsburg. It was remarkable in the use of inclines for overcoming many high lifts across a precipitous country. The Lehigh navigation made use of bear-trap dams, which were lowered in floods, and this idea was carried to France, and gave rise to very extended river improvements in that country and Germany. Various modifications and adaptations were made, and these have been re-imported within the last 20 years. The principles developed by the engineers who projected the Morris canal and the Lehigh navigation are destined to extended future application. Throughout the territory, 1,586 miles of canal were developed, 899 miles of which are still in actual service. Some of the lines were abandoned without proper justification.

In the territory lying between Lake Erie and the Ohio River, lines were carried from Lake Erie, at Erie, Pennsylvania, and at Cleveland and Toledo, Ohio, reaching the Ohio at Beaver, Pennsylvania, Marietta, Portsmouth and Cincinnati, Ohio, and Evansville, Indiana. Five main lines crossed the territory, and these had many laterals. Two of these, the Pennsylvania and Erie and the Wabash and Erie, have been abandoned. All these canals belonged to the early type of small canals. Nearly all the routes have been reexamined within the last twenty years for canals of larger capacity, and a ship-canal is now being actively promoted through the territory between Cleveland and Erie and south to the Ohio River, so the abandonment of canals in this region was evidently a mistake. The aggregate mileage of the various canal systems was 1,624 miles, 708.5 of which are still in service.

In the territory lying between Lake Michigan and the upper Mississippi River, Illinois projected a route by the Illinois River and built a canal from Chicago to La Salle, and deepened the summit-level so as to feed the same from Lake Michigan, in 1866–71. A proposed branch from Hennepin to Rock Island is now being built by the general government. The Kankakee valley branch, designed to reach Lake Erie by the Wabash and Erie route, has been abandoned.

Wisconsin projected the Fox-Wisconsin route and carried it out as far as Portage. The works are now being maintained by the general government. The Illinois and Wisconsin canals have a length of 369.4 miles in operation and under way, and 21 miles have been abandoned.

Kentucky undertook many important works in

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the way of canalizing rivers, as the Kentucky and Green rivers, but constructed no canals of the ordinary type. These are in active service, and in recent years there has been a notable increase in the mileage of canalized rivers in the Ohio basin. At the present writing there are 646 miles of rivers improved by locks and dams, many of the movable type. Only 94 miles have been abandoned, and these were very inadequately carried out. The Illinois River has been canalized for 227 miles, and a few minor works give 10.6 miles more in the upper Mississippi basin.

New England executed 133 miles of work, of which 13.5 miles are in use. In the South, 168.3 miles were developed, of which 75 were abandoned, mostly of a small class. New works are being carried out in several localities in the way of canalizing rivers and overcoming abrupt ascents. The Pacific Coast has but two short canals, overcoming rapids, one on the Willamette and one at the cascades of the Columbia.

Canada has had an active canal policy from an early day. Among those first constructed were the ordnance canals for military purposes. They consisted of three short canals, around rapids of the Ottawa River, by which Ottawa is reached, and thence the Rideau canal, 126¼ miles to Kingston. The Trent canal was intended to extend the system to Georgian Bay, and was partially opened up, and this is now being completed. The Rideau-Trent system aggregates 395 miles. What are known as the St. Lawrence canals consist of seven detached canals of an aggregate length of 72.8 miles, overcoming the rapids of the St. Lawrence and the ascent from Lake Ontario to Lake Erie through the Welland canal. The enlargement of this system has been under way since 1872, with many delays, and its completion is expected in 1898. The locks are 270 feet long and 45 feet wide, with 14 feet of water on the miter-sills. A ship-canal 1⅛ miles long has also been constructed around St. Mary's Falls at the outlet to Lake Superior, and opposite the one constructed by the United States. The Chambly canal and the St. Ours lock unite Lake Champlain and the St. Lawrence through the Richelieu River. The entire mileage of Canadian canals is 450.5, excluding the 28 miles of the abandoned improvement of Grand River.

Several short canals have been constructed for the purpose of overcoming rapids and falls in rivers, as the Louisville and Portland on the Ohio, the Muscle Shoals on the Tennessee, the Des Moines on the upper Mississippi and the one at the cascades of the Columbia. These are hardly canals in the old sense, but in conjunction with the improvement and canalization of rivers, they illustrate the tendency of modern waterway development, both in this country and abroad. The aggregate length of these special canals is small, and is no index of their importance, and each would call for separate mention in any complete discussion.

In the foregoing summaries, no canal is included that merely constitutes an artificial strait without locks, designed to shorten the passage between two navigable waters. A complete summary, so far as data are obtainable, of all the canals constructed in the United States and Canada, including canalized rivers and land-locked waters made part of canal systems, gives 6,548 miles. Of these 2,277.6 miles have been abandoned, while those in actual service aggregate 4,270.4 miles. Considered in the light of what now is actually being done, the abandonment of at least 1,000 miles was a mistake, and they are likely to be replaced by more adequate works in the future. The remainder probably had no sufficient reason for their construction.

The change in conditions brought about by modern railway facilities accounts for the decadence of the early type of canal and defines the line of future development. In the segregation of commerce between the two agencies, it is found that coarse freights of low value lying at the basis of industrial operations naturally seek the water routes, and also commodities to be moved in bulk over long distances, while the railway better satisfies the requirements of the detailed and distributive traffic and high-grade freight. Thus it is found on the Western rivers that the old-style steamboat is being replaced by barges moved in fleets over long distances. On the lakes, the average movement by water is from five to eight times that of the railways operating in the same territory. The reason is therefore clear why the old type of canal persists in mineral regions, and where forming part of long-distance water routes, and has fallen into disuse in other situations. Following further this line of reasoning, it is apparent that future development will be largely in the direction of uniting natural waters and the canalization of rivers, so as to form connected systems by which exchanges may be effected between remote sections, and that the capacity of these natural waters and their possibilities of development will determine the scale of the undertakings.

There are, however, certain limiting conditions, based on the unit cargo, which can be moved in competition with the railway. This was considered a generation ago by John G. Stevens and John B. Jervis, veteran authorities in such matters, and placed at 600 to 800 tons, or the maximum capacity of the best-equipped freight train. This limit to-day should not be placed at less than 1,000 tons of cargo, and a navigation suited to boats of this capacity over long routes may be relied upon to maintain its vitality in railway competition, and develop resources not otherwise practicable. Future canals will then be of the ship or barge canal type, suited to large vessels or to fleet movement.

The engineering resources of the waterway engineer have developed so radically in the last 20 years that the principles of location have materially changed. Larger prisms are demanded, not only for larger hulls, but for their free and rapid movement. These are best provided by canalizing the watercourses proper, by straight-

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ening, deepening and widening where necessary, and by the use of dams that can be lowered in the flood seasons. Where the prism is not sufficiently scoured by the natural flow of the stream, it may be cheaply maintained by the hydraulic or other type of dredge. The canal proper is thus measurably limited to the summits between watercourses and to overcoming rapids and falls. It will be seen that the old location along the foot of the slopes of the valley, with embankments, aqueducts, waste-weirs and other artificial works, expensive to maintain and always subject to risk of failure and to interruptions of traffic, with complicated problems of seepage and feeders, is largely done away with.

The desirability of high lifts, in order to save time in lockage, and the increased capacity, still demands the fullest resources in providing feed-water at summits, but, happily, the important routes of the future lie over the deeper passes to which large areas may be made tributary; and, again, much consideration is being given to barge-lifts designed to overcome large elevations with a minimum use of water. These have proven very serviceable on the smaller type of canal, but it is doubtful whether the conditions will invite their use to the same extent on canals of large capacity.

In the way of ship-canals proper for maritime rather than domestic uses, the past twenty years has witnessed several notable achievements. The Suez canal has developed a commere of 8,000,000 tons, and is being gradually widened and deepened to better accommodate the traffic. The Corinth canal, across the Isthmus of Corinth, in the kingdom of Greece, was opened in 1893, substantially along the route upon which work was prosecuted in the reign of the emperor Nero, in A.D. 67. This canal is at sea-level and without locks, and is 3.91 miles long, 69 feet wide on the bottom, and 26 feet deep, and the excavation of 15,000,000 cubic yards of material was involved in its construction. It saves a long detour in the coasting trade and the tempestuous passage off Cape Matapan.

The North Sea canal, connecting the North Sea and the Baltic across the base of the Peninsula of Jutland, was opened with much ceremony in 1895. It is a sea-level canal, with tidal locks at either end, and is 61.3 miles in length. The width is 72 feet on the bottom and the depth 29.5 feet, and the material excavated was 104,640,000 cubic yards of earth. No special engineering difficulties were encountered. The formation of the prism through marshes, by placing two parallel embankments of sand and excavating between, was an interesting application of practice developed in Holland. This work was chiefly remarkable for its thorough and efficient organization and administration, and its steady prosecution to successful completion without unforeseen complications. Its inspiration lay in its military value to the German Empire, rather than in its commercial necessity, though it will doubtless develop large utility in the Baltic Sea trade.

The Amsterdam canal, uniting the port of Amsterdam with the North Sea, and 17.9 miles long, is undergoing enlargement to a bottom width of 82 feet and a depth of 27.9 feet, to be completed in 1896. There are tidal locks at the North Sea entrance and at the Zuider Zee end, and the founding of these works on a most difficult soil is of interest.

The Manchester ship-canal is a very ambitious attempt to make a seaport of the city of Manchester for that part of the seagoing business formerly transacted at Liverpool for Manchester and the surrounding district. The works have been carried out under much financial vicissitude and with some set-backs, due to failing contractors and unprecedented floods, and were opened in 1893. The canal extends from the estuary of the Mersey, at Eastham, a distance of 35½ miles, to the heart of Manchester, rising some 70 feet above mean sea-level by means of five locks, one of which is a tide-lock, at the entrance. It is generally 120 feet wide on the bottom and the depth is 26 feet, and the locks are 600 feet long and 65 feet wide. The excavation of nearly 7,000,000 cubic yards of rock, much of it of a friable character, and over 40,000,000 cubic yards of earth, was required. It is crossed by many bridges, mostly high level, with clear headway of 75 feet, so as to permit passage of vessels with top-masts struck. It contains a unique structure in the swinging aqueduct provided for the crossing of the Bridgewater canal. The great sluices devised for controlling floods are also of special interest. This canal, constructed in a densely settled country, with interests vested from time immemorial, presented many unusual problems. It is too early to judge the utility of this work. It certainly has given the Manchester district lower rates, and doubtless, with the adaptation of slowly changing institutions to the new conditions, it will eventually prove an important factor in the prosperity of the regions it is designed to serve.

In America the St. Mary's Falls canal, uniting Lake Superior with the other great lakes, has developed a commerce double that passing the Suez canal, and the largest lock in the world will be opened in 1897, its length being 800 feet, its width 100 feet, and with 21 feet of water on the miter-sills at the average lake-level. The Canadian government opened its new canal on the opposite shore in 1895, the lock being 900 feet long and 60 feet wide, with the same depth of water.

The most remarkable work of recent times, and now nearing completion, is the sanitary and ship canal of Chicago. The prism is larger than any canal heretofore constructed, and it is the only ship-canal so designed as to carry a large volume of water. Its primary purpose is to dispose of the sewage of the city, so diluted as to be without offense, and keep all polluted waters away from the lake front, and thus do away with the necessity of building costly water-works at some distant point on the north shore. Incidentally, the channel forms a much-needed deep-water extension of the

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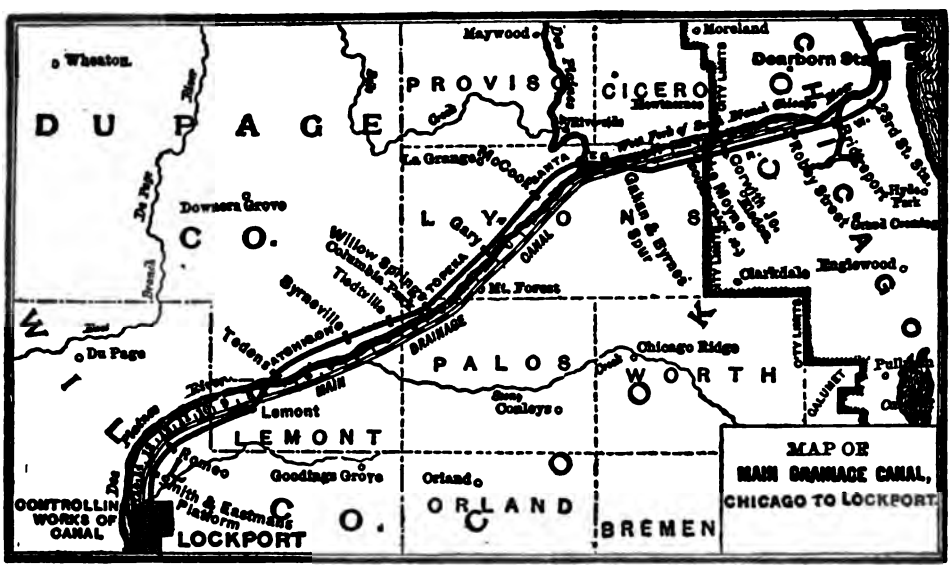
harbor; at the same time, it is the most costly part of a waterway to the Mississippi River, and carries the volume of water required in order to develop a 14-foot barge navigation through 300 miles of the Desplaines and Illinois rivers to the Mississippi. This work, in conjunction with the improvement of the Mississippi River now in progress, will enable this scale of navigation to be maintained between the lakes and the Gulf of Mexico for the larger part of each year.

The canal proper extends from a junction with the Chicago River, in the southwest part of the city, 28 miles to a point near Lockport, where it is to be discharged through controlling-works, designed to regulate the flow or stop the same at pleasure. Works will be required to conduct the waters through the city of Joliet for a distance of seven miles farther, and improvements of a radical character will be required between the head of the canal and Lake Michigan, through the city of Chicago. The entire extent of work is about 40 miles. The prism of the canal is 160 feet wide at bottom in solid rock and 162 feet at surface, while in earth-cutting the bottom width is 202 feet and 300 feet at the flow-line, the nominal depth throughout being 22 feet at low water, to be increased to 24 feet when finally completed to Lake Michigan. Seven miles of the Chicago end has been excavated, with a bottom width of 110 feet only, the purpose being to increase the prism to the standard by dredging after the canal is opened. The capacity is to be sufficient to pass ten thousand cubic feet of water per second at all times, and this is to be increased, under certain conditions, with the growth of population, the ratio of dilution to be maintained on the basis of 20,000 cubic feet per minute for each 100,000 of population.

The physical conditions which invited this work are in themselves remarkable. The old portage west of Chicago is scarcely ten feet above ordinary lake-level, and leads to the Desplaines valley, which in a distance of 30 miles from the lake has descended to its level, and in 10 miles more to some 75 feet below the same. The Desplaines River in flood overflowed the portage and divided its waters between the Mississippi and St. Lawrence basins. The canal problem was simply to cut a channel through the old pass which drained the lake region to the Mississippi in glacial times and restore in part the ancient outlet. In doing this, one half the distance is cut through solid Niagara limestone, and when this does not reach the surface, the sides of the cutting are carried up with massive retaining-walls so as to conform to the full rock-cut. In preparing for the construction of the canal proper, it was necessary to provide a new channel for the Desplaines River, draining 700 square miles, for a length of 13 miles and to define its course by massive embankments 20 miles long.

The work has developed the channeling-machine, by which the sides are chiseled out smooth in advance of the blasting, the cantilever-hoist for the rapid handling of rock in deep cuts, and the cableway-hoist for similar situations and for difficult glacial drift cuts. The steam-shovel has also received a notable development adapting it to heavy and rough work, machines of 60 to 80 tons being in use. The installation of the work represented a plant investment of about $3,000,000. An average force of 7,000 to 8,000 was employed during the favorable season and 6,000 tons of dynamite were used. Along the rock-cuts, the machinery was driven in large part from air-compressor stations on each section of about one mile. In the purely earth-cut toward the Chicago end, inclined and bridge conveyors were devised, with a large saving over former methods by cars, tracks and locomotives. The work was actually executed at prices of less than half what similar work in rock had been before estimated, and the earth-work has been greatly cheapened. The total excavation *in situ* was 12,200,000 cubic yards of rock and 37,500,000 cubic yards of earth, estimated at 67,000,000 yards in the waste-banks.



The work has been carried on by a board of nine trustees elected by the people, and this board is vested with all municipal powers necessary to its purpose by the sanitary district act passed by the general assembly of Illinois in 1889, and under which the sanitary district of Chicago has been organized. Work was actually begun in 1892, and prosecuted with great vigor, with the intention of completing the same in four years

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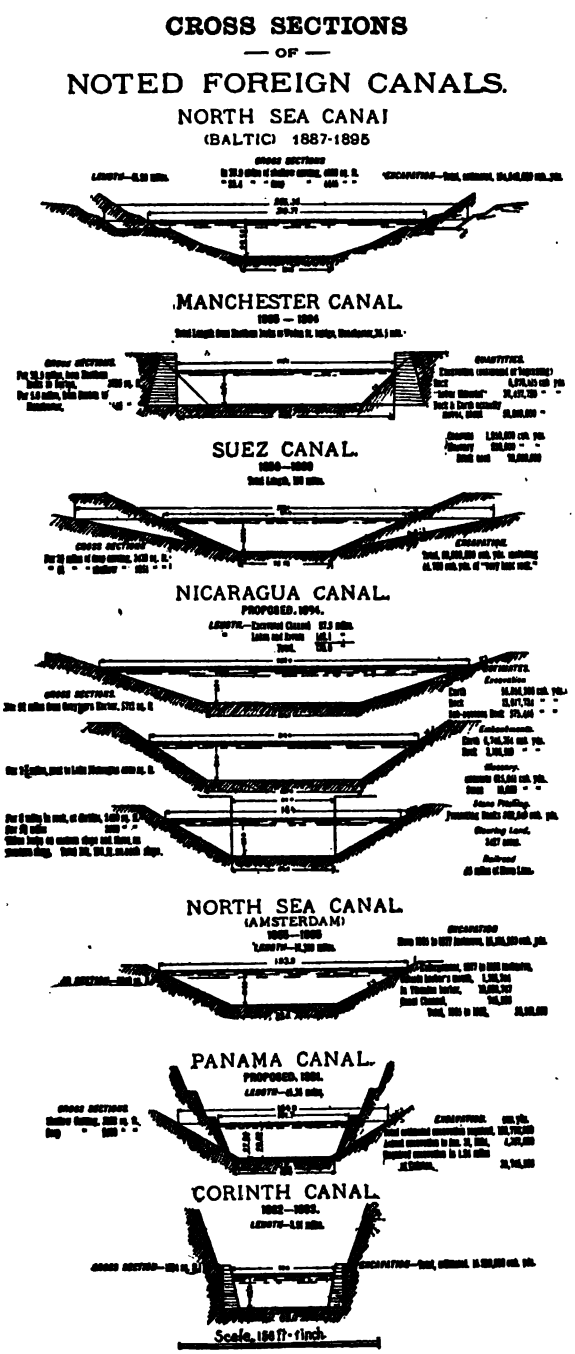
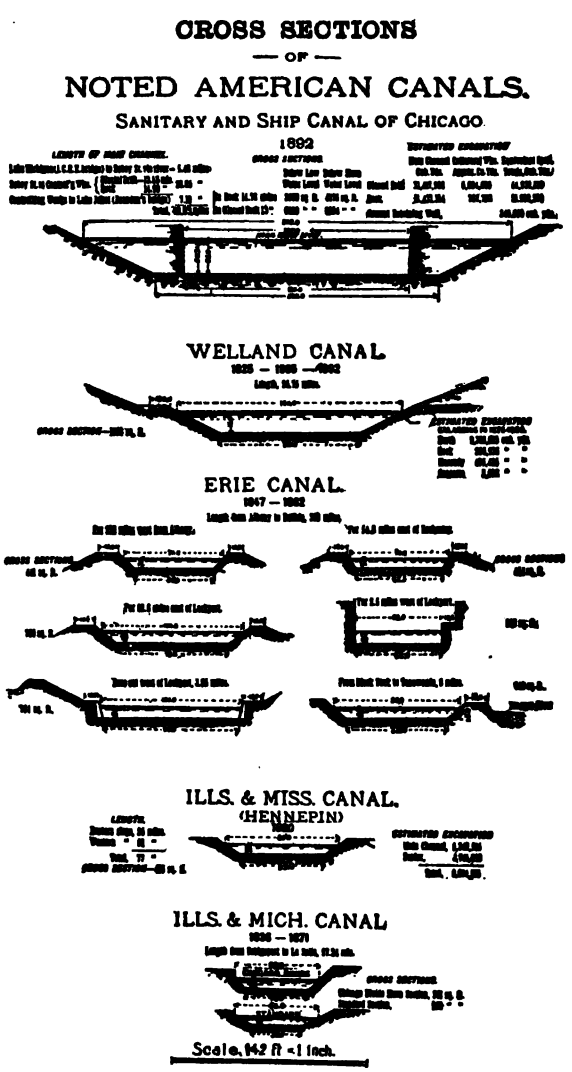
and opening the work in 1896. This could not be realized, as the financial management has been inadequate. However much final completion may be delayed, this work, measured by the material handled, will prove the cheapest of modern times; and in the development and use of appli-



ances, in the volume of rock and in the engineering features it outranks any other yet constructed.

The project of cutting the American isthmus has received much attention within the 20 years, and an enormous sum of money was raised to construct a sea-level canal at Panama under the auspices of a company organized in France. The actual work performed was a mere fraction of the total, and out of all proportion to the expenditure, and the affairs of the company fell into the hands of liquidators, under very scandalous circumstances. Some efforts have been made to resus-



citate the enterprise and complete the work, with a summit-level and locks, but confidence seems to be lacking, and this proposition has received little encouragement. The consensus of American opinion has favored the Nicaragua route, using Lake Nicaragua as a summit-level, as more practicable, and a company was organized, and expended some five million dollars in getting the work under way. Operations were suspended in 1893, owing to the financial depression, and several propositions have been brought before the Congress of the United States, designed to enlist the financial support of the government through a guaranty of bonds. Meantime the report of an engineering commission, appointed to examine the matter, has greatly increased the estimates and raised doubts as to the practicability of the project, so that some time may elapse before the

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work is put in actual execution. Meanwhile the proprietors of the French Panama Canal Co. have made offer to the United States of their interests in their project for $40,000,000, which as we write (1902) is under the consideration of Congress.

The plate herewith is drawn to true proportions, and shows the relative cross-section of the notable ship-canals of the world as actually built or proposed.

One of the boldest and most far-reaching projects, now being considered by an international commission, is the proposition to extend navigation for seagoing vessels from the seaboard by both the St. Lawrence and Hudson rivers into the Great Lakes. This will involve several works of magnitude, and large problems in lockage. Considering the great marine development on the lakes and the enormous freight movement between the interior and seaboard, the consummation of this project will produce the greatest water route of the world.

Nothing is more certain than that, having measurably reached the limit of railway development and extended the service throughout the productive areas of the country, with densification and smaller margins of profit, the water routes will grow in importance, and the next great step in transportation facilities is probably in this direction. This development will not, however, be along the lines of early canal policies, but will define itself in connecting links through the great passes and valleys and in the improvement and canalization of natural waters. Eventually, the country will be netted with an arterial system to which other means of transportation will furnish the veins and capillaries.

LYMAN E. COOLEY.

CANAL DOVER, a village of Tuscarawas County, central eastern Ohio, on the Tuscarawas River, about a hundred miles N. of Marietta, on the Ohio canal, on the Cleveland, Lorain and Wheeling, the Cleveland and Marietta and the Cleveland and Pittsburg railroads. Here are a rolling-mill, iron-furnace, tannery, boiler factory and flour-mills. Population 1900, 5,422.

CANANDAIGUA, village and lake of Ontario County, New York. (See Vol. IV, p. 702.) The village is on the Northern Central and the New York Central and Hudson River railroads. There are here two academies, a private insane asylum, two orphan asylums, a brewery and several factories. Population 1890, 5,868; 1900, 6151.

CANARIS, CONSTANTINE. See KANARIS, in these Supplements.

CANARIUM, a genus of Asiatic trees belonging to the family *Burseraceæ*, a family noted for its strong aromatic resins and balsams. The genus *Canarium* is one of the largest, and abounds in aromatic resins, some of its species being supposed to be among those yielding "gum elemi."

CANARY-GRASS, a popular name applied to *Phalaris Canariensis*, a grass yielding "canary-seed." It is a native of the Canary Islands, is extensively cultivated in Europe, and has also become somewhat naturalized in the United States. *P. arundinacea* is the common "reed canary grass" of bogs and low grounds, a striped variety of which is cultivated for ornament under the name "ribbon-grass."

CANASTOTA, a village of Madison Co., N. Y.; about 30 miles W. of Utica, on the West Shore, the New York, New Haven and Hartford and the Delaware and Hudson railroads. It is the seat of an academy, and contains manufactories of cutlery, astronomical instruments; has saltworks, canning factories, etc. Sulphur and iron springs are also found here. Pop., 1900, 3,030.

CANAVERAL, CAPE OF, on the east coast of Florida, 135 miles S.E. of St. Augustine, in lat. 28° 27′ N., long. 80° 33′ W.; just east of Merritt's Island and separated from it by a branch of the Indian River. The government light located here is a revolving one.

CANBY, EDWARD RICHARD SPRIGG, an American soldier; born in Kentucky in 1817. He was graduated from the United States Military Academy at West Point in 1839, and from 1846 to 1848 served in the Mexican War. In 1863 he commanded the United States troops in New York city during the draft riots, and in the following year succeeded General Banks in command of the army in Louisiana. In 1865, he captured Mobile and received the surrender of the Confederate forces there. In 1866 he was made major-general of volunteers. In 1873 he was sent by the government to make a treaty with the Modoc Indians in northern California. He was treacherously shot by one of the Modoc chiefs, April 11, 1873. W.M.C.

GENERAL CANBY.

CANBY, FORT, a United States army post and fortification on Cape Disappointment, Washington, at the mouth of the Columbia River, 14 miles from Astoria. It is the principal defense for the entrance of the river.

CANCELLARIA, a genus of gasteropod mollusks, characterized by the shell being marked off into squares by transverse ribs and revolving lines. They are found in northern seas.

CANCER, the crab, a common species of crustacean decapods, used as food. W.R.B.

CANCER-ROOT, a name applied to species of *Epiphegus*, *Conopholis* and *Aphyllon*, of the family *Orobanchaceæ*, and often extended to the whole family. The family is made up of root-parasites, destitute of green foliage, with yellowish or brownish scales in place of leaves. *Epiphegus* is also known as "beech-drops"; *Conopholis* as "squaw-root"; and other species as "broomrapes."

CANCRINITE, a silicate of alumina and soda found in Norway and in Maine. It is a variety of nephelin. See MINERALOGY, Vol. XVI, p. 430.

CANDLENUT TREE (*Aleurites*), a native of Java, Hawaii and other Pacific islands. It is so

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named from the natives stringing together the nuts, which are very oily, and thus making candles. See also OILS, Vol. XVII, p. 766.

CANDON, town in Ilocos Sur, Luzon, Philippine Islands, 25 m. south of Vigan. Woven fabrics are manufactured here. Pop., 1903, 18,828.

CANDYTUFT. See *Iberis*, under HORTICULTURE, Vol. XII, p. 259.

CANELLA, a small genus of tropical American trees of the family *Canellaceæ*. The best-known species is *C. alba* of south Florida and the West Indies, the "wild cinnamon" or "white cinnamon," under latter name the bark is exported.

CAÑETE, MANUEL, Spanish poet; born in Seville, Aug. 6, 1822; after a short term of study at Cadiz, he entered the government service in the office of the Minister of the Interior. He wrote a number of volumes of poetry and dramas. Made a special study of Spanish dramatists of the 15th and 16th centuries, and published the result of his study in *Spanish and Spanish-American Writers* and *The Spanish Stage of the Sixteenth Century.*

CANFIELD, JAMES HULME, president of the Ohio State University since 1895; born at Delaware, Ohio, March 18, 1847; studied at the Polytechnic Institute of Brooklyn, and graduated from Williams College; practiced law at Jackson, Michigan, and at St. Joseph, Michigan; superintendent of schools at the latter place in 1876; in 1877 to 1891, professor of history and political science in the University of Kansas; was president and secretary of the National Educational Association; elected chancellor of the University of Nebraska in 1891.

CANICULAR YEAR, also SOTHIC OR SOTHIAC YEAR, a fixed year of the ancient Egyptians. See EGYPT, Vol. VII, p. 632.

CANISIUS (DE HOND), PETRUS, the first German Jesuit; born March 8, 1521, at Nimeguen; died Dec. 21, 1597, at Freiburg, Switzerland, and beatified in 1864 by Pius IX. In 1543 he entered the order, and was in 1546 ordained a priest. A member of the Council of Trent, he was sent to Germany to counteract the Reformation by establishing schools for priests. From 1549–56 he was teacher at Ingolstadt, Vienna and Prague, and in 1556 became first provincial of the order. He wrote *Summa Doctrinæ Christianæ, Sive Catechismus Major; Epistolæ et Acta.* G.A.S.

CANISTEO, a village in Steuben County, southwestern New York, on the Canisteo River, at the junction of the Hornellsville and Canisteo, the Erie, and the New York and Pennsylvania railroads. It is about 60 miles south of Rochester, and is the center of a rich farming district. Population, 1890, 2,071; 1900, 2,077. R.W.C.

CANKER-WORM, the larval form of two species of moths of the genus *Anisopteryx*, belonging to the family of measuring-worms, *Geometridæ*. The worms are ash-colored above, black on sides and yellowish beneath. The wingless female moth ascends orchard trees, such as apple, cherry, plum, and deposits her eggs. The larvæ are very destructive to the foliage in their early life. Later they descend the tree and burrow in the soil, where the metamorphosis takes place. The canker-worms are common in America from Maine to Texas.

CAN-MANUFACTURE AND CANNERS' TOOLS. Tin cans are made mostly for the canning of fruits, meats and vegetables, condensed milk, spices, paints and varnishes, etc. There are in the United States eight or ten large establishments making cans and supplying them to the canning factories. Some of these factories have an output of over 100,000 cans per day each. Many of the canning factories are making their own cans, of late years, especially in the districts where they are located away from the railroad centers. Fruits and vegetables are usually packed in round cans, the small sizes being known as 1, 2 and 3 pound cans, and the larger sizes as half-gallon and gallon. Meats are usually packed in tapering oblong cans, ordinary fish in oval cans, and sardines in a small oblong can, in imitation of those first put up in France and Italy.

In the large factories automatic machinery is used for cutting out the parts and soldering together the cans. In the smaller factories the work is done mostly by hand. A press run by foot-power is used to stamp the tops and bottoms, and a boy or man will produce about 1,000 per day. The bodies are cut in square sheets, and are then formed up in forming-rolls. The bodies are then placed on special formers and the side seams soldered. After the tops and bottoms are placed on the body it is rotated in a bath of melted solder, which connects the three parts and leaves the can air-tight. After the cans are filled with the contents, the caps are soldered on by hand. Square, oblong and oval cans are made in the same manner, the only variations being in the shape of the dies and frames and the method of soldering. Ordinary country factories usually put up from 300,000 to 1,000,000 cans during a season's pack.

The Ferracute Machine Company's foot-presses for can-makers are made with an adjustable frame which permits the stamping to be done upright, or at any suitable angle rendered convenient by the nature of the work, which is usually slid off the die through the hole in the back of the press into a box. Sets of dies are furnished with the presses for a variety of work.

The Page vacuum can-testing machine has a horizontal rotating wheel, on which the cans are mounted as hollow arms. As the wheel goes around, the cans are put in place by a boy, and if imperfect, so that they leak, and no vacuum can be formed, they fall off automatically, and are thus separated from the perfect cans.

The Ferracute soldering turn-table has a heavy iron pedestal, around which is a rotating table with eight treadles and seaming-frames. The can bodies are set on the table, the seam soldered, and the cans removed by different operatives as the table turns around. On top of the pedestal is a fire-pot with soldering-coppers. Double seaming-machines are made for forming a tight seam without solder, and these do very

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well for goods that are not "processed." Other machines used by the can-maker are capping-machines, for soldering a number of cans at once, floating-machines, for soldering the end seams on the outside; can-beaders. for forming the mouths of the bodies of open-top cans, folding-machines, for square and oblong cans, crimpers, for crimping the bottoms of cans and small pails; can-heading machines, and various grooving, notching, flanging, squeezing, threading, cleaning and polishing machines, together with can-wedges, floating-boards, soldering-plates, solder-ladles and solder-kettles. etc. A great variety of dies of almost numberless shapes and designs are also used. C. H. COCHRANE.

CANNA, a tropical American monocotyledonous genus of about 30 species, largely cultivated for ornament, and belonging to the family *Scitaminaceæ*, although sometimes restricted to a family by themselves. the *Cannaceæ*. The common name "Indian shot" refers to the hard shot-like seeds in the rough three-celled pod. The flowers are irregular and showy, and the leaves large and handsome.

CANNABIS, a genus of textile plants of which *Cannabis sative*, or hemp, is the principal source of the hemp of commerce. It is native in India and parts of Asia, but is cultivated in temperate regions also, its fibers being made into ropes, ship's cables, mats, etc. Manila hemp yields the strongest fiber. W.R.B.

CANNING, SIR SAMUEL, civil engineer; born in Wiltshire, England, in 1823; manufacturer and superintendent of the laying of the Atlantic cables of 1865, 1866 and 1869, and the Mediterranean cables; also, was largely in charge of the English cables to Gibraltar, Malta and Alexandria. By his direction the Atlantic cable, lost in 1858, was found and relaid.

CANNELTON, a city, capital of Perry County, southern Indiana, on the Ohio River, 70 miles above Evansville, on the Louisville, Evansville and St. Louis railroad. It is an important coaling-station for steamboats, and manufactures cotton goods, flour, pottery, chairs, paper, lumber and drain-tiles. Population 1900, 2,188.

CANNING INDUSTRY. There are now more than twenty thousand canning factories in the United States and territories. Maryland has the largest number, followed, in order, by Maine, New York, Virginia, New Jersey, Delaware and California. Employment is given by these factories during the canning season to more than one million persons, while some three million more have indirect connection with the business, through raising the fruit, vegetables, etc., for their use, manufacturing machinery, or selling the product. It is estimated that one and a half million acres of land in the United States are devoted to raising goods for the canners. Three thousand fishing-vessels and twenty-five thousand fishermen find employment in gathering salmon, mackerel and other fish for canning, while two thousand vessels and twenty thousand men in the oyster industry are kept busy supplying the canner. The number who furnish meat to the canning-house is not obtainable, but the output of canned meats foots up to twenty-five million dollars annually.

The machinery used in a canning factory includes usually the following: A steam-boiler for heating a water-bath, with piping and connections to tanks or kettles; scalding kettles or tanks are used for scalding or blanching numerous vegetables; exhaust tanks or kettles are required to exhaust cold air from the cans after they have been packed and capped; process kettles or tanks are provided for cooling or "processing" the canned fruit; scalding-baskets of heavy galvanized wire are used for tomatoes, in order to facilitate peeling; crates made of strap-iron, with handles which may be hooked to a crane, are used for handling cans in quantities, in the operations of exhausting and "processing." Many factories use gasolene fire-pots for heating capping-steels and tinning-coppers; gasolene-tanks have to be provided for these, and an air-pump for pumping air into the gasolene-tank, thus forcing the oil to the fire-pots, where it is vaporized and burned as a gas. The tinning-coppers are used to close the vents after the air has been exhausted from the cans. Capping-tables are used for holding fire-pots and for capping cans. Can-tongs, platform-scales, thermometers, syrup-gauges, and various minor tools complete the outfit. For special work there are made pea-hulling machines that will handle one thousand bushels a day; rotary pea-separators, that will grade into sizes six hundred bushels a day; corn-cutting machines, taking the corn from the cob at the rate of seventy ears a minute; corn-silking machines, for removing silk and refuse from the corn after it is cut from the cob; automatic steam-cooking and can-filling machines for corn, having a capacity of twelve thousand cans per day; can-tipping machines, for filling cans or jars with liquids of various kinds; tomato and pumpkin fillers, for accurately filling cans; pumpkin-peelers; pumpkin-graters; pea-sieves, for grading peas in small quantities; pea-blanchers, for scalding and blanching hulled peas; corn-cutting knives, and various forms of parers, graters, seeders, corers, etc.

Wages paid in canning factories vary from $2.50 to $1 a day, or less, a considerable portion of the work often being done by women or children working by the piece. C. H. COCHRANE.

CANNON-BALL TREE (*Couronpita guianiensis*), a tree of the order *Lecythidaceæ*, growing in the hottest parts of South America, particularly in Guiana. Its fruit resembles a ball six to eight inches in diameter, of a hard, woody texture. The seeds are embedded in pulp. W.R.B.

CANOE, MODERN PLEASURING. The sport of sailing and racing canoes had its origin in New York City in 1871, and the formation of clubs and annual regattas since that time has resulted in a material development of this form of water craft. The early canoes carried lateen, leg-of-mutton and four-sided fore-and-aft sails, being universally two-masted. Experience showed that an extension of the lower portion of the sails was desirable, so an

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ranged that it could be reefed in at times. In 1883 the *Atlantis* was built, with sails having equilateral triangular tops, and being rectangular below. In 1885 the form was altered so as to bring the peak to the top of the mast. More recent forms have four or five divisions, like the parts of a folding fan. These can be reefed in as desired. Others maintain the triangular peak, with a rectangular body, arranged for two or three reefs. It was not until about 1888 that the canoeists learned that it was best to get out of the hold and sit on the deck to balance the sails. In 1888 there was introduced a sliding deck-seat, on which the sailor would extend his body as ballast. The canoes have also been improved by the addition of center-boards, the prevailing type being made of several fan-like leaves. Canoes managed only with a double-bladed paddle also have been used in races, but they are not as popular as the sailing-canoes. C. H. COCHRANE.

CANNON, JOSEPH G., statesman; was born in Guilford, North Carolina, on May 7, 1836, became a lawyer in Illinois, and was state attorney-general in 1861–68. He has been a representative in Congress since 1874, with the exception of 1891–92, and has been Speaker of the House since 1903. W.F.J.

CANON, in music. See MUSIC, Vol. XVII, p. 90.

CAÑON CITY, a precinct, city and the county seat of Fremont County, in the south central part of the state of Colorado. It lies at the eastern foot of the Rocky Mountains, north of the Wet Mountains and thirty miles south of Pike's Peak and Colorado Springs. It is on the Arkansas River and is reached by the Atchison, Topeka and Santa Fé and the Denver and Rio Grande railroads. It is in the heart of a rich mineral region, and is a popular health resort. Its population was 3,775 in 1900. W.F.J.

CANONSBURG is an incorporated borough of Washington County, Pennsylvania, near the southwestern corner of that state. It is an old place, and was the original site of Jefferson College, which was afterward removed to the county seat, Washington. It is now the seat of one of the state reform schools, and of extensive industries in coal, iron and steel, and lumber. It is reached by the Pittsburg, Cincinnati, Chicago and St. Louis railroad. Its population was 2,714 in 1900. W.F.J.

CANONESS, the title given to a class of women, the members of a Roman Catholic order during the eighth century and for some time afterward. The rules governing the order were not so severe nor so rigid as those governing nuns. They took the vows of celibacy, to last only during membership. They were not required to live in poverty nor in cloisters. They were divided into secular and regular, a division brought about in the natural order of growth, and not indicated by law. To the secular belonged many of the daughters of princes and nobles. The chief occupation of the canoness was the education of girls, transcription of church books and embroidery of vestments. The order was confined to the German Empire.

CANONICUS, an American Indian, chief of the Narragansetts; born about 1565. He commanded 3,000 warriors at the time of the landing of the Pilgrims, and in 1636 granted to Roger Williams and his company the land where the city of Providence now stands. He was succeeded as sachem by his nephew Miantonoma. Canonicus was an important figure in colonial history. He died June 4, 1647. W.M.C.

CANOPIC VASES. See POTTERY, Vol. XIX, p. 621.

CANOPUS, a star of the southern hemisphere, constellation Argo Navis, or the Ship Argo. It is situated in the rudder of the ship, and is said to have received its name from Canopus, the pilot of Menelaus. It is the brightest star of the constellation.

CANOPY. See ARCHITECTURE, Vol. II, p. 404.

CANOSSA, a small town of Italy, in Emilia, 11 miles S.W. of Reggio. Its chief interest lies in the fact that here Henry IV, emperor of Germany, made humiliating submissions to Pope Gregory VII, in 1077. See HENRY IV, Vol. XI, p. 595.

CANOVAS DEL CASTILLO, ANTONIO, Spanish statesman; born Feb. 8, 1828, at Malaga, Spain; assassinated at Santa Agueda, Aug. 8, 1897. He became a journalist in 1852, and the same year began to take an active interest in politics. He was elected to the Cortes, or Chamber of Deputies, in 1854. He was an active royalist, and took a prominent part in the restoration of Alphonso XII in 1874, and was, in that year, appointed Prime Minister. He remained in office until 1879, being forced to resign by the opposition of Martinez de Campos. He was again called to the premiership in 1880, and from that time on alternated in the office with Sagasta. He was a Conservative, and under his leadership that wing of the government constantly increased in power. In addition to his political work, Señor Castillo found time for historical writing. Among his published works are *History of the Decline of Spain from the Ascension of Philippe III to the Death of Charles II; Problems of To-day;* and *Arts and Letters.* Died Aug. 8, 1897.

CANROBERT, FRANÇOIS CERTAIN DE, marshal of France; born June 27, 1809, at St. Cerre in the Auvergne; died in Paris, Jan. 28, 1895. After having absolved the Military School of St. Cyr, he took part in several African campaigns, and returned a brigadier-general in 1850. Promoted to the generalship of a division in 1851, he participated in the Crimean War in the battle of the Alma, and as commander-in-chief in that of the Thernaja. In 1856 he was created a marshal and commanded in 1859 the third division at Magenta and Solferino. In 1861 he became commander of the 4th Army Corps, and in 1865 commander-in-chief of Paris. In the Franco-Prussian War he fought at the head of the Sixth Army Corps at Vionville, defended St. Privat, was shut up at Metz and was after the surrender of the fortress sent a prisoner to Germany. On his return he was member of the Supreme War Council, in 1873 a witness in the trial of Bazaine and from 1879–94 a senator. G.A.S.

CANSO, the name of a strait, cape, and town of Nova Scotia. The strait runs from St. George's to

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Chedabucto Bay, connecting the Gulf of St. Lawrence with the Atlantic Ocean and separating Cape Breton Island from Nova Scotia. It is 17 miles in length and varies between 2 and 3 miles in width. The cape, on St. Andrew's Island, is the extreme eastern point of Nova Scotia. The town is a seaport in Guysborough County, on the Chedabucto Bay, 35 miles E. by S. of Guysborough. Population 1901, 1,734.

CANSO, GULF OF. See CAPE BRETON, V, p. 36.

CANTABRI, an ancient people. See CANTABRIA, Vol. V, p. 25.

CANTABRIAN MOUNTAINS. See SPAIN, Vol. XXII, p. 308.

CANTALOUPE. See MELON, Vol. XV, p. 850.

CANTATA. See MUSIC, Vol. XVII, p. 95.

CANTEEN, a term derived from the Italian *cantino*, meaning a wine-cellar. It is applied (1) to a sutler's store connected with a camp or garrison, in which spirituous beverages are sold under military regulation; (2) to a mess-case used by British army officers to hold knives, forks, tea and like articles for use at the mess-table; (3) to a soldier's flask or vessel for carrying water or other portable liquid on the march, usually strung about the neck when worn. Its usual capacity is about three pints. The regulation canteen of the United States army is made of two concave tin plates joined together and having an open neck, and covered with some woven fabric.

CANTERBURY, ARCH'P. See TEMPLE, FRED'K.

CANTERBURY-BELL, a species of the campanula. See HAREBELL, Vol. XI, p. 427.

CANTILEVER, a bracket used in architecture for supporting cornices and balconies. The term, originally thus applied, is better known as the name of a class of bridges in which two brackets are built out, one from each bank of the stream to be bridged, to meet at the center without the support of intermediate piers.

CANTO FERMO, the simple melody of the ancient chants of cathedral music. These tunes form the basis of the compositions of many of the Roman Church composers. See PALESTRINA, Vol. XVIII, p. 184.

CANTON, Illinois, a township and city of Fulton County, in the west central part of the state. It lies in an agricultural region, just north of the Illinois River, but is also an important industrial center, and has an extensive trade in grain, timber, bituminous coal, bricks, and other commodities. It is reached by the Chicago, Burlington and Quincy and the Toledo, Peoria and Western railroads. Its population (city) was 6,564 in 1900. W.F.J.

CANTON, Massachusetts, is a town of Norfolk County, in the eastern part of the state. It lies on the Neponset River, and has important machine shops and silk, woolen and other mills. It is on the Old Colony (New York, New Haven and Hartford) railroad. Its population was 4,584 in 1900. W.F.J.

CANTON, Mississippi, is a city of Madison County, in the central part of the state. It lies in the level agricultural region between the Pearl and Big Black Rivers, on the Illinois Central railroad. Its population was 3,404 in 1900. W.F.J.

CANTON, Missouri, is a city of Lewis County, near the northeast corner of the state. It lies on the Mississippi River, near the Wyaconda River, 127 miles northwest of St. Louis, and is reached by the St. Louis, Keokuk and Northwestern railroad. It is an important commercial center, and is the seat of Christian University. Its population was 2,365 in 1900. W.F.J.

CANTON, a manufacturing town, county seat of St. Lawrence County, northeastern New York, situated on Grass River and on the Rome, Watertown and Ogdensburg railroad, 50 miles N.E. of Watertown. Canton Academy and the St. Lawrence University (Universalist) are two of the institutions here located. It has also a boat factory of importance. Population 1890, 2,580; 1900, 2,757.

CANTON, a city and capital of Stark County, northeastern Ohio. It is situated on half a dozen railroads; by the Cleveland, Canton and Southern railroad it is 60 miles S.E. of Cleveland. It is an extensive manufacturing city, its industries numbering over 450, in which are invested twelve millions of dollars, and which employ 5,000 hands. The chief of these industries is the manufacture of agricultural implements, bricks and tiles, products of lumber, roofing materials, and saddlery and harness and railway car shops. It is also important as an agricultural shipping-station. The home of the late President McKinley was here. From 1880 to 1890 the population increased more than one hundred per cent. Population, 1890, 26,189; 1900, 30,667. See CANTON, Vol. V, p. 36. R.W.C.

CANTON, town and county seat of Lincoln County, southeastern South Dakota, situated on the Sioux River, about 70 miles N. of Sioux City. It is on the Chicago, Milwaukee and St. Paul railroad. It is the seat of Augustana College; has manufactories, and an electric-light plant. Pop. 1900, 1,943.

CANTON, a seaport and capital of the province of Kwang-tung, China. It is one of the principal commercial cities of the country. The opening of inland communication by the West river route to Wuchow and Nanning largely increased the foreign traffic of Canton. It possesses a well-equipped mint, built in 1889. Est. pop. in 1902, 2,000,000.

CANTON, in geography, a division of territory constituting a separate government or state, as in Switzerland. In France a canton is a subdivision of an arrondissement, comprising several communes. In heraldry it is used to designate a small division in the corner of a shield, generally the dexter corner. When it is on the left side it is called a *canton sinister*.

CANTONMENT, in general use applied to quarters for soldiers. Troops, when not in close proximity to the enemy and yet in the field, are distributed among adjacent villages and quartered upon the inhabitants. These villages are then called cantonments. In India, cantonments have become permanent military towns, containing barracks for troops, houses and gardens for the officers, magazines, public buildings, etc. Such towns are distinct from the native villages and cities.

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CANTU, CESARE, author; was born at Brivio, near Milan, Italy, on December 2, 1805, was educated for the priesthood, but turned to literature instead. Imprisoned in 1833 for liberal writings in a history of Lombardy, he wrote an historical romance called *Margherita Pusterla*, describing the woes of a prisoner. His chief work was the *Storia Universale*, in thirty-five volumes. He wrote a great number of lesser histories, literary treatises, sketches and *Reminiscences of Manzoni*. He died on March 11, 1895. His *Storia Universale*, or *Universal History*, has been translated into French and English. W.F.J.

CANVAS-BACK DUCK. See POCHARD, Vol. XIX, p. 264.

CAPANNORI, a town of Italy in the province of Lucca. It has manufactories of silk, thread and paper. Estimated population, 1903, 45,000.

CAPACITY, as a legal term, is the power or legal right or qualification to perform civil acts, which power or qualification depends upon the state or condition of the person with reference to certain restrictions fixed by law. Until recently the law has not given the capacity of exercising the electoral franchise to women, and they are still, in most states, given this capacity only to a limited extent. Persons under 21 years of age have not the legal capacity to bind themselves by contract, and a child under the age of 7 years has not the capacity to commit crime, or usually under the age of 12, unless it be affirmatively shown that the child knew the nature of the act. An insane person has not the legal capacity to commit a crime or to bind himself by contract. Civil incapacity or disability is often imposed upon criminals as a punishment, especially to the extent of disfranchisement. Foreigners have not the legal capacity to exercise many of the civil rights and privileges. They have not the capacity to exercise any political rights, and in many States they cannot own real estate. Formerly, married women were debarred from exercising many of the civil rights of a citizen, but by statute many of their common-law disabilities have been removed in most States, especially as to property rights.

CAPAC YUPANQUI. See CHILI, Vol. V, p. 537.

CAPE BRETON. See NOVA SCOTIA, in these Supplements.

CAPE COLONY. For general description, see CAPE COLONY, Vol. V, pp. 37 *et seq.* Cape Colony is divided into 74 divisions and its dependencies into 29 districts. These dependencies are East Griqualand, Tembuland, Transkei, and Walfish Bay. In 1891 Cape Colony proper, including West Griqualand, had an area of 206,613 square miles and with its dependencies, 221,311 square miles. In 1900, the total estimated population was 2,350,000. Pondoland was annexed in 1894 and British Bechuanaland in 1895. These two territories added 55,464 square miles to the area and 260,736 to the number of inhabitants. Of the inhabitants in 1891, 1,150,237 were natives and colored persons. The same year the population of the chief towns was as follows: Cape Town, the capital, 83,718; Kimberley, 28,718; Port Elizabeth, 23,266; Graham's Town, 10,498; and Beaconsfield, 10,478. Aided government immigration was stopped in 1886. In 1894 the arrivals were 18,133, and departures 10,288 The number of registered voters in 1895 was 91,875. The legislative power rests in a Council of 23 (1901) members, elected for seven years, and a House of Assembly consisting of 95 (1901) members, elected for five years. The government in its executive department consists of the Governor (1901, Lord Alfred Milner, G. C. B.), and the Ministry, which is made up of the Prime Minister and Treasurer, Colonial Secretary, Attorney-General, Commissioner of Public Works, and Secretary of Agriculture. In 1894, there were 1,933 colleges and schools, including the university. The government expended on education in 1900, $1,361,000. In 1900, the total income of the colony was $32,818,760 and the expenditure $38,866,150, which includes a military expenditure of $1,117,145. The imports in 1900 were valued at $98,391,680 and the exports at $40,738,350. Large amounts of wheat oats, barley, corn, and tobacco were raised. Of wine, 4,559,904 gallons were made, and 1,384,480 gallons of brandy. Wool, mohair, ostrich feathers, cheese and butter were exported. Sheep-raising occupied 83,900,000 acres of land. The factories, tanneries, gold, silver and diamond mines employed 32,735 persons. There are in the colony over 8,000 miles of road. There were, in 1901, 2,914 miles of railroad. Telegraph lines extending over 7,467 miles have been constructed by the government.

The chief political parties in Cape Colony are the Afrikander Bond and the Progressives. The former are led by Mr. Hofmeyr, whose sympathies are with his Dutch brethren, and who are believed to desire a Dutch republic embracing all of South Africa. The Progressives embrace the imperialistic, or Government House party, as it is called, and since the era of the late Mr. Rhodes's premiership it has been represented in Parliament by Hon. W. P. Schreiner, by Mr. Rose-Innes, and since June, 1900, by Sir J. Gordon-Sprigg, P. C., with Sir J. Rose-Innes, as Att'y-Gen'l. Of recent years, and especially since the Jameson Raid the two chief parties have been very antagonistic, the issue dividing them being racial as well as political. Party divergence became more acute with the outbreak (Oct., 1899) of the war between Great Britain and the two *quasi* independent Dutch republics, one side sympathizing, though not overtly, with their Dutch kin in the Orange Free State and the Transvaal, while the other loyally espoused the side of the Crown and upheld British suzerainty. Party feeling continued to run high throughout the war, though both sides ostensibly agreed to organize and put actively in the field the military forces of the colony in defence of the Motherland. The Afrikander leaders were influenced thereto by the feeling that President Kruger should have granted reforms in the Transvaal franchise laws at the bidding of the imperial country and in the interest of the Uitlanders, and so secure to the non-Dutch inhabitants of the South African re-

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public rights and privileges similar to those enjoyed by the Dutch in Cape Colony. This being the attitude of the majority in the colony, Mr. Kruger's ultimatum, of Oct. 9, which precipitated war, was naturally a surprise to them. After hostilities were begun, the Colony honestly strove to be loyal to the Crown and to keep it from being dragged into the vortex of war. It has hardly succeeded, however, in allaying race feeling, as the demonstration in the Legislature showed when Lord Roberts's proclamation was discussed reincorporating the two Boer republics with the possessions of the Crown. See also AFRICA and BOER WAR, in these Supplements. G. M. A.

CAPE ELIZABETH, town and summer resort, in Cumberland County, southwestern Maine, a suburb of and partly incorporated with South Portland. It has a state reform school, important manufactories, a dry-dock, an oil-refinery, and a rolling-mill. There are two lighthouses on the cape, one with a revolving and one with a stationary light. They are 140 feet above the sea. Population (1900) merged, in part, in South Portland.

CAPE FEAR RIVER, the southernmost of the large rivers of North Carolina, rises in the northern part of the state and flows diagonally across to the southern extremity, where it enters the Atlantic by way of a fine estuary upon which is situated the commercial city of Wilmington. W.F.J.

CAPE GIRARDEAU, a county, township and city of southeastern Missouri, on the Mississippi River. The city is a river port and terminus of the Cape Girardeau and Fort Scott railroad, 100 miles southeast of St. Louis. The population of the county in 1900 was 24,315, and of the city, 4,815. W.F.J.

CAPEL, THOMAS JOHN, MONSIGNOR, an English Roman Catholic prelate; born at Brompton, Oct. 28, 1836; was ordained a priest in 1860; founded St. Mary's Normal College at Hammersmith in 1854; established the English Catholic mission at Pau; was private chamberlain to Pope Pius IX in 1868; established the Roman Catholic public school at Kensington in 1873; visited America in 1883. He has held many important church offices, and gained a reputation as a preacher. He has published several volumes, among them *Great Britain and Rome; The Holy Catholic Church;* and *The Pope the Head of the Christian Church.*

CAPE MAY, a county forming the southern extremity of the state of New Jersey, and one of the "Capes of the Delaware," the other being Cape Henlopen, at the opposite side of the entrance to Delaware Bay. The name is also borne by a city at the southern extremity of the county, which has long been one of the favorite seaside resorts of the north Atlantic coast. It has a pleasant summer climate and one of the finest beaches in the world. It is about 80 miles from Philadelphia, from which it is reached by Delaware River steamers and by the Pennsylvania railroad The population (permanent) of Cape May City in 1900 was 2,257. W.F.J.

CAPE MAY COURTHOUSE, town in Middle township, Cape May County, southern New Jersey, and capital of the county. It is situated on the West Jersey railroad and the South Jersey railroad, 12 miles from Cape May City, and midway between the Atlantic Ocean and Delaware Bay. The population of the township in 1900 was 2,191.

CAPE NOME, Alaska. See under GOLD, AND GOLD-MINING, Vol. XXVII, p. 117.

CAPEN, ELMER HEWITT, educator; born in Stoughton, Mass., April 5, 1838; entered Tufts College in 1856, and a year before his graduation, in 1860, was elected to the Massachusetts Legislature. He next entered the Harvard Law School and was admitted to the bar in 1864. After practising a short time in Stoughton, he took a course in theology; became pastor of the Independent Christian Church of Gloucester, Mass., in 1865; and of the First Universalist Church of Providence, R. I., in 1870 and president of Tufts College in 1875. He died March 22, 1905. G.J.H.

CAPE VINCENT, a cape, township and village of Jefferson County, New York, in the northwestern part of the state. The cape is at the southern side of the outlet of Lake Ontario into the St. Lawrence River. The village is the terminus of a division of the Rome, Watertown and Ogdensburg railroad. Its population in 1900 was 1,310. W.F.J.

CAPIAS. A *capias* is a writ issued out of a court directing the sheriff to take the person therein named in custody. It is in the nature of a supplemental writ, and is issued only to enforce compliance with a prior original writ, or a judgment or decree of the court. Many kinds of *capias* writs were in use under the common law, but those which are now in general use in this country are *capias ad satisfaciendum*, which commands the sheriff to arrest the person named and produce him in court on a day named to satisfy the party who has recovered judgment against him; and *capias ad respondendum*, which requires the sheriff to arrest the party named and produce him in court at the time named to answer the plaintiff's demand. Since imprisonment for debt is no longer permitted in this country, these writs are not now in use except where debt is contracted through fraud of the debtor or in actions of tort. See WRITS, Vol. XXIV, p. 730.

CAPIBARA, a rodent. See CAPYBARA, Vol. V, p. 72.

CAPILLARIES. See VASCULAR SYSTEM, Vol. XXIV, pp. 112, 117.

CAPITAL. See ARCHITECTURE, Vol. II, p. 405.

CAPITAL PUNISHMENT, in criminal jurisprudence, is the infliction of the punishment of death upon conviction of crime. This extreme penalty has formed a debatable proposition for modern jurists, statesmen, philosophers and philanthropists.

The history and methods of inflicting the penalty vary with every nation. In the theocracy of ancient Israel many were the offenses punished capitally, for there was a taint of apostasy in disobedience of the law.

Murder, blasphemy, desecration of the Sabbath,

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idolatry, witchcraft, cursing, offering children to Moloch, disobedience to parents, adultery, kidnaping a free person, and some other offenses, were punishable by death. For a time, in cases of homicide, the "avenger of blood" had a right of carrying out private vengeance, as a relic of the nomadic blood-feud; but "cities of refuge" were appointed to be safeguards against precipitancy, and eventually they substituted official jurisdiction for private revenge.

The feudalism of mediæval days was bloodthirsty. Each lord held his tenant's life in his hands. Treason was the certain avenue to execution, and nearly every offense was treason in the eyes of a feudal lord. Nor was England a whit better in this respect. Sturdy vagrants, counterfeiters, and those who "consorted for a month with Egyptians," all went to the gibbet in Tudor days. Benefit of clergy was the only loophole of escape, and the claim was allowed but once. Even "rare Ben Jonson" carried the "Tyburn T,' burnt in the ball of his thumb, as a reminder of the halter he escaped for manslaughter in a tavern brawl. Of the 160 capital offenses referred to by Sir William Blackstone, four fifths of them were so created and expressly enacted to be without benefit of clergy during the reigns of the first three Georges. That some idea may be formed of such Draconian justice as was established then, the following may be mentioned as among the offenses which involved sentence of death: Stealing, in a dwelling-house, to the amount of $10; stealing privately, in a shop, goods of the value of $1.25; counterfeiting the stamps that were used for the sale of perfumery; and doing the same with the stamps used for the certificates for hair-powder. So it was a capital offense to rob a rabbit-warren, to cut down a tree, to personate a Greenwich pensioner, or to harbor an offender against the Reveenue Acts. It must, however, be remembered that the practice of the law for many years was less severe than the theory. Thus, while there were more than 200 offenses in the statute book for which capital punishment might be inflicted, there were only 25 offenses for which any one had suffered death during the preceding three quarters of a century.

Mainly to the exertions of Sir Samuel Romilly, England was indebted for the reformation of its criminal code. From 1808 to his death in 1818, Romilly strenuously continued his efforts to destroy this cruel system. Later, the cause of criminal reform found in Sir James Mackintosh a bolder and abler, if not more earnest, champion; and, aided by Peel, he secured legislation that reduced punishment by death to its present humane limits. In 1823, five statutes, exempting from capital punishment about a hundred felonies, were passed by both houses without a dissentient voice, and Peel's measures in 1826 to consolidate the criminal law were also humane. The punishment of forgery with death ceased in 1832–37. Since the statute of 1861 there remain in England only four capital crimes—setting fire to dockyards or arsenals, piracy with violence, treason, and murder. Practically it is only in the case of murder that the capital sentence is pronounced; and even then executive clemency occasionally commutes the sentence to life-imprisonment. With the change of severity came a change in methods, and the ribald horrors of public executions were abolished in 1868. The pens of Charles Dickens, Thomas Ingoldsby and Samuel Warren had not been employed in vain to satirize and scourge the shameless creatures who turned executions into saturnalia of debauchery.

Continental Europe has kept pace with reform in criminal law, the principal powers now restricting the death penalty to the gravest offenses. Public executions, however, are the rule rather than the exception. Hanging is the more usually employed method; but France retains the guillotine, and Spain the garotte. In Holland no person has been executed since 1860, and the death penalty was abolished by law in 1870. In Roumania it was abolished in 1864, and Portugal has adopted the same course. In Belgium the punishment of death practically is abolished, for, though the death sentence formally is retained, no execution has taken place in that country since 1863. In Switzerland, capital punishment was abolished in 1874, but, owing to a marked increase in the number of murders, by a federal decree of June 18, 1879, the cantons recovered the right of re-establishing the punishment of death in their respective territories. Seven of the cantons immediately took advantage of the permission, but the sentence of death seldom is passed in any of these cantons. In the remaining 15 cantons, including more than four fifths of the population of the republic, the death penalty remains totally abolished.

In many European countries in which the extreme penalty is authorized, the law has practically been abrogated by sentiments of humanity. Thus in Austria, owing to the repugnance of the Emperor to the death penalty, it has been enforced during his entire reign very rarely, and then in cases of atrociously brutal murderers. In Sweden, from 1870 to 1880, out of 32 sentenced to death, only 3 were executed; in Denmark, out of 94, only 1; in Bavaria, out of 249 committed for murder, only 7 were executed. In North Germany, during the 10 years from 1869 to 1878, 1,301 persons were convicted of "homicidal crime," and 484 of them were sentenced to death, but only 1 was executed—Hödel, who attempted the assassination of the Emperor William.

At the beginning of the nineteenth century the United States followed the ferocity of British statutes in the number of offenses incurring the death penalty. To-day the Federal laws are few and simple on the subject of capital punishment. In practice, the death penalty is exacted only in cases of murder, and then only after appeal to higher courts and after a refusal of executive clemency. Federal statutes are valid in territories, the District of Columbia, government reservations, the sea, Great Lakes and navigable rivers, and in cases arising under laws dealing with matters of interstate importance, as the mail service, etc. Even here the tendency is to grant territorial legislatures control over the punishment of crime, and to recognize a concurrent jurisdiction of the Federal and state

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governments over felonies committed on reservations and waters within each particular state, under which the Federal courts release themselves, as far as justice will allow, from criminal prosecutions.

As regards the separate states, with four exceptions capital punishment is inflicted on conviction for murder. Michigan, Wisconsin, Rhode Island and Maine substitute imprisonment for life. Some of the Southern states add rape to the catalogue of capital offenses. Iowa and New York, after a trial of life-imprisonment, restored the death penalty for murder; and the latter, with Ohio, inflicts the penalty by electricity.

In the armies of the world, desertion, conviction as a spy, and the act of secretly communicating intelligence to the enemy are regarded as capital offenses, and punishable by either being shot or hanged—the latter being regarded as the more disgraceful mode of execution. In many of the navies of the world, the culprit, if he be an officer, is shot; if a seaman, he usually is hanged at the yard-arm.

The tendency in the present century has been to limit capital punishment to the greatest crimes only; but, on the other hand, there is a well-defined public sentiment demanding the social security that it is believed the death penalty alone affords.

This sentiment finds some justification in the large use or abuse of executive clemency in many states, under which atrocious crimes received undue leniency, and in the obstructions legal ingenuity can interpose to the conviction or execution of a murderer. Hanging does not, it is true, remedy these evils, but they do arouse a spirit of severity in the public mind, as the miscarriage of justice inevitably does.

Societies for the abolition of capital punishment exist and have many supporters; but until

> "the time of the New Sublime,
> And the better than human way,"

the removal of malefactors from the body politic, the welfare of which they endanger, will find advocates.

The literature on the question of capital punishment is learned and voluminous. Among the best-known works on the subject may be mentioned: Basil Montagu, *On the Punishment of Death* (1813); *Memoirs of Sir Samuel Romilly* (1840), and his writings; Bentham, *Rationale of Punishments* (1830); Beccaria, *Essay on Crimes and Punishments* (1775; Eng. trans. by Farrer, 1880); Berner, *Die Abschaffung der Todesstrafe* (1861); Mittermaier, *Die Todesstrafe* (1862; Eng. ed. by J. M. Moir); Von Holtzendorff, *Das Verbrechen des Mordes und die Todesstrafe* (1874); Clode's *Administration of Justice Under Military Law;* Professor Lorimer, *Institutes of Law;* W. A. Coppinger, *Capital Punishment* (1876); J. M. Moir's *Capital Punishment* (1865); Stephen's *History of the Criminal Law.* See also the publications of the Howard Association, London.

Revised by R.W.C.

CAPITOL AT WASHINGTON, DISTRICT OF COLUMBIA. See ARCHITECTURE, XXV, 224.

CAPITOLIUM. See ROME, XX, pp. 844, 845.

CAPIZ, the capital of a province of same name in the island of Panay, Phil. Is. Leading products, rice and sugar. Population, 1903, 18,525.

CAPONNIÈRE. See FORTIFICATION, IX, 388.

CAPON SPRINGS, a post-office and watering-place in Hampshire County, eastern West Virginia, on the Great North Spur of the Alleghanies, 17 miles W. of Winchester, Virginia. The scenery here is beautiful and trout abundant. Its springs are a warm solution of carbonated calcic; they are widely known, and considered to be highly beneficial. The population of Capon district in 1900 was 1,700.

CAPPARIDACEÆ, a family of dicotyledonous plants, allied to *Cruciferæ*, and including about 350 known species, mostly natives of tropical and subtropical countries. Many of the species possess stimulant properties, while some are poisonous. One of the most interesting plants of the family is the *Sirvâk*, a bush or small tree of Africa, the small berries of which have a pungent taste, like pepper. When dried they constitute an important ingredient in the food of the natives, and the roots, when burned, yield considerable salt. *Cleome* is a genus with showy flowers; *Polanisia* is sometimes planted for ornament; the flower-buds of *Capparis spinosa*, a climbing, thorny shrub of the Mediterranean region, are the well-known "capers." The family differs from *Cruciferæ* in that its stamens are not tetradynamous and may be numerous; the pods are not divided by a false partition, and the ovary is elevated upon a stalk which is sometimes very long.

CAPPEL, a village in the canton of Zurich, northern Switzerland, 10 miles S.W. of the city of Zurich. Here the reformer Zwingli was killed in a conflict with troops of the Roman Catholic cantons in 1531. See ZWINGLI, Vol. XXIV, p. 873.

CAPRICCIO, in art, a term applied to a picture or other work which designedly violates the ordinary rules of composition. Foliated ornaments, with cupids or other figures appearing in them, in situations not strictly natural, are capriccios. In music, *capriccio* is a free composition, not conforming to rule as to form or figure. Locatelli, at the beginning of the eighteenth century, composed capriccios for the violin. The most celebrated capriccio of modern times is Mendelssohn's B minor capriccio for pianoforte and orchestra.

CAPRICORN, TROPIC OF, a circle in geography at lat. 23° 27′ S., the most southerly point at which the sun's rays are vertical, becoming thus at the winter solstice, December 21st. It corresponds to the tropic of Cancer in the north. It receives its name from the zodiacal sign *Capricorn*, where the ecliptic crosses the astronomical circle bearing a corresponding relation.

CAPRICORNUS, the Goat, a southern constellation and the tenth sign of the zodiac. It is usually represented as having the fore part of a goat, but the hinder part of a fish. The ancients regarded it as the harbinger of good fortune, and as marking the southern tropic, or winter solstice, wherefore they called it the "Southern Gate of the Sun." See ZODIAC, Vol. XXIV, p. 830.

CAPRIFICATION, a process used from the earliest times, by which branches of the sterile wild fig, or "caprifig," are suspended among the cultivated figs, to insure pollination. Sometimes, instead of using the branches, a few wild trees are planted among the others. The process of pollination is quite intricate. The "fig" is a flower-cluster in which the flowers are inclosed within an enlarged

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receptacle, and access to them is only possible through a small opening at the top. The pollination is effected by a small gall-wasp. The female wasp enters the fig, lays an egg in each flower, and dies within the fig. Each flower then develops into a kind of gall. The male wasp is wingless, and entering the fig, bites a small passage into the ovaries containing young female wasps, and impregnates them. The impregnated females then escape from the fig, in some cases carrying pollen with them, enter other figs, lay their eggs and die. The presence of the pollen-bearing wild fig is thought to insure the transfer of pollen in these migrations of the wasp; though the necessity of this "caprification" is quite doubtful. J. M. COULTER.

CAPRIFOLIACEÆ, a family of dicotyledonous plants, allied to the *Rubiaceæ*, containing about 230 species, chiefly found in the northern hemisphere outside of the tropics. Among the genera are the elders (*Sambucus*), the honeysuckles and woodbines (*Lonicera*), the snowberries (*Symphoricarpos*), the bush honeysuckles (*Diervilla*), the arrow-woods (*Viburnum*), among which is the *V. Opulus*, or snowball tree.

CAPRIMULGIDÆ, a family of birds. See GOATSUCKER, Vol. X, pp. 633–635.

CAPRIVI DE CAPRERA DE MONTE-CUCCULI, COUNT GEORG LEO VON, Chancellor of the German Empire, was born in Charlottenburg, Prussia, Feb. 24, 1831. He entered the Prussian army in 1849; served in the war of 1866 and the Franco-Prussian war, and became major-general in 1877. In Dec., 1882, he was given command of the third army division, with headquarters at Metz; from 1883 to 1888 was at the head of the admiralty; and then held command of the Tenth Army Corps, in Hanover. On March 19, 1890, he became Chancellor, in succession to Prince Bismarck. He revolutionized the commercial system of central Europe by a new series of commercial treaties, which laid the foundation for a central European customs union. Was made count in 1891, and retired from office Oct. 26, 1894. Died at Skyren, near Crossen, Feb. 6, 1899.

CAPRON, ALLYN, American army officer; born in Tampa, Florida, Aug. 27, 1846. On Sept. 1, 1863, he was appointed, from South Carolina, cadet at West Point, and graduated June 17, 1867, and was, on the same date, appointed second lieutenant of the First United States Artillery. He was made first lieutenant Aug. 19, 1883, and captain Dec. 4, 1888. In 1890 he was stationed at the Presidio, San Francisco. When, during the war with Spain, the invasion of Cuba was decided on, he was ordered to Santiago, where, at the battles of El Caney and San Juan, July 1 and 2, 1898, "Capron's battery," under his skillful and energetic command, greatly distinguished itself by its accurate and effective fire. Later, however, Captain Capron was stricken down with typhoid fever, and he was removed to Fort Myer, Va., where, on Sept. 18, 1898, he died. His son, ALLYN K., captain of Troop L of the Rough Riders, was killed in the battle at Las Guasimas, near Santiago, June 24, 1898. Captain Allyn Capron's father was killed during the Mexican War, at the battle of Churubusco, Aug. 20, 1847, while also in command of "Capron's battery."

CAPSICIN, an alkaloid, the active principle in capsicum or cayenne pepper, from which it is obtained. It is a thick liquid, of a reddish color, and possesses strong acrid properties. See CAYENNE PEPPER, Vol. V, p. 244.

CAPSULE, in physiology, is the name given to a membranous integument surrounding a joint, or the envelope, or sac, enveloping an organ, variously known as articular capsule, synovial capsule, seminal capsule, etc. The pericardium is the capsule of the heart. The bundle of white ligaments surrounding a joint, form what is called a capsular ligament, or articular capsule. The internal surface of the capsule is lined with a delicate membrane called the synovial membrane, which secretes a viscid fluid, the lubricant of the joints. The thin membranous sheath of the kidneys is the capsule of the kidney. In the kidneys themselves the uriniferous tubules are each supplied with a sac known as the Malpighian capsule, whose purpose is to secrete urine from the blood. Above each kidney is the suprarenal capsule. This is a flat, triangular organ, containing a brown, yellowish fluid, whose exact function has not yet been demonstrated. The seminal capsule is the extremity of the *vas deferens* which is sensibly dilated in the vicinity of the *vesiculæ seminales*. The various sense organs are lined or enveloped with capsules, transparent as in the case of the lens of the eye. In the brain the "internal capsule" is a layer of nerve fibers connecting the *crura cerebri* and *cortex*, while the "external capsule" is a similar layer between the *claustrum* and the *putamen* of the brain. W.R.B.

CAPSULE, in botany, a dry fruit, or spore-case, generally more or less cylindrical, or globose, containing many cells and seeds as in the poppy. See BOTANY, Vol. IV, p. 138. W.R.B.

CAPTAIN (MILITARY), originally a head or leader, irrespective of the number of men under him, but now the commander of a company, whether of infantry, cavalry or artillery. In the German army, where the infantry companies consist of 250 men each, the captain is a mounted officer; in the British and United States armies he marches on foot with his men, who look to him for everything, both in barracks and in the field. In cavalry regiments the captain also deals individually with his men when in barracks, but in the field he works under the leader of the squadron of which his troop forms half. The badge of rank in the British army is two stars on each shoulder-strap; in the United States army, two bars. In the United States navy the title is given the officer who ranks next to the commodore and above commander. In the British navy he stands next to the rear admiral. In both navies he is entitled to the command of a ship. This naval rank corresponds to that of colonel in the army. The master of any merchant vessel is given the title.

CAPTION, as a legal term, signifies a formal heading or title to an indictment, deposition, bill or other legal document in which is set forth the time, place and by what authority and in connection with what matter it was taken or executed, and such other matters as may be required to render the instrument

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legal and valid for use in the matter for which it is intended. Generally, such documents as indictments, affidavits, pleadings, process, depositions and other formal legal papers designed for use in court must bear a caption, in order to make them available for the use intended.

CAPUCHIN MONKEY, a name given to several South American monkeys of the genus *Cebus*. The hair on the head resembles the hood or cowl of a Capuchin monk.

CAPUDAN-PASHA OR CAPITAN-PASHA, the high admiral of Turkey. He has the entire command of the navy and the management of all naval affairs. The port of Pera, contiguous to the arsenal, the Turkish island in the Archipelago, and a number of seaports and maritime districts are under him, even in their civil administration.

CAPULETS AND MONTAGUES, in Italian, CAPPELLETTI AND MONTECCHI, were two noble families of Verona, in northern Italy. They both belonged to the Ghibelline faction, but were long in a bitter feud against each other. Dante mentions them in his *Purgatorio*, canto VI. Luigi da Porto wrote a romance about them in 1535, Bandello another in 1554, and Boisteau a third a little later. Boisteau's version of their story was translated into English in 1567, and even before that an English poem and a play based upon the same theme had appeared. Finally Shakespeare's superb tragedy of *Romeo and Juliet* immortalized the tragic tale and made it classic. W.F.J.

CAPUT MORTUUM OR COLCOTHAR VITRIOLI, the residuum of distillation, or sublimation of substances, as the brownish-red peroxide of iron which remains after the distillation of sulphuric acid from iron sulphate. W.R.B.

CAQUETA, a river of Colombia. See JAPURA, in these Supplements.

CARABIDÆ, a tribe of beetles. See COLEOPTERA, Vol. VI, p. 117.

CARABOBO, a state and plain of northern Venezuela. The state borders on the Caribbean Sea. It lies west of Caracas, north of Portugueza and east of Barinas, states of Venezuela. It has an area of 2,984 square miles, and in 1891 had a population of 198,021. Its capital is Valencia, with a population of 38,654. The plain lies south of Valencia near the mountains. This plain is famous for two decisive victories gained there by Bolivar in the war for independence against Spain. The first of these battles was fought May 28, 1814, and the other June 25, 1821. The last completely routed the Spaniards, and gained for Venezuela its independence. See VENEZUELA, Vol. XXIV, p. 152.

CARACARA EAGLE (*Polyborus tharus*), a large bird belonging to the subfamily of carrion-buzzards, abundant in South America. It feeds on animal matter, whether fresh or putrid, and sometimes attacks young and weak animals. The name *carrancha* is often used.

CARACCA, a village of Andalusia, Spain, one of the chief naval arsenals of the kingdom, situated four miles S.E. of Cadiz. It has been completely detached from the mainland by artificial means; it is defended by four forts, and is altogether very complete as an arsenal. See CADIZ, Vol. IV, p. 557.

CARACCIOLI, PRINCE FRANCESCO, born about 1748, in Naples, of a noble Neapolitan family. He had risen to the supreme command of King Ferdinand's navy, when, in December, 1798, he fled with him, before the French, from Naples to Palermo. Learning, however, of the intended confiscation of the estates of all absentees, he obtained permission to return to Naples, where he entered the service of the "Parthonopean Republic," and was placed at the head of its marine. For two months he ably directed the operations of the revolutionists, and not until their cause seemed hopeless, though before the capitulation, did he quit the capital. He was captured in peasant disguise, and, June 29, 1799, was brought on board Nelson's flagship, tried by a court-martial of Neapolitan officers, and hanged from the yard-arm of a Neapolitan frigate.

CARACTACUS OR CARADOC. See BRITANNIA, Vol. IV, p. 318.

CARADOC SANDSTONE AND BALA BEDS, a division of the Lower Silurian system developed in Shropshire, England. See GEOLOGY, Vol. X, p. 294.

CARAFFA, the name of an ancient and famous Neapolitan family, to which several cardinals and Pope Paul IV belonged. Carlo Caraffa, nephew of Paul IV, was born in 1517, fought in the Netherlands, joined the Knights of Malta, and was made cardinal by his uncle. Paul subsequently banished the Cardinal and his brothers from Rome for extortion, and in 1561 Pope Pius IV caused him to be put to death. See PAUL IV, Vol. XVIII, p. 441.

CARAITES. See KARAITES, Vol. XIV, p. 4.

CARALIS, ancient Sardinian town. See CAGLIARI, Vol. IV, p. 569.

CARAMBOLA, the "Coromandel gooseberry." The acid fruit of a small East Indian tree (*Averrhoa carambola*). It has a golden yellow, thin, smooth rind, and a clear watery pulp, in some varieties sweet, and in others acid, of a very agreeable flavor. It is often used in making sherbets and in tarts and preserves. W.R.B.

CARAMEL, "burnt sugar," a black or brown porous substance obtained by heating sugar to about 201° C., by which it loses two equivalents of water. The name is given to a form of candy made of cream, sugar, vanilla, pistache, etc., an article that is a general favorite with all classes. See CONFECTIONERY, Vol. VI, p. 228. W.R.B.

CARAMOTE, a large species of shrimp, found in the Mediterranean, whence it is exported in great numbers for food, packed in tins like sardines. W.F.J.

CARANX, also called SCAD OR HORSE MACKEREL, a species of acanthopterygian fishes, of the *Scomberidæ* family, found in great numbers on the British coast—the *Caranx trachurus*. W.F.J.

CARANNA RESIN, a resinous gum extracted from a tree of the same name growing in Mexico and South America. Its properties and uses resemble those of tacamahac. It is entirely soluble in alcohol, and melts at a slight heat.

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CARAPA, a genus of plants of the family *Meliaceæ*, found in tropical America and in Africa. *C. Guianensis* is a fine, large tree whose wood, called carapa-wood, or crab-wood, is used for making furniture, and also for the spars of ships; its bark is a febrifuge, and its seeds yield a lamp-oil, called carap-oil, or crab-oil. The African species (*C. Touloucouna*) yields an oil called coondi, kundah, or tallicoona, which is used by the natives for anointing their bodies, its bitterness protecting them from the bites of insects. The oil of the South American carapa is sometimes used for the same purpose. See OILS, Vol. XVII, p. 768.

CARAPACE, the protecting shell of chelonian reptiles, and part of the shell-covering of crustaceans, such as the lobster, crab, etc. See TORTOISE SHELL, Vol. XXIII, p. 489. R.W.C.

CARAPANOS, CONSTANTIN, Greek archæologist; born in Arta d'Epire, province of Ambracie, Greece (then under Turkish rule), March 13, 1840. He became an *attaché* of the Turkish embassy at Paris, but in 1864 gave up his diplomatic career to assume the duties of secretary of the first large banking establishment at Constantinople founded by native bankers. In connection with this financial institution, he was prominent in the great industrial and other reforms of his country, and was instrumental in securing the transfer, in 1878, of the provinces of Epirus and Thessaly from Ottoman to Hellenic control, becoming thus a Greek citizen. In 1878, when he began to have some leisure, he took up again the archæological studies of his youth. On his own estates in Epirus, he directed the excavations which resulted in the discovery of the ruins of the Temple of Dodo. He published a work on *Ruins of Dodo* (1878). Was correspondent of the French Antiquarian and Berlin Archæological Institutes.

CARAPEGUA, a town in Paraguay. Pop. 13,000.

CARAT, a term applied by goldsmiths and assayers to the twenty-fourth part of a troy pound, ounce, or any other weight, as a means of stating the proportion of pure gold contained in any alloy of gold with other metals. Thus, pure gold being considered as 24 carats fine, gold containing two parts of alloy is called 22 carats fine, or 22-carat gold. The carat used in this sense has, therefore, no absolute weight; it merely denotes a ratio. The gold used by jewelers is seldom over 18 carats fine, except in wedding-rings, the standard fineness of which is 22 carats. The so-called gold used for jewels, watch-cases, etc., varies from 8 or 9 to 18 carats fine. The jewelry carat, used as a unit for weighing diamonds and other precious stones, is quite different. It has a fixed weight, equal to 3.174 troy grains, and is divided into quarters, or "carat grains," eighths, sixteenths, etc. These carat grains are thus less than troy grains, and therefore the jeweler has to keep a separate set of diamond weights. This weight was fixed in 1877, by a syndicate of Amsterdam, London and Paris jewelers, at 205 milligrams, and is known as the *Amsterdam* or *diamond carat*. See DIAMOND, Vol. VII, p. 143.

CARAUSIUS, a British emperor. See BRITANNIA, Vol. IV, p. 319.

CARAVAGGIO, a town of Lombardy, Italy, about 24 miles E. from Milan. Population, 5,880. Three famous painters were born here—Fermo Stella, Polidoro Caldara (see Vol. V, p. 74), and Michel Angelo Amerighi (see Vol. V, p. 74). In the neighborhood is a sanctuary of the Madonna, built from designs of Pellegrini.

CARAVEL, the name of several kinds of vessels of ancient and modern use. The term is

THE CARAVEL SANTA MARIA.

chiefly known in its application to the vessels of the Spanish and Portuguese navigators of the 15th and 16th centuries, it being with three such ships that Columbus made his famous voyage. These vessels carried four masts, were very wide at the bow, and narrow and high at the stern, with deck-houses or towers in each end. Modern ships of this name are used in Portugal, and in some Mediterranean countries, one kind being of 100 to 150 tons burden, and another, especially adapted for fishing purposes, of 10 to 15 tons. Certain large Turkish war-ships are also known as caravels. R.W.C.

CARBAZOTIC OR PICRIC ACID, a substance of great importance in dyeing. It is a combination of nitric or sulphuric acid with carbolic acid. See CARBOLIC ACID, Vol. V, p. 76.

CARBOHYDRATES. See CHEMISTRY, Vol. V, pp. 489, 490.

CARBON, a village of Carbon County, southern Wyoming, on the Union Pacific railroad, about 80 miles N.W. of Laramie. It is the trade center of a rich mining district, and is almost exclusively engaged in business tributary to the mining interests of the surrounding country. Population 1890, 1,140; 1900, 634.

CARBONADO OR BLACK DIAMOND, an amorphous variety of carbon, brown or black in color, found in Brazil in connection with pure diamonds, and extensively used in diamond drills. See DIA-

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MOND, Vol. VII, p. 141; and MINERALOGY, Vol. XVI, p. 397.

CARBONDALE, a city and railroad junction of Jackson County, southern Illinois, 57 miles N. of Cairo by the Illinois Central railroad, also on the Chicago and Texas railroad and the St. Louis, Alton and Terre Haute railroad. The Southern Illinois Normal University is located here. The trade of the city is principally in building-stone, tobacco, cotton, lumber, farm products and coal. Population 1890, 2,382; 1900, 3,318.

CARBONDALE, Kansas, a city of Osage County, on the Atchison, Topeka and Santa Fé and the Kansas City, Wyandotte and Northwestern railroads, is a coal mining center. Its population in 1900 was 625. W.F.J.

CARBONDALE, a city of Lackawanna County, northeastern Pennsylvania, on the Lackawanna River, 16 miles N.N.E. of Scranton, and on the Delaware and Hudson, the New York, Ontario and Western, and the New York, Erie and Western railroads. The mines of the neighborhood are worked by the Delaware and Hudson Canal Company, and yield about 900,000 tons annually. It is supplied with electric lights and motor power, gas and water. The population of the city was, in 1890, 10,826; in 1900, 13,536. See Vol. V, p. 79.

CARBONIC ACID. See under CARBON, Vol. V, p. 78.

CARBONIC OXID OR OXIDE. See CARBON, OXIDES OF, Vol. V, p. 78.

CARBONIFEROUS PERIOD. See GEOLOGY, Vol. X, pp. 306–311.

CARBON THEORY OF STEEL. See IRON, in these Supplements.

CARBORUNDUM. See CHEMISTRY, in these Supplements.

CAR-CONSTRUCTION, ELECTRIC. Street-cars are being made larger and stronger each year, as the patronage of electric railways increases. To a great extent their manufacture has taken the place of car-building for steam-railways, the latter industry having suffered a most marked decline. The frames of trolley-cars have to be built especially strong, for several reasons—the roof has to bear the jerks of the trolley-pole, the floor-frame has to support powerful brake-mechanism, and the bracing has to withstand the shocks incident to the sudden stops which are often required. The cross-timbers of the floor-frames have to be arranged so as to avoid the motors, and so as to contain trap-doors through which the motors can be removed entire when needed. All the principal woods are used in their manufacture, though oak and hard pine predominate. Concealed steel rafters are commonly used to strengthen the roofs. The average length of trolley-cars is now about 25 feet, but the tendency is toward increased length. The principal styles made are motor, trailer and mail cars; also, open, closed, vestibule, convertible and combination styles. Notwithstanding increased size and strength, the weights are kept down, varying mostly between 3,000 and 5,250 pounds. The electric mail-car was first introduced in Boston, and, proving successful, has been placed on lines in several other large cities of the United States. Among the most recent improvements in electric cars, that of electric-heating commands much attention. Coils are placed under the seats, and, the current being turned on, the heat escapes into the car through gratings. When this system of heating is used on a vestibule-car, having no doors directly at the ends to cause chilling blasts to sweep through, it is possible to keep a car comfortably warm in quite cold weather. In some recent styles of cars, electric buttons are placed at intervals, by means of which passengers may signal when they desire to stop the car. Improved forms of fenders and brakes are being applied. See BRAKE, in these Supplements.

C. H. COCHRANE.

CARBURETER. The principal gas companies now employ gasolene extensively for raising the illuminating power of their gas. In the Maxim apparatus, patented in 1889, the gasolene is evaporated by heat, so as to obviate any fractional evaporation or any variation of the amount volatilized, due to differences in temperature of the air or gas. The extent of evaporation is automatically regulable. With this carbureter the enrichment of the gas is the same, no matter how many or how few burners are being supplied, and no deposition of liquid takes place if the temperature of the enriched gas is kept below 50° F.

In the Maxim and Sedgwick carbureter the gasolene is vaporized by steam supplied from a generator. This vapor is mixed with a proper proportion of gas drawn from the main at a convenient point, and afterward returned to it. The method of mixing is to force the gasolene vapor out of an injector in such manner that it draws a quantity of unenriched gas from the main by means of the partial vacuum created, and this, mingling with the gasolene vapor, becomes enriched, the extent of such enrichment being easily controlled.

The Simplex carbureter is largely used in the manufacture of air-gas. In this, hot water and a brush are made use of, to vaporize the petroleum.

C. H. COCHRANE.

CARCANO, GIULIO, born in Milan, Italy, Aug. 7, 1812; died Sept. 5, 1884. He was brought to favorable public notice in 1835 by his novel, *Ida della Torre*. He was banished in 1849; but on the establishment of national independence was appointed inspector of schools, and held important government positions. He made a faithful translation into Italian of the dramatic writings of Shakespeare.

CÁRCAR, a Philippine town on E. coast of Cebú, 23 m. S.W. of Cebú on Cárcar Bay, sheltered by islet. Country rugged but fertile. Language, Cebú-Visayan. Pop., 1893, 31,895.

CARCASS, in military pyrotechny, a hollow case of iron filled with combustibles. It is fired from a mortar. Its chief use is to ignite the enemy's buildings, and to give sufficient light to aim the shot and shells. Carcasses were first used by one of the princely ecclesiastics, the Bishop of Münster, when he fought against the Duke of Luxemburg at Groll, in 1672. They do not burst, but send out an inextinguishable fire through holes in the shell. They burn from 3 to 10 minutes. The fuses are inserted in the holes and are adjusted in length to suit the

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time taken in firing. The composition in the carcass consists mostly of saltpeter, sulphur and pitch.

CARCEL LAMP, invented in 1800 by Carcel, a Frenchman; burns colza oil; is used in lighthouses and photometry. The oil is pumped to the wick by clockwork arranged to go a certain time. In France the flame is taken as the standard of illumination.

CARDBOARD, pasteboard of the thickness of card for cutting cards from, or for making boxes, and the like. Bristol-board, which is used by artists, is made entirely of white paper; ordinary cardboard of fine white paper outside with a sheet of coarse cartridge paper between. Bookbinders' mill-board is made of coarse brown paper, glued and strongly pressed. W.R.B.

CARDENAS, a town and bay on the north coast of Cuba, in Matanzas province, about 80 miles E. of Havana. Population of town (1899), 21,940. (See Vol. V, p. 82.) On May 11, 1898, the bay was the scene of a naval action in the war with Spain, in which the United States gunboats *Wilmington* and *Machias*, the torpedo boats *Winslow* and *Foote*, and the revenue tug *Hudson* took part against some Spanish gunboats and shore batteries, and in which Ensign Bagley and others on board the *Winslow* were killed, and Lieut. J. J. Bernadou wounded.

CARDIADÆ. See COCKLE, Vol. VI, p. 91.

CARDIFF, town in Onondaga Co., N. Y., chiefly notable for the pretended discovery of the "Cardiff Giant," a statue carved in Chicago from a block of Iowa gypsum, buried at Cardiff, and then dug up and exhibited as a petrified giant.

CARDINAL, the highest dignitary in the Roman Catholic Church after the pope. (See CARDINAL, Vol. V.) Cardinals are divided into three orders, bishops, priests, and deacons. First in chronological order came cardinal priests, then cardinal deacons, and lastly cardinal bishops. There have been, also, cardinal sub-deacons, but since the time of Alexander III we find no mention of them. The order of cardinal priests seems to have originated thus: St. Cletus (elected pope A. D. 78), the second successor of St. Peter according to *Liber Pontificalis*, divided the city of Rome into districts, each with its own priest. Pope Evaristus confirmed this division into parishes, or titles, and the priests who were incardinated, or entitled, in these churches were afterward called cardinal priests. The origin of cardinal deacons is more obscure. Pope Clement, in A. D. 92, appointed seven deacons, similar to those mentioned in the Acts, to preside over the seven districts into which he divided Rome, and to their care he confided the *diaconiæ*, that is, hospitals or houses where widows, orphans, and the poor in general were supported out of the patrimony of the church. Later, the number of deacons was increased to 14, each of whom was assigned to a deaconry, and who were known as cardinal deacons of the Holy Roman Church. The admission of cardinal bishops into the College of Cardinals seems to have taken place not earlier than the year 731. Before that time the bishops of the churches surrounding Rome may have been consulted by the pope concerning affairs of the universal church, but they were not considered part of the presbytery or chapter of the Roman Church, nor were they called cardinals. Gregory III, however, appointed seven bishops to officiate by turn in the cathedral of St. John Lateran, and thus instituted the order of cardinal bishops. The number later was reduced to six, and these bishops were appointed to the suburbicary churches or dioceses of Ostia and Velletri, Porto and Santa Rufina, Frascati, Sabina, Palestrina, Albano, making six in all. The bishops of these dioceses, and they alone, are cardinal bishops of the Holy Roman Church. The essence of the cardinalate consists in the right and duty of assisting the Roman pontiff in ruling the universal church, and in case of vacancy in the Apostolic See of supplying his place until the election of a new pope. These duties are performed by the cardinals as a body, not as individuals, so that the corporate or collegiate form is of the essence of the cardinalate. The name, privileges and the various accessory duties of the cardinalate have undergone great changes in the course of ages, but its essential characteristic has been traced back to apostolic times by not a few writers, as appears from the Council of Constance, held in 1417. The dignity of the cardinalate is, after that of the pope, the highest in the church. It is greater than that of bishops, archbishops, primates, or even patriarchs. Whether this precedence was obtained by cardinals only in the eleventh or twelfth century, or whether by right and in fact they always held it, is a controverted question. Bellarmine, Baronius, Thomassin, maintain the former opinion, as do also Cohellius, Petra and Ferraris, who all wrote specially on this subject. Natalis Alexander claims that only under Innocent IV, in the year 1243, did cardinals obtain the right of precedence in session over bishops. All these writers claim that the precedence of the cardinals of the Holy Roman Church over all other dignitaries was only of gradual development. The question of precedence was specifically determined by Pope Eugene IV, in his bull *Non Mediocri*, by which he gives precedence to John Kemp, bishop of York and cardinal of the Holy Roman Church, over Henry, Archbishop of Canterbury, primate of England and legate-born of the Holy See. Later, in the year 1449, the Archbishop of Gneisen, primate of Poland, was made yield precedence to Cardinal Sbigneo, bishop of Cracow. Precedence among the cardinals themselves is regulated by the order of cardinal bishop, cardinal priest or cardinal deacon, to which they belong, and seniority in creation.

For the creation of a cardinal, all that is required is the will of the sovereign pontiff sufficiently expressed. Neither a certain form nor any special ceremony is essential, because the whole substance of the cardinalate consists in the power of jurisdiction, and its consequent prerogatives, which depends simply on the will of the superior. The cardinalate is not, like the priesthood, a sacrament. Since the publication of the decree of Pope Pius V, it is certain that cardinals obtain all cardinalitial rights the moment they are appointed in secret consistory, unless the pope makes special mention to the contrary. If the newly appointed cardinals are in Rome, they proceed in their usual dress without any attendants to the Apostolic Palace, where one of the

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old cardinals presents them to the Holy Father, who gives them the red cap, or beretta. But if a newly appointed cardinal is absent from Rome, one of the attendants of the Pope is dispatched at once to carry him the red beretta, in receiving which the new cardinal must promise on oath, under pain of deprivation of the cardinalate, that within a year he will proceed to Rome to visit the Holy Father. A public consistory is then called for giving the insignia to the new cardinals. In another consistory, the pope closes the mouths of the new cardinals, prohibiting them from speaking in consistories and other meetings until their mouths are opened again. Then, again, in another consistory, the pope orders the new cardinals to retire, while he asks the older cardinals whether they think the new cardinals should have their mouths opened. And, all assenting, the new cardinals are called back and kindly admonished by the Holy Father, who then opens their mouths, with these words: "We open your mouth both in conferences and in councils and in the election of the sovereign pontiff, and in all acts which both in and out of the consistory pertain to cardinals. In the name of the Father, and of the Son, and of the Holy Ghost, amen." Then finally the ring is given, and the title or church assigned to each new cardinal.

The title of a cardinal is the church in the city of Rome to which he is appointed. Cardinals, who are at the same time ordinaries or bishops of dioceses are obliged to reside, not in their titular churches in Rome, but in their dioceses. Though such cardinals cannot fully assist the Pope, still they can give some help, and it has long been the custom that quite a number, sometimes reaching nearly one half of the seventy cardinals, are selected from among such bishops as are obliged to reside in their own dioceses. Cardinals retain the title assigned them until by right of option, they acquire a higher, cardinals of a lower order having the right to ascend to a higher one. Thus the vacancies in the six suburban sees are always filled, not by an election, but by the right of option; according to seniority in the cardinalate. Thus, too, the oldest cardinal bishop who is present in the papal court becomes dean of the Sacred College as soon as a vacancy occurs. This cardinal is always the Bishop of Ostia, and he has the privilege of consecrating the newly elected pope if, when chosen, he is not yet a bishop.

Cardinals have many privileges, but chief among them is the precedence all of them have over bishops, archbishops, primates and patriarchs. They have also the exclusive right to the titles "Eminence" and "The Most Eminent," and everywhere rank with princes of the royal blood. At present cardinals have the exclusive right of electing a new pope when a vacancy occurs. (See CONCLAVE, in these Supplements.) In this election they are obliged strictly to follow the laws made before the vacancy. Further, it may be observed that while the pope usually consults with the cardinals, still neither their consent nor advice is necessary for the validity of papal acts. The College of Cardinals is a corporate body, and has as secretary a prelate who keeps its records, and a cardinal camerlingo who attends to its property Still, as a college, it may not meet without the previous permission of the pope. The selection of cardinals is optional with the pope. Still, certain positions in the papal court are supposed to prepare the way to the cardinalate, and are thus termed cardinalitial positions. Such are nunciatures to the greater nations. Among the cardinals there should be at least four from the regular and mendicant orders, according to the bull of Sixtus V, and finally, according to the mind of the Council of Trent, the cardinals, as much as can be, should be selected from all the nations of Christianity. Following the wish of the council, the Roman pontiffs now promote to the dignity of the cardinalate select men from various regions, but particularly from Catholic nations.

P. A. BAART.

CARDINAL-BIRD, also called cardinal grosbeak. See GROSBEAK, Vol. XI, p. 186.

CARDINAL-FLOWER, a name applied to *Lobelia cardinalis* on account of showy deep red flowers. Indigenous in the United States, in wet or low grounds, but often cultivated for ornament. It has a tall, simple stem, alternate lance-oblong leaves, and an erect raceme of showy flowers, which sometimes vary from deep red to rose-colored or even white.

CARDINGTON, a township and village of Morrow County, Ohio, in the central part of the state. It lies on the Cleveland, Cincinnati, Chicago and St. Louis railroad, 37 miles north of Columbus and 90 miles southwest of Cleveland. Its population was 1,354 in 1900. W.F.J.

CARDITIS, or inflammation of the heart, a form of disease of very rare occurrence, if the term be limited in its application to cases of true acute inflammation of the muscular structure of the heart itself. Carditis, however, was formerly understood in a wider sense, so as to include certain forms of disease of the external and internal lining membrane of the heart. See HEART, Vol. XI, p. 494.

CARDOON, a vegetable. See HORTICULTURE, Vol. XII, p. 292.

CARDUCCI, GIOSUÈ, Italian poet; born July 26, 1836, at Val di Castello, near Pietrasanta, in the province of Pisa. His youth was spent in study, and at the age of 25 he was appointed to a professorship in the University of Pisa, from which he was transferred in 1860 to a chair in the University of Bologna. He has been throughout his life a stanch republican, and in 1867 was for a short time suspended from his professorship for having signed an address to the patriot Mazzini. In 1876 he was returned to the Italian Parliament as member for Lugo di Romagna. His earliest poems, *Juvenilia* and *Levia Gravia*, contrast strongly with his later works. Signs of a transition in sentiment and in style appeared in the *Decennalia*, which dealt mainly with political events of the years 1860–70. The change became complete in the *Nuove Poesie*, in which he gave expression to the most advanced political views. These poems are remarkable for the sustained power and dignity of the language and the frequent nobility of the thought. The *Odi Barbare*, written in meters borrowed from Horace, are

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very popular with Italians, but to foreign critics Carducci seems in these pieces to have erred in the rejection of rhyme.

CARDWELL, EDWARD, VISCOUNT, English statesman; born July 24, 1813, at Liverpool; died Feb. 15, 1886, near Torquay. In 1842 he entered the House of Commons, and was Secretary of the Treasury under Peel from 1845–46, and from 1852–55 president of the Board of Trade under Aberdeen. In 1859 he was appointed Secretary for Ireland, and served from 1864–66 as Secretary of State for the Colonies. As Secretary of State for War under Gladstone from 1866–74 he effected a complete reorganization of the English army. In 1874 he was raised to the peerage with the title of Viscount of Ellerbeck. He published with Stanhope *Memoirs of Sir Robert Peel* (2 vols., 1856–57). G.A.S.

CARE OR CARLE SUNDAY, the Sunday before Palm Sunday, said to be so-called because it was the practice in many places to eat gray peas, called carlings, which were steeped all night in water and fried the next day in butter. This practice apparently had its more immediate origin in the custom of the Roman Catholic people of eating hallowed beans at this time. The beans are described in some religious books as symbolical of confession, and their steeping before use of meditation. It appears to have been adapted from a heathen custom.

CARÊME, MARIE ANTONIN, cook and author; was born in Paris in 1784, and was chief cook to the Emperor Napoleon and to Talleyrand. As Talleyrand's cook he played an important part at the Congress of Vienna. He was the author of *Les Déjeuners de l'Emperor Napoleon; La Cuisine Française*, and other works, and died in Paris in 1833. W.F.J.

CARETTE, ANTOINE ERNEST HIPPOLYTE, French military officer and writer; was born May 25, 1808. He entered the Polytechnic School in Paris in 1828; took an active part in the revolution in July of that year. Joining the army, he took part in the Algerian campaigns. There he became interested in ancient African history, and was accorded especial mention for his writings on that subject by the French Institute. He was a member of scientific expeditions to Algiers in 1840–42. After the revolution of 1848 he participated in the discussion of the Algerian question, and was defeated for the Chamber of Deputies at the elections under the constitution. In 1852 he was appointed chief of a battalion of engineers and colonel in 1863. He retired in 1868. He was made a commander of the Legion of Honor in 1867.

CAREX, a very large genus of plants of the family *Cyperaceæ*, commonly known as sedges. They are all of a grassy or rush-like appearance, and have some value in the economy of nature as forming the principal part of vegetation in swamps, which they assist in converting into fertile ground. The stems are triangular, and the staminate and pistillate flowers are separated from each other in the same cluster, or in different clusters on the same plant, or, rarely, on different plants. A characteristic feature of the genus is the *perigynium*, which incloses the pistil as a more or less inflated sac.

CAREY, a village of Wyandot County, north-central Ohio, on the Columbus, Hocking Valley and Toledo, the Northern Ohio and the Cleveland, Chicago and St. Louis railroads. By the last it is 16 miles S. of Tiffin. It contains manufactories of lumber and iron. Population, 1900, 1,816.

CAREY, HENRY CHARLES, an American political economist; born in Philadelphia, Pennsylvania, December 15, 1793. He was the eldest son of Matthew Carey, the publisher, and in 1814 entered into partnership with his father, succeeding him as head of the bookselling and publishing house. In 1835 he published an essay on *The Rate of Wages*, which he expanded in 1839 into *The Principles of Political Economy*. His other well-known works are *The Credit System in France, Great Britain and the United States* (1838); *The Past, the Present and the Future* (1848); *The Principles of Social Science* (1858–9); *Letters on Political Economy* (1860 and 1865); *The Unity of Law* (1872). His first work on political economy won him an authoritative international position notwithstanding what was then an extravagantly unorthodox opposition to Adam Smith and his followers. He was originally a free-trader and then became an advocate of protection. Several of his books were republished in England and on the Continent. He died in Philadelphia, October 13, 1879. W.M.C.

HENRY C. CAREY.

CAREY, JOSEPH MAULL, an American statesman; born in Milton, Delaware, January 19, 1848. He studied at Union College and graduated from the law department of the University of Pennsylvania in 1867. From 1869 to 1872 he was United States district attorney for Wyoming. From 1872 to 1876 he was justice of the Wyoming supreme court and from 1885 to 1890 was a member of Congress. He was United States Senator from 1890 to 1895. W.M.C.

CAREY, MATTHEW, an American publisher; born in Dublin, Ireland, Jan. 28, 1760. He learned printing, and in 1779 published *A Letter to the Catholics of Ireland* on their oppressions; but it was suppressed by the government, and its author sought refuge in Paris, where he worked for Dr. Franklin. Returning to Ireland he edited the *Freeman's Journal* for a short time, but got into other political troubles, and sailed for Philadelphia, arriving there Nov. 15, 1784. Here in 1785 he started the *Pennsylvania Herald*, the first newspaper in America to give accurate reports of legislative debates, Mr. Carey being his own reporter. In a duel with the editor of a rival journal Carey was so severely wounded as to cause his confinement for sixteen months. His

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next venture, the *American Museum*, lasted about six years. In 1791 he began business as a bookseller, and in 1796 took part in the formation of the first American Sunday School Society. Among his published writings are: *An Essay on Duelling* (1777); *A History of the Yellow Fever* (1793); *The Olive Branch* (1814); *Vindiciæ Hibernicæ* (1818); *The New Olive Branch* (1820); *Essays on Political Economy*, advocating protection (1822). Mr. Carey was active in philanthropic movements and internal improvement measures. He died in Philadelphia, Sept. 16, 1839. E.E.T.

CARIACOU, a name often applied to deer of the genus *Cariacus*. The common white-tailed or Virginia deer of North America is a member of the genus.

CARIAMIDÆ, a family of birds allied to the cranes, but exhibiting also close resemblance to gallinaceous birds. They are natives of Guiana, Brazil and Paraguay, are larger than the heron. They are much esteemed as food. W.R.B.

CARIBEE-BARK OR PITON BARK is obtained from *Exostemma floribundum*, an evergreen timber tree, a native of the West Indies. It has a very bitter taste and is sometimes substituted for the true chinchona bark. W.R.B.

CARIBOO, a once famous placer gold-mining district, in the northern part of British Columbia, at the sources of the Stikeen and Liard rivers. It is now almost entirely deserted, except by a few industrious Chinese, who make fair livings by washing over the tailings from the old diggings.

CARIBOU. See DEER, Vol. VII, p. 23.

CARIBOU, a village in Aroostook County, northern Maine, on the Aroostook River, 20 miles above its junction with the St. John River. It is situated on the Boston and Maine and the Bangor and Aroostook railroads. Its principal industry is agriculture, though it has starch, carriage, sash and door factories, lumber and shingle mills, grist-mills, and a foundry; has water-works and electric lights. Population of Caribou township in 1900, 4,758.

CARIGARA, a Philippine town in the province of Leyte. Population, 1903, 16,382.

CARILLON, a set of bells arranged for striking in such a way as to produce tunes. The set usually varies from 12 to 20. Eight bells and more are called a chime; less than these, a peal. The apparatus by which a carillon is played is called a clavecin, a recent form of which is operated by electricity, current contacts being produced by a piano key-board conveniently arranged. The term *carillon* is sometimes applied to the music produced by or arranged for chiming. See BELL, Vol. III, p. 465.

CARINARIA, a remarkable genus of gasteropodous mollusks, of the order called *Heteropoda* or *Nucleobranchiata*, having a thin shell, in form somewhat like that of a limpet. The shells of some of the species have been denominated Venus's-slipper. The body is gelatinous, and so transparent that much of its interior organization can be seen. The species are all marine. See MOLLUSCA, XVI, 678.

CARINATÆ, a genus of flying birds having deep keeled breastbones. See BIRDS, Vol. III, p. 604; ORNITHOLOGY, Vol. XVIII, p. 48. W.R.B.

CARINI, ISIDORE, premier préfetto at the Vatican Library; born in Palmero, Sicily, Jan. 7, 1843; became a priest in 1866; in 1875, canon of the Cathedral of Palermo; in 1877, professor of paleography and curator of the Archives of Palmero; in 1882, sent to Spain by the government to collect information on the Sicilian vespers; in 1884, assistant archivist and professor of paleography at the Vatican School in Rome; in 1889, appointed premier préfetto at the Vatican Library. He has published numerous writings on religion, bibliography and subjects in archæology.

CARINUS, MARCUS AURELIUS, a Roman emperor; elder son of Emperor Carus; raised to the throne in A.D. 283, by his father, who left him in the west and went with his younger son, Numerianus, against the Persians. On the death of Carus the same year, both brothers succeeded to the purple. Numerianus was slain in 284, and Carinus marched to oppose Diocletian in Mœsia, defeating him, but was assassinated in 285, by one of his officers, whose wife the emperor had betrayed.

CARISSA, a genus of plants of the order *Apocynaceæ*. One species is a thorny shrub, common in India, where it is used for hedges, and where its fruit is used for tarts and preserves. Other species have some medicinal use. W.F.J.

CARLÉN, FLYGARE-CARLÉN, EMILIA, a Swedish novelist; born Aug. 8, 1807, at Strömstad; died at Stockholm, Feb. 5, 1892. In 1827 she was married to Flygare, a physician; and in 1841 to Carlén, a jurist and poet. Her works include *Waldemar Klein; The Substitute; Gustav Lindorm; The Professor; The Rose of Tisselö; The Entailed Estate; The Guardian*, and *A Trading House on the Schären*. Her remarkable gift of observation and the moral tone permeating all her productions assure her a front rank among contemporaneous novelists. G.A.S.

CARLETON. See COFFIN, CHARLES CARLETON, in these Supplements.

CARLETON, SIR GUY, LORD DORCHESTER, a British soldier; born in Strabane, Ireland, Sept. 3, 1724. He distinguished himself at the sieges of Louisburg (1758), Quebec (1759), and Havana (1762). In 1772 he was appointed governor of Quebec, and in 1775 defeated the expeditions of Montgomery and Arnold. In 1781 he became commander-in-chief in America. He died in Stubbings, Eng., Nov. 10, 1808. E.E.T.

CARLETON, THOMAS, a British soldier, brother of Sir Guy Carleton (q. v.). On entering the army in 1755 he was appointed an ensign in Col. James Wolfe's regiment; was commissioned captain in 1759; and was brevetted major-general in 1773. He was quartermaster-general to the army in Canada in 1775; was gazetted lieutenant-colonel in 1776, in which year he was wounded in the naval contest with Arnold on Lake Champlain; was commissioned colonel in 1782; appointed governor of New Brunswick in 1783; and was commissioned major-general in 1793, lieutenant-general in 1798, and general in 1803. He died in January, 1817. E.E.T.

CARLETON, WILL, poet and lecturer, was

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born at Hudson, Mich., on October 21, 1845, and was graduated from Hillsdale College in 1869. He engaged in newspaper work, and became widely known as a poet. He has lectured and given readings in all parts of the world. Among his books are *Farm Ballads*, *Farm Legends*, *Farm Festivals*, etc. He is now editor of a magazine entitled *Everywhere*. W.F.J.

CARLETON COLLEGE, organized in 1870, at Northfield, Minnesota; conducted by the Congregational Church; president in 1901, James W. Strong; the same year there were 21 in the faculty and 366 students; 15,400 volumes in the library. From its organization till the year 1900, 394 have graduated.

CARLINE THISTLE, a name applied to species of *Carlina*, a genus of plants of the family *Compositæ*. The name is said to be derived from a legend, that an angel showed the root of one of the species to Charlemagne as a remedy for a plague. This particular species (*C. acaulis*) grows on hills and mountains in the middle latitudes of Europe. It has a very short stem and very large heads of flowers.

CARLING, Sir John, statesman; was born at London, Ontario, Canada, on January 23, 1828, and followed his father in the brewing industry. From 1857 to 1867 he was a Conservative member of the Canadian Assembly, and was also for a time receiver-general and commissioner of agriculture and public works. After the formation of the Dominion he entered Parliament as a Conservative, and was postmaster-general and then minister of agriculture. In 1891 he was made a senator, but the next year resigned in order to return to the House of Commons. In 1895 he was again made a senator. He was the founder of the Agricultural College and Experimental Farm system. W.F.J.

CARLINVILLE, city and capital of Macoupin County, southwestern Illinois, on the Litchfield, Carrollton and Alton and the Chicago and Alton railroads; 54 miles N.N.W. of St. Louis. Blackburn University is here located, and there is also a theological seminary. Pop., 1900, 3,502.

CARLISLE, capital of Nicholas County, northeastern Kentucky, on the Louisville and Nashville railroad, 17 miles N.E. of Paris. Its principal industries are carriage-making and flour-milling. Population in 1900, 1,377.

CARLISLE, an organized borough and the county seat of Cumberland County, in the central part of the "southern tier" of Pennsylvania. It is a favorite for residence, an industrial center, and the seat of important educational institutions, of which latter Dickinson College (q. v.) and the Carlisle Indian School are the chief. Dickinson College has been greatly developed since 1885, and in 1905 some fine new buildings were completed to take the place of those destroyed by fire. The chief industries of Carlisle are car shops and manufactories of carpets and of boots and shoes. The place is also an important trade center for the rich fruit and agricultural region surrounding it. It lies about 18 miles southwest of Harrisburg, and is reached by the Philadelphia and Reading and the Cumberland Valley railroads. Its population was 9,626 in 1900. See Carlisle, Vol. V, p. 97. W.F.J.

CARLISLE, John Griffin, statesman; was born in Campbell County, Kentucky, on September 5, 1835, and was a student and afterward a teacher in the common schools. He studied law and was admitted to the bar of Kentucky in 1858, was a member of the state assembly in 1859–61, and of the state senate in 1866–71. He was a representative in Congress from 1877 to 1889, and from 1883 to 1889 was Speaker of the House. He was United States Senator from Kentucky in 1890–93, and Secretary of the Treasury under President Cleveland from 1893 to 1897. Since the last-named date he has been engaged in legal practice in New York. He has been a conspicuous figure in the Democratic party since 1868, when he first was a delegate to its national convention. In Congress he was one of its chief leaders, and was especially an advocate of free trade or a tariff for revenue only. In 1895 he took a strong stand in favor of the gold standard for currency, in which he differed from the majority of his party, and in the following year he identified himself with the "Gold Democrats," who temporarily seceded from the bulk of the party. In 1904 the party was reunited, and he returned to his old allegiance. W.F.J.

JOHN G. CARLISLE.

CARLISTS, the name given to the supporters of the Spanish pretender, Don Carlos de Bourbon. See Spain, Vol. XXII, p. 359, 360.

CARLOMAN. See France, Vol. IX, p. 469.

CARLOS I, king of Portugal, son of King Louis I, was born Sept. 28, 1863; married Marie Amélie, daughter of the Comte de Paris, May 22, 1886, and succeeded his father on the throne, Oct. 19, 1889.

CARLOS I.

CARLOS, Duke of Madrid, born March 30, 1848. He claims the Spanish throne as the son of Don Juan, the brother of Carlos (Charles VI), who claimed the throne, and in whose behalf the uprisings of 1848, 1855 and 1860 took place. As Charles VI died without heir, his claims were taken up by Don Juan, and in turn by the present Carlos. Don Juan married Marie Teresa of Austria. Carlos is married to Margaret of Bourbon, sister of the late Henry V of France, Comte de Chambord. Carlos styles himself Charles VII, and in 1872, 1873 and 1875–78 his followers raised rebellions in the mountain provinces. They were defeated and Carlos obliged to flee to France, from which he was expelled by the order of President

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Grévy, because of his sympathy for the Comte de Chambord. R.C.A.

CARLOS, Don, Infante of Spain, and oldest son of Philip II of Spain; born July 8, 1545; died in prison July 24, 1568. His career furnished the subject of five dramas, of which that by Schiller is the best known. G.A.S.

CARLOTTA, Marie Charlotte Amélie Auguste Victoire Clémentine Léopoldine, ex-empress of Mexico, daughter of Leopold I, king of the Belgians; was born on June 7, 1840, and was married on July 27, 1857, to Maximilian, archduke of Austria. She shared with him the short-lived throne of the Mexican empire, went to Paris in 1866, and thence to Italy, vainly seeking aid for him against the revolutionists, and became hopelessly insane after he was put to death on June 19, 1867. W.F.J.

CARLSBAD, the well-known Bohemian town, maintains its rank as one of the foremost health resorts of Europe. The virtues of its medicinal springs, with their daily flow of 2,000,000 gallons, are more and more confirmed and are yearly sought by increasing numbers. W.F.J.

CARLSRUHE, the capital of the grand duchy of Baden, Germany. The city, with a population of (1900) 97,181, has a museum containing a library of 160,000 volumes and 3,725 manuscripts and objects of archæology and ethnology, a hall of arts, a School for Art Trades, and a Technical High School, an imperial bank, and diverse factories. G.A.S.

CARLTON, Thomas, clergyman; was born at Londonderry, N.H., in 1810, and became a minister of the Methodist Episcopal Church. After 29 years of pastoral work he was appointed agent of the Methodist Book Concern, the chief denominational publishing house in New York. He remained at the head of that institution from 1852 to 1872, when failing health compelled his retirement. He died in Elizabeth, N. J., on April 16, 1874. W.F.J.

CARLUDOVICA, a genus of tropical American palms, belonging to the small family *Cyclanthaceæ*. It differs from the true palms, with pinnate leaves, in having fan-like folded leaves. The flowers are arranged in whorls or close spirals on a thick axis. The leaves of *C. palmata* are used in the manufacture of Panama hats.

CARLYLE, a town and capital of Clinton County, southern Illinois, on the Kaskaskia River, 47 miles E. of St. Louis, and on the Baltimore and Ohio Southwestern railroad. It contains important manufactories of iron, wagons and plows, and is the seat of a seminary for young women. Pop., 1900, 1,874.

CARLYLE, Alexander, a Scottish clergyman; born in Dumfriesshire, January 26, 1722. He was educated at the universities of Edinburgh, Glasgow and Leyden and in 1744 was ordained a Presbyterian minister. He was one of the leaders of the Moderate party in the Church, was present at the Porteous riot, served as a volunteer in the 1745 rebellion, and was present at the battle of Prestonpans. He was intimate with the most eminent Scotchmen of his day. In his later years he wrote an *Autobiography* which was not published until 1860. He died at Inveresk, Scotland, August 25, 1805. W.M.C.

CARLYLE, Thomas, a Scottish critic and historian; born in Ecclefechan, a small market town in Dumfriesshire, February 5, 1795. James Carlyle, his father, was a mason by trade, a man of resolute, strongly marked character, and of the straight theological views of the sect called Burghers. The family consisted of four sons and five daughters, and Thomas was the eldest. From the village school and the tutoring of the minister he went to Annan Grammar School in 1808 with a view to the University and the ministry. He always retained a painful memory of the school, and did not carry away much educational profit. French and Latin, algebra and a smattering of Greek, constituted his scholarly equipment when he set out to walk to Edinburgh University, where he remained two years, spending the vacations under his father's roof. At college he was distinguished for nothing so much as his attachment to the study of mathematics, then taught there by Leslie. He appears at this time to have proposed to himself the Christian ministry in the church of his fathers. After teaching mathematics at a school in Dysart, Fifeshire, for about two years, he devoted himself, in 1823, to the profession of literature; and in the following year contributed to Brewster's *Edinburgh Encyclopedia* the articles "Montesquieu," "Montaigne," "Nelson," "Norfolk" and those on the two "Pitts" and to the *New Edinburgh Review* an Essay on Joanna Baillie's *Plays of the Passions*. In the same year he completed a translation of Legendre's *Geometry*, to which he prefixed an *Essay on Proportions*, and also published his translations of Goethe's *Wilhelm Meister*, a work which betrayed a direction of reading destined to influence materially his future career. On the completion of this translation he commenced his *Life of Schiller*, which appeared by instalments in the *London Magazine*, then sustained by the talents of Lamb, Hazlitt and Cunningham. In 1826 he married Miss Jane Welsh, daughter of a doctor at Haddington, and a lineal descendant of John Knox. After his marriage he resided for a time in Edinburgh, and then withdrew to a farm in Dumfriesshire belonging to his wife, about 15 miles from the town of Dumfries. This place, Craigenputtock, he describes in a letter to Goethe, in 1828, as the "loneliest nook in Britain, an oasis in a wilderness of heath and rock, among the granite hills and the black morasses which stretch westward through Galloway almost to the Irish Sea." Here he wrote a number of critical and biographical articles for various periodicals, such as the *Edinburgh Review*, the *Foreign Quarterly*, and

THOMAS CARLYLE.

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Fraser's Magazine. For six years he lived the life of a recluse, working out his ideas, laying in stores of wide reading, developing *Sartor*, and writing the essays which are now included in the *Miscellanies*. It was a stern and desolate life. Carlyle was engrossed in his studies and meditations, and could only work in absolute solitude; read, wrote, walked, rode, and even slept alone. To him the apprenticeship of these solitary years was invaluable; he had time to mature; to his wife it was the bitterness of death, and the misery and physical hardships of these six years embittered her spirit and permanently injured her health. In the latter part of 1830, when he was thirty-five, Carlyle "set himself down passionately to work" at *Sartor*. He had already written a first draft and submitted it to the London editors, only to meet with firm rejection. He now used his own experience, treated somewhat mythically, as a framework, and thus poured out the thoughts, the ideals, the hopes, the scorn and contempt, that had been surging in him all these years. He wrote tumultuously, and the book *Sartor Resartus*, the most inspiring of all his writings, still blazes with the fiery impulse that prompted it. Jeffrey lent him $250 to go up to London with the manuscript, and arrange for its publication, and this was the only occasion on which Carlyle condescended to accept help in money from anyone. Arrived in London, he offered *Sartor* to Murray, Longmans, Fraser, all in vain. The MS. went back to Scotland unsold. But Carlyle had not made the journey altogether in vain. Hitherto his only influential friend had been Jeffrey; now he had formed a warm attachment for John Stuart Mill, Leigh Hunt, Lytton Bulwer, and other celebrities of the day. *Sartor Resartus* was finally printed serially in *Fraser's Magazine* in 1833–4. It is the most original of his works, the one which first brought him fame, and which has had, perhaps, a greater influence on the minds of his readers than any single work that could be named. The whimsical tale of this work (literally "The Tailor Repatched") is a translation of that of an old Scottish song ("The Tailor Done Over"). The book professes to be an exposition for English readers of a new philosophy, the philosophy of clothes. In the summer of 1834 Carlyle established himself in the house at Chelsea in London, at No. 5 Cheyne Row, which was henceforth to be his home. His existence hitherto had been a prolonged battle; a man does not carry himself in such conflicts so wisely and warily that he can come out of them unscathed; and Carlyle carried scars from his wounds both on his mind and on his temper. He called things by their right names "in a dialect edged with sarcasm." He was stubborn, proud, ungovernable in temper, he was unintentionally cruel to his wife, and sacrificed her to his work. Yet he had preserved the great qualities of his nature through all his many years of struggle. In 1837 he published his *French Revolution*. Two years after his *Chartism* appeared, and with it his *Critical and Miscellaneous Essays*, collected and republished, in five volumes, from reviews and magazines. In 1840 he delivered a series of lectures on hero-worship at the west end of London, which he published in the following year. His *Past and Present* was published in 1843. The general conviction of men's minds after the European convulsions of 1848 offered an occasion for expressing his views on the aspects of the time, and *The Latter Day Pamphlets* were written. He next wrote a life of his friend John Sterling, published in 1851. The largest and most laborious work of his life, *The History of Friedrich II. of Prussia, Called Frederick the Great*, next appeared, the first two volumes in 1858, the second two in 1862 and the last two in 1865, and after this time little came from his pen. In 1866, having been elected Lord Rector of Edinburgh University, he delivered an installation address to the students *On the Choice of Books*. While still in Scotland the news reached him that his wife had died suddenly in London. Her death was a severe blow to Carlyle, for she was a woman of exceptional intellect and a most devoted and affectionate wife. From this time his productions were mostly articles or letters on topics of the day, including *Shooting Niagara* and *After*, in which he gave vent to his serious misgivings as to the result of the Reform Bill of 1867. An unimportant historical sketch *The Early Kings of Norway* appeared in 1874. Toward the end of his life he was offered a government pension and a baronetcy, but declined both. During his last years he suffered from a nervous affection of the right hand, which precluded any writing save by dictation, which he found unsuited to his mode of composition. He died at Chelsea, February 4, 1881, and was buried in the Ecclefechan kirkyard. He left the estate of Craigenputtock to the University of Edinburgh, settling that the income should form ten bursaries for annual competition:—five for proficiency in mathematics, and five for classics. He had appointed James Anthony Froude his literary executor, who, in conformity with his trust, published *Reminiscences of Thomas Carlyle* (1881); *Thomas Carlyle; the First Forty Years of His Life* (1882); *Letters of Jane Welsh Carlyle* (1883) and *Thomas Carlyle; Life in London* (1884). Carlyle was a master of the English language and while his style was often eccentric, uncouth, rugged and extravagant, it developed into an instrument of unsurpassable power. W.M.C.

CARMAGNOLE, the name of a song and dance, also a kind of white coat, of the French revolutionists. It probably originated in Carmagnola (q. v.), Piedmont. R.W.C.

CARMAN, Albert, clergyman; born in Iroquois, Ontario, Canada, June 27, 1833; was graduated at Victoria University in 1855; was headmaster of the Dundas County Grammar School for two years; became professor of mathematics in Belleville Seminary (Albert College) in 1857, and principal in the following year; was ordained in the Methodist Episcopal Church in 1859; aided in

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securing the affiliation of Albert College with Toronto University and a university charter for the college; was elected bishop of the Methodist Episcopal Church in Canada in 1874; and in 1883, general superintendent of the Methodist Church in Canada. G.J.H.

CARMAN, (WILLIAM) BLISS, a Canadian poet and journalist; born in Fredericton, New Brunswick, April 15, 1861. He was educated at the universities of New Brunswick, Edinburgh, and Harvard. He then studied law and civil engineering, but in 1886 returned to Harvard and studied philosophy and English literature. Soon after he began writing verse and contributing essays to the newspapers of Boston and New York. His poetry met with considerable favor and his books have been widely read. His works include *Low Tide on Grand Pré* (1893); *A Sea Mark* (1895); *Behind the Arras* (1895); *Ballads of Lost Haven* (1897); *By the Aurelian Wall* (1897); *Songs from Vagabondia*, joint author with Richard Hovey (1894); *More Songs from Vagabondia* (with Hovey) (1896); *Last Songs from Vagabondia* (with Hovey) (1900); *A Winter Holiday* (1902). In 1903 he became editor of the *Boston Literary World*, and remained until that journal was merged with the *Critic* of New York in January, 1905. In 1895 he published a *Threnody for Robert Louis Stevenson*. He has edited several collections of verse and has written many delightful prose essays largely in the way of nature studies, and descriptions of the homes and haunts of birds and wild game. Since 1894 he has made his residence in New York city. W.M.C.

CARMATHIANS OR KARMATHITES, a branch of the Ismailian sect of Islam. See MOHAMMEDANISM, Vol. XVI, pp. 609, 610, 616.

CARMEL, town and capital of Putnam County, southern New York; 49 miles N. of New York City. It is the seat of Drew Seminary for Young Ladies. Population 1900, 2,598.

CARMEN SYLVA, the pseudonym of Pauline Elizabeth Ottilie Louise, queen of Roumania. See ELIZABETH, QUEEN OF ROUMANIA in these Supplements.

CARMI, city and capital of White County, southeastern Illinois, situated at the head of navigation on the Little Wabash, about 100 miles N. E. of Cairo, and on the Cleveland, Cincinnati, Chicago and St. Louis, and the Louisville and Nashville railroads. It contains flour-mills and manufactories of woolens and iron. Population 1900, 2,939.

CARNAUBA PALM, the *Ceroxylon andicola*, or wax palm, a native of the elevated regions of Colombia. The whole of the stem and leaves are covered with a whitish waxy substance, which is collected from the stem by scraping. It is principally used for making candles for the Roman Catholic churches and forms an article of trade. The *Copernicia cerifera* is another species of wax palm native to Brazil. Its young leaves are covered with a waxy secretion which is obtained by shaking and beating them and from which candles are also made. W.R.B.

CARNALLITE, a mineral which, when found in masses, has fertilizing value. See MINERALOGY, Vol. XVI, p. 400.

CARNARVON, HENRY HOWARD MOLYNEUX HERBERT, fourth Duke of; born June 24, 1831; died June 28, 1890. He studied at Eton and Oxford, and succeeded his father in the House of Lords in 1849. He was under-secretary of state from 1858–59, and secretary for Colonies under Derby from 1866–67, and under Disraeli from 1874–78. The aggressive policy of Disraeli in the Orient led to his resignation in 1878, but not to his affiliation with the opposition. In 1885 he was appointed lord-lieutenant of Ireland by Salisbury. His dealings with Parnell caused considerable strife and animosity. At the beginning of a new coercive policy against Ireland he resigned. He wrote *Recollections of the Druses of the Lebanon* and *Notes on Their Religion;* and a metric translation of *Agamemnon* by Æschylus and of the *Odyssey*. G.A.S.

CARNATION, a plant. See PINK, Vol. XIX, p. 115; HORTICULTURE, Vol. XII, p. 261.

CARNEGIE, Andrew, iron manufacturer and philanthropist, was born at Dunfermline, Scotland, on November 25, 1837, and was brought to the United States eleven years later. He worked as a telegraph messenger boy and in other occupations, in Pittsburg, Penn., and rose to be a railroad superintendent. He became interested in the introduction of sleeping cars, and thus laid the foundation of his fortune.

ANDREW CARNEGIE.

Finally he established iron and steel works at Pittsburg, and by development and consolidation of other concerns made them the largest in America. He introduced the Bessemer steel process into America. In 1901 his enterprises were merged into the United States Steel Corporation, the largest capitalized corporation in the world, of which he is the largest bondholder. He has given $10,000,000 to the Carnegie Institute at Pittsburg, $10,000,000 to the Carnegie Institute at Washington, D. C., $5,200,000 for Carnegie libraries in New York City, $10,000,000 to Scotch universities, $5,000,000 for a benefit fund for the employés of his steel works, $1,000,000 for a public Carnegie Library in St. Louis, and millions more for Carnegie libraries in numerous cities and towns in all parts of the English speaking world. In 1904 he established on a generous foundation a system of prizes for acts of heroism. He has thus disposed of more than $50,000,000. In 1903 he was elected Lord Rector of the University of St. Andrews, Scotland. He has written a number of books, including *An American Four-in-Hand in Britain*, *Triumphant Democracy*, *Round the World*, *The Gospel of Wealth*, and *The Empire of Business*. He

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divides his time between two homes, Skibo Castle in Scotland and a palace on Fifth avenue, New York. W.F.J.

CARNEGIE, an iron-manufacturing town in Allegheny County, Pennsylvania. Pop., 1900, 7,330.

CARNELIAN. See AGATE, Vol. I, p. 248.

CARNES, THOMAS P., lawyer; was born in Maryland and became a lawyer in Georgia, where he served as solicitor-general, attorney-general, and justice of the supreme court of the state. In 1793 he was elected a representative in Congress, from Georgia. He died at Milledgeville, Georgia, on May 8, 1822. W.F.J.

CARNIFEX FERRY is a place of ferriage across the Gauley River, in Nicholas County, West Virginia, in the south central part of that state. It was the scene of one of the first Federal victories in the Civil War, which, however, was not so much a battle as a manœuver. The engagement began late in the day on September 10, 1861, and was brought to an end by nightfall. During the darkness the Confederates, who were considerably outnumbered, escaped across the river and retired, leaving the bulk of their camp equipments and ammunition. W.F.J.

CARNOCHAN, JOHN MURRAY, surgeon; was born at Savannah Georgia, on July 4, 1817, and was educated for the medical profession, completing his studies at the University of Edinburgh, Scotland, and in London, Paris, Berlin and Vienna. He established himself in New York City in 1847 as a physician and surgeon, and soon won very high rank, especially as an operating surgeon. He was notably bold and successful in performing operations never before attempted, and, indeed, thitherto deemed impossible. Among his achievements were the severing and tying of the femoral artery, the removal of the lower jaw, the removal of both bones of the forearm, and the removal of some of the cranial nerves for the radical cure of neuralgia. He became professor of surgery in the New York Medical College in 1851, and was also chief surgeon to the New York State Immigrant Hospital. He was the author of several works on surgery, which have run through numerous editions. He died in New York on October 28, 1887. W.F.J.

CARNOT, LAZARE HIPPOLYTE, a French political writer and statesman, a son of Lazare Nicolas Marguerite Carnot, born at St. Omer, April 6, 1801; died March 16, 1888. He early embraced the teachings of the St. Simon school which he, however, gave up for those of Enfantin. From 1839–48 he was a member of the Chamber of Deputies, where he ranged with the Radicals. In 1848 he was appointed minister of Public Instruction, but resigned in the same year. He was elected to the legislative assembly in 1850, 1852, 1857 and 1864, but defeated in 1869 by Gambetta. In 1871 he became a member of the National Assembly, and in 1875 a Senator for lifetime. In 1885, 1887 and 1888 he functioned as president of the Senate, and organized before his death a society for making researches in the history of the French Revolution. He wrote *Expose de la Doctrine Saint Simonienne*, and *La Revolution Française*, *Resumé Historique*. G.A.S.

CARNOT, MARIE FRANÇOIS SADI, President of the French Republic, was born at Limoges, Aug. 11, 1837. He studied at the École Polytechnique and the school for construction of bridges and roads, and built the large bridge over the river Rhone at Collonge. In 1871 he became Prefect of the department Seine Inférieure, and Commissary-General in the Normandy. After the armistice of Feb. 7, 1871, he retired and was, Feb. 8, elected in the National Assembly. As deputy for Beaune, elected in 1876, he was among the 363 who protested against the *coup d'état* of May 16, 1877. Re-elected in 1878, he became assistant secretary to Freycinet, Minister of Public Buildings, which latter post he himself held during the premiership of Ferry from 1880–81. He voted against the motion to impeach the ministry of May 16, against secularization of public instruction, and the removability of officials. Re-elected in 1881, he was vice-president of the Chamber from 1883–84; on April 6, he took charge of the Ministry of Public Buildings, and on April 16, of the Ministry of Finances, under the premiership of Brisson, and under that of Freycinet till Dec. 3, 1886. On the resignation of Grévy, in 1887, Carnot was elected President of the republic. In 1889 he opened the Paris Exposition. Honored and trusted by all good Republicans, he was assassinated by the Italian anarchist Caserio, June 24, 1894, at Lyons, during the Colonial Exposition. G.A.S.

M. FRANÇOIS SADI CARNOT.

CARO, village and capital of Tuscola County, in the west-central part of southern Michigan, on the Michigan Central railroad, 34 miles E.S.E. of Bay City, in a district of stock and produce farms. It has several lumber-mills; is supplied with electric lights and water-works. In 1900 the population was 2,006.

CARO, ELME MARIE, a French philosopher; born March 4, 1826, in Poitiers; was appointed professor of philosophy at the Sorbonne in Paris, 1864, and became a member of the French Academy in 1874. A philosopher by word and letter, he attacked the pessimistic views, as expressed by Hartman and Schopenhauer, with the weapons of spiritualism. He died at Paris, July 13, 1887. Among his works are *Martin, le Philosophe Inconnu* (1875); *Nouvelles Études Morales sur le Temps Présent* (1879); *L'Idée de Dieu et ses Nouveaux Critiques* (1843); *Les Matérialism et la Science* (1868); *Problèmes de Morale Sociale* (1878); *Le Pessimisme au XIX Siècle* (1878); *La Philosophie de Goethe* (1880). G.A.S.

CAROB. See LOCUST TREE, Vol. XIV, p. 774.

CAROLINE BOOKS were four treatises, forming a connected whole, which were written either by the Emperor Charlemagne himself or by some one at his command and under his inspiration. His famous chaplain, Alcuin, was probably much concerned in their preparation. Their theme was image worship in the Christian Church, and the author sought to pursue a middle course between the Council of A. D. 754, which sanctioned the free use of images, and that of A. D. 787, which forbade it. The books appeared in the year 790, and the gist of their argument was that images were not to be regarded as objects of worship, but as ornamentations and as inspirations to devout thought. A council or synod of the Church at Frankfort in A. D. 794, approved the doctrines set forth in these books. An abstract of the books was sent by Charlemagne by the hands of his son-in-law, Angilbert, to Pope Hadrian I, who had approved the image-worshiping doctrines of the Council of 754, and a controversy thus arose between the emperor and the pontiff, which ended with the latter's death in the next year. They were first printed in Paris in 1549 by Jean du Tillet, who then inclined toward Protestantism, and who regarded the books as arguments against the Roman Church. W.F.J.

CARON, Sir Joseph Philippe René Adolphe, lawyer; born in Quebec, Canada, Dec. 24, 1843; son of René Edward Caron; was graduated at McGill University in 1865; called to the bar the same year; and was created a queen's counsel in 1879. He entered the Canadian House of Commons in 1873; subsequently was minister of militia and postmaster-general; and rendered valuable service in the Riel rebellion in 1885. G.J.H.

CARP, a fish of the *Cyprinidæ* family. See Angling, Vol. II, p. 39; Ichthyology, Vol. XII, p. 731; Pisciculture, Vol. XIX, p. 135.

CARPACCIO, Vittore, a painter of the early Venetian school; born in Istria about 1450. He was a pupil of Vivarini, the elder, and also of Gentile Bellini. In 1490–95 he painted nine subjects from the life of St. Ursula, which are now preserved in the Accademia of Venice. About 1494 he executed another work now in the same collection, *The Patriarch of Grado Casting Out a Devil*, which possesses much antiquarian interest, from its accurately detailed view of the Rialto. His next great series of works was the nine subjects from the lives of the Saviour and Sts. Jerome, George and Tryphonius (1502–08), painted for the school of San Giorgio de Schiavoni, still preserved there, and made still more famous by Ruskin. In 1510 he executed the *Presentation in the Temple*, now in the Accademia, which is usually regarded as his masterpiece. His latest dated works, at Pirano and Pozzale, are inscribed 1519, and he is believed to have died about 1522.

CARPEAUX, Jean Baptiste, a French sculptor; born May 11, 1827, at Valenciennes; studied under Duret at Paris, obtaining, in 1854, first prize with his *Hector Giving His Son Astyanax in Care of Jupiter*. He then studied five years at the French Academy and executed *Palombella* and a bronze statue of a *Young Fisherman*. He won fame, in 1863, by his *Ugolino and His Children* (in the Tuileries Garden), by an alto-relievo of *France Protecting Art and Agriculture* at the Pavilion de Flora of the Tuileries and by his most realistic group *The Dance* on the main front of the Paris Opera House. Among his later works are to be mentioned a bronze group in the Garden of Luxembourg, representing four winged sea-horses and four female figures. He also executed marble busts of Princess Mathilde, of Alexander Dumas, Junior, of Gérôme the painter, and of Garnier the architect. He died Oct. 11, 1875, in the castle Bécon near Asinières. G.A.S.

CARPENTARIA, a gulf of the northern coast of Australia, named in honor of Pieter Carpenter, governor-general of the Dutch East Indies from 1623–27. Its length from north to south is 450 miles, and its width between Cape York and Cape Arnhen 360 miles. Its shores on the east and south are low and marshy, but on the west steep and rich in harbors and bays, among them Melville, Blue Mud and Caledon bays. Outside lie the Groote Eylandt, Bentink, Wellsley and Sir Edward-Pellew islands. G.A.S.

CARPENTER, Charles C., naval commander, was born at Greenfield, Mass., on Feb. 27, 1834, and entered the navy as a midshipman at the age of sixteen years. He saw much active service during the Civil War, in the Gulf blockading squadron, and in the attacks upon Charleston, S. C. After the war he served with the Asiatic squadron, at the Portsmouth and Boston navy yards. In 1894–96 he was again with the Asiatic squadron as its commander, and witnessed the war between China and Japan. He was made a commander in 1869, captain in 1880, commodore in 1893, and rear-admiral in 1894. On February 27, 1896, he was retired under the law for age. In the Spanish War of 1898 he offered his services to the government, which were accepted, and he was put in command of the Portsmouth navy yard again. His health soon after failed, and he died under his own hand at a sanitarium on April 2, 1899. W.F.J.

CARPENTER, Edmund James, author, was born in Massachusetts on October 16, 1845, and was educated at Brown University. He has been a merchant and editor, but is best known as the author of a number of works on American history and as a writer for magazines. W.F.J.

CARPENTER, Francis Bicknell, artist, was born at Homer, New York, on August 6, 1830. He had only a few months' instruction in painting when, in 1851, he opened a studio in New York City and began his artistic career. The next year he was elected an associate member of the National Academy. He devoted his attention chiefly to portrait work, and had as his subjects many eminent men and women, among them being Lincoln, Fillmore, Lowell, Horace Greeley, John C. Fremont, Henry Ward Beecher, Ezra Cornell, George William Curtis, Schuyler Colfax, Richard S. Storrs, Edwin M. Stanton, and Myron H. Clark. Several of these portraits, including those of Lincoln and Myron H. Clark

have been placed in public galleries. His best known work was his great historical painting of *The Signing of the Emancipation Proclamation*, depicting President Lincoln and all the members of his Cabinet. In order to paint this picture Mr. Carpenter spent six months in Washington, chiefly at the White House, carefully studying his subjects. The result was one of the most satisfactory historical portrait groups ever produced by an American artist. The painting has been reproduced as a steel engraving and has thus had wide circulation. The original canvas was purchased by Mrs. Elizabeth Thompson and presented to Congress. It now hangs in the Capitol at Washington. Mr. Carpenter wrote a popular book about his experiences in Washington, entitled *Six Months in the White House with Lincoln*. He died on May 23, 1900. W.F.J.

CARPENTER, JOSEPH ESTLIN, theologian and author; was born in England in 1844, and was educated at University and Manchester New Colleges. He was pastor of churches at Clifton and Leeds from 1866 to 1875, and from 1875 to 1899 lecturer in Manchester College, London and Oxford, and since 1899 at Oxford. He edited Ewald's *History of Israel;* translated Tiele's *Outlines of the History of Religion*, and has written *Life in Palestine; The First Three Gospels; The Bible in the Nineteenth Century*, and other works. He has also collaborated with other scholars in editing and translating various Indian religious works, exhibiting a fine degree of Sanskrit scholarship. He is a nephew of Mary Carpenter (q. v., infra) and wrote her biography. W.F.J.

CARPENTER, LANT, an eminent English theological writer; born at Kidderminster in 1780; was drowned April 5, 1850. He was the father of Mary Carpenter, the philanthropist, and of William Benjamin Carpenter, the physiologist. Carpenter was a most prolific writer. Beside publishing many sermons and polemical pamphlets, he contributed many articles to Ree's *Cyclopedia*, and his works published both during his life and after his death are masterpieces of style, argument and diction. His work, *Apostolical Harmony of the Gospels*, is conceded an authority on the subject, even among those theologians who hold views differing from him. G.A.S.

CARPENTER, LOUIS GEORGE, engineer; was born at Orion, Michigan, on March 28, 1861, and was graduated from the Michigan Agricultural College in 1879. He was an instructor and professor in the Michigan Agricultural College in 1880–88, and in the latter year became identified with the Colorado Agricultural College. Since 1899 he has been director of the Agricultural Experiment Station. One of his chief works was the organization, in 1888, of the first systematic instruction in irrigation. W.F.J.

CARPENTER, MARY, an English philanthropist; born at Exeter, April 3, 1807; died June 14, 1877. She was the daughter of Dr. Lant Carpenter and aunt of Joseph Estlin Carpenter (q. v., in these Supplements. Trained as a teacher she took an active part in the movement for the reformation of neglected children, and besides advocating their cause in her writings, she founded a ragged school at Bristol in 1846, and several reformatories, one of which, the Red Lodge Reformatory, she superintended. She promoted the Industrial Schools Act of 1857, and some of her proposals were adopted in the amended acts of 1861 and 1866. In the prosecution of her philanthropic labors she visited India four times, had an interview with the Queen in 1868 in connection with her work, and in 1870 instituted the National Indian Association, whose journal she edited. She attended at Darmstadt a congress on women's work, as a guest of the Princess Alice, and visited America in 1873. Her plan of day-feeding industrial schools in connection with school boards was adopted in 1876. Besides her reformatory writings she published *Ragged Schools* (1849); *What Shall We Do with Our Pauper Children?* (1861); *Our Convicts* (1864); *The Last Days in England of the Rajah Rammohun Roy* (1866); *Six Months in India* (1868), etc.

CARPENTER, MATTHEW HALE, statesman, was born in Vermont in 1824, studied at West Point, and was admitted to the bar. He became a leading attorney and state officer in Wisconsin, and was a United States Senator from that state from 1869 to 1875, and from 1879 to 1881. He was noted for his eloquence as a speaker as well as for his legal knowledge. He died in Washington on February 24, 1881. W.F.J.

CARPENTER, PHILIP PEARSALL, naturalist, was born in Bristol, Eng., on Nov. 4, 1819, and was educated at Edinburgh University and Manchester College. He was a Unitarian minister, but was best known for his studies and researches in conchology. He was connected with the British Museum, and the Smithsonian Institution. The latter portion of his life was spent in America, and he died in Montreal, Can., on May 24, 1877, leaving a fine collection of shells to McGill University. W.F.J.

CARPENTER, WILLIAM BENJAMIN, biologist; brother of Mary Carpenter (q.v., supra); was born at Exeter, England, on October 29, 1813, was educated at Bristol, London and Edinburgh, and became professor of physiology at the Royal Institution, London, lecturer at the London Hospital and University College (1849), and examiner and registrar of the University of London (1856). He edited the *British and Foreign Medico-Chirurgical Review* and a *Popular Cyclopædia of Science* (1843). He was made a C. B. in 1879. He made three voyages to the North Atlantic and Mediterranean, for biological research, and thus inspired the great Challenger expedition. His researches were of great value both in biology and in ocean hydrography. He made valuable researches into the *Foraminifera*, on the *Eozoon Canadense*, on the feather-stars and crinoids, on the relation between mind and brain, and on "unconscious cerebration." His observations of the sea-depths led him to put forth a theory of vertical ocean currents or circulation sustained by opposition of temperatures only, independent of and quite distinct from the horizontal currents caused by winds. His conclusions were not always accepted by his contemporaries, but

they were conducive to further investigation and did much to stimulate additional research into the profound mysteries of deep sea life and conditions of matter, for which Carpenter will always be held in grateful remembrance by scientists. He was a voluminous, versatile, but always careful and scholarly author. Among his many scientific writings were *Principles of Human Physiology; Principles of Mental Physiology; Animal Physiology; Manual of Physiology; Zoölogy and Instincts of Animals; The Microscope and Its Revelations; Introduction to the Study of Foraminifera; The Use of Alcoholic Liquors; Physiology of Temperance*, and *Mesmerism and Spiritualism*. He died on November 19, 1885, from the effects of burns received from the upsetting of a spirit lamp while engaged in scientific work. He had received many honorary degrees, medals, and other tokens of the high esteem in which his scholarship and achievements were held by his contemporaries. W.F.J.

CARPENTER, WILLIAM BOYD, an English churchman; born at Liverpool, March 26, 1841; educated at St. Catherine's College, Cambridge, graduating there, senior optime, 1864, in which year he was ordained. He became canon of Windsor in 1879; lecturer and select preacher in Cambridge and Oxford universities, and in 1884 was consecrated bishop of Ripon. He was honored with the degree of D.C.L. by Oxford in 1889, and was appointed honorary chaplain to the Queen in 1878. Some of his works are *Thoughts on Prayer* (1872); *The Prophets of Christendom* (1876); *Narcissus: A Tale of Early Christian Times* (1879); *The Witness of the Heart to Christ*, the Hulsean lecture at Cambridge for 1878 (1880); *My Bible* (1884); *The Permanent Elements of Religion*, the Bampton lectures at Oxford for 1887 (1889).

CARPENTER, WILLIAM HENRY, philologist; was born at Utica, New York, on July 15, 1853, and was educated at Cornell, Leipsic, Freiburg, and Johns Hopkins universities. He was a teacher and lecturer at Cornell in 1883, and since that time has been connected with Columbia University, New York city, where he has for some years filled the professorship of Germanic languages and literature. He is the author of a number of works. W.F.J.

CARPENTER-BEE, a hymenopterous insect of the genus *Xylocopa*, and the bee family (*Apiariæ*), resembling the ordinary bumble-bees. They bore long tunnels in solid wood, which are subdivided into cells by partitions formed of particles of sawdust glued together. These cells are provisioned with pollen, and an egg deposited in each. These bees are the largest known, and occur in both Old and New Worlds.

CARPENTRY. The trade of the carpenter has been largely changed within a score of years, by the introduction of labor-saving machinery for the manufacture of standard parts of buildings, which once were fitted by hand by the workman, and put up as made. Frame houses and the woodwork of other buildings are now manufactured at the planing-mills, sash and blind factories, etc. The builder buys all his doors, door-frames, window-frames, sashes, moldings, mantels, cornices, stair-rails, newel-posts, and the thousand and one accessories of a modern dwelling, and the carpenter simply puts them together, with the parts that have all been sawed to size at the mill. In short, the carpenter, as the public sees him, has become simply a fitter up of the parts of houses as designed by an architect, and made from his specification at the mills.

A very long list of wood-working machines are manufactured to do this work for the carpenter. There are almost numberless varieties of sawing-machines, planers and matchers, molding-machines that will give a board almost any pattern of molding, both double and single surfacers, sash-sticking machines, tenoning-machines, resawing-machines, miter-cutting machines, tongueing and grooving machines, dovetailing-machines, sanders, boring and mortising machines, together with various combinations and modifications of all of these.

The metal-worker has intruded on the field of the carpenter, and reduced the share of work that formerly fell to him. Steel ceilings are becoming common in large and handsome buildings, and the sheet steel is stamped into beautiful designs, which can hardly be matched in any other material. Metal lath is also increasing in use, its insertion being required by law in some classes of buildings, in some large cities. It consists of sheet steel, about as thick as a good grade of stovepipe, and is corrugated and slit by running through a creasing and cutting machine. Iron and steel shutters are common in fire-proof buildings, and iron doors are sometimes introduced at points where they would serve to cut off a fire. Metal shingles and various other forms of metal roofing meet with increased favor, and galvanized iron cornices, ridging, gutters, trimmings, etc., have usurped the market. Building-papers for making outer walls more impervious to the wind, and mineral wool and asbestos for deadening sounds and fire-proofing are among the other common articles which supplement the woodwork in most modern dwellings. The small hardware used by carpenters in building construction has been generally improved in appearance and cheapened in price.

Another innovation of metal in frame buildings is the introduction of malleable iron brackets as joist-hangers and wall-hangers, for supporting the ends of joists and doing away with the old method of framing by mortising and tenoning.

The more ornamental designs of frame buildings which now prevail have called for increased skill on the part of both architect and carpenter in matters of roof-framing, balcony-construction, and arrangement of framing to meet peculiarity of design. Otherwise the trade of carpentry has been simplified by modern improvements. See BUILDING, Vol. IV, pp. 426–433. CHARLES H. COCHRANE.

CARPET-BUG. See ANTHRENUS SCHROPHULARIÆ, in these Supplements.

CARPINO, a town of Italy, on the promontory of Gorgano, in Apulia, 22 miles N.E. of San Severo. Population about 6,300.

CARPIO, MANUEL, a Mexican poet and politician; born at Casamaloapan, Vera Cruz, March

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1, 1791. He studied medicine, graduating as a physician in 1832. He became professor of physiology in the University of Mexico in 1833 and entering political life he became a leader of the Conservatives. In 1825 and 1848 he was a deputy in the Mexican Congress; in 1851 was elected Senator. In 1858 he was made a member of the state council. Several editions of his *Poesias* have been published, the latest in 1883. He was well known in Europe by his poems, which met with marked favor. He died February 11, 1860. W.M.C.

CARPOPHYTES, a name applied by some botanists to those Algæ and Fungi in which a *spore-case* is developed. This spore-case primarily results directly from the act of fertilization, called carpogamy, although in many fungi in which the so-called "spore-case" appears the power of sexual reproduction seems to have been lost. Those who use such a classification include under the name the highest of the Algæ and Fungi.

CARPUS, bones of the wrist. See SKELETON, Vol. XXII, pp. 125, 126.

CARQUINEZ OR KARQUENAS STRAIT. A strait 20 miles N.N.E. of San Francisco, connecting Suisun Bay with San Pablo Bay, and separating the counties of Solano and Contra Costa. It is eight miles long, from one to two wide, and is navigable. It conveys the waters of all the rivers of the Sierra Nevada to the sea.

CARR, CAMILLO CASATI CADMUS, soldier, was born at Harrisonburg, Virginia, on March 3, 1842, was educated at Chicago University, served in the Civil War, and afterward on the frontier, served in Porto Rico in 1898–99, and in the Philippines in 1900–01. He translated *Cavalry Outpost Duties* from the French. W.F.J.

CARR, EUGENE ASA, an American soldier; born in Concord, Erie Co., N.Y., March 20, 1830. He was graduated from the United States Military Academy in 1850, and for several years was engaged in Indian warfare in New Mexico, Texas and the far West. In a skirmish near Diablo Mountain in 1854 he was severely wounded. In the Civil War he served with the 4th Division of the Army of the Southwest; commanded a division in the Vicksburg campaign in 1863, and led the assault on that city. At the close of the war he was promoted to brigadier-general and brevetted major-general of volunteers. In 1868 he was engaged against the Sioux and Cheyenne Indians, and took part in other expeditions against hostile Indians. He was retired in 1893. W.M.C.

CARR, JOSEPH, soldier and politician, was born at Albany, New York, on August 16, 1828, and on reaching his majority enlisted in the state militia. His regiment was among the first to go to the front in the Civil War, and the first of all to cross the Potomac and encamp on Virginian soil. He was promoted to be a brigadier-general of volunteers in 1862, and in that capacity participated in some of the chief battles of the war, including Malvern Hill, Fredericksburg, Chancellorsville, and Gettysburg. He was mustered out with the rank of major-general at the end of the war. He became a manufacturer, served as secretary of state of New York, was a leader of the Republican party, and died on February 24, 1895. W.F.J.

CARR, JOSEPH WILLIAM COMYNS, an English art critic and dramatist; born 1849; studied law at the Inner Temple, was called to the bar in 1872, and joined the northern circuit, but soon forsook the legal profession to take up that of literature. He became a frequent contributor to the reviews, his favorite subject being art. He was art critic for the *Pall Mall Gazette*, and English editor for *L'Art*. He assisted in establishing the Grosvenor Gallery, and was one of its directors. His published works on art include *Drawings by the Old Masters* (1877); *The Abbey Church of St. Albans* (1878); *Examples of Contemporary Art* (1878); *Art in Provincial France* (1883); and *Papers on Art* (1884). He is perhaps better known as a playwright, dramatizing Hardy's *Far from the Madding Crowd;* collaborating with Hugh Conway in *Called Back;* and writing *Arthur*, produced at the Lyceum Theater in 1895.

CARR, SIR ROBERT, was born in Northumberland, England, and in 1664 was appointed as one of four commissioners to visit New England, investigate the affairs of the colonies, and "to provide for the peace of the country, according to the royal instructions and their own discretion." Their coming caused great indignation among the colonists, who regarded the commission as an infringement upon the colonial rights of self government. Carr was also commissioned to take possession, for England, of the Dutch colony of New Amsterdam (New York) and also of the Swedish and Dutch settlements on the Delaware River. He returned to England and died soon after his arrival, on June 1, 1667. W.F.J.

CARRATRACA SPRINGS are a health and pleasure resort in Plantagenet township, Prescott County, in the northeastern part of Ontario, Canada. They are near the Nation River, a tributary of the Ottawa River. W.F.J.

CARRERA, JOSÉ MIGUEL, a Chilean patriot; born in Santiago de Chile, Oct. 15, 1785. He was one of three brothers who distinguished themselves in the revolution against Spanish dominion. After the battle of Rancagua, in October, 1814, the Carreras fled to Buenos Ayres, José later going to the United States. His brothers, who had been detained on parole, escaped, but were re-arrested. The Chilean general, San Martin, plotted their downfall, and they were shot, March 8, 1818. José raised troops to avenge their deaths in 1821; but he was captured near Mendoza and shot, Sept. 4, 1821. E.E.T.

CARRERA, RAFAEL, soldier, was born in Guatemala, Central America, in 1814, of Indian and negro ancestry. He was uneducated, but ambitious, and had much executive and military ability. In 1839–40 he organized an army which dominated the country, and in 1847 made himself President of Guatemala. A year later he resigned and left the country. A few years later civil

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wars gave him an opportunity to return and make himself President again in 1851, and in 1854 he was declared President for life. He opposed the union of the Central American states, and was the champion of the Clerical and Conservative party. Little progress was made under his rule, and he was guilty of many severities. He died in 1865. W.F.J.

CARRERE, JOHN MERVEN, architect; born of American parents in Rio de Janeiro, Brazil, Nov. 9, 1858. He early went to Europe and was educated in Switzerland. Turning his attention to architecture he entered the École des Beaux Arts, Paris, and was graduated in 1882. With Thomas Hastings he established in New York the firm of Carrere & Hastings, who planned the Alcazar and Ponce de Leon hotels, St. Augustine, Fla.; the New York Public Library, etc. G.J.H.

CARRICKMACROSS, a parish of the county of Monaghan, Ireland, thirteen miles west and south of Dundalk. It contains the ruins of a castle built by the Earl of Essex in Elizabeth's reign, and a grammar school founded by Lord Weymouth in 1711. W.F.J.

CARRICK-ON-SHANNON, the capital of the County Leitrim, western Connaught, Ireland, on the Shannon, 98 miles N.W. of Dublin by the Midland Great Western railroad. It is advantageously situated for trading by rail, river and the Ulster canal. Population, 1901, 1,350.

CARRICK'S FORD is a crossing of the Cheat River, in Tucker County, West Virginia, in the eastern part of that state. It lies west of the Alleghanies, and near the Great Backbone Mountains. It was the scene of a Federal victory in the Civil War, on July 13, 1861. W.F.J.

CARRIER, COMMON, one who, for hire, undertakes the conveyance of goods or passengers. There is an important distinction between a *common carrier* and a *private carrier*. A common carrier is bound by law to serve the public generally without favoritism or discrimination, and is held responsible for the safe delivery of all property delivered to his care. Railway companies, steamboat lines, express companies and other carriers have endeavored to escape or limit this liability by incorporating in the bill of lading a contract to the effect that in case of loss or damage to property in transit the carrier should not be liable beyond a certain sum. But the American courts have held that, in so far as this provision seeks to avoid liability for injury resulting from the negligence of the carrier or its employees, it is against public policy, and therefore void. It seems, therefore, well settled that in case of damage occasioned by negligence the carrier must respond for all losses sustained. On the other hand, the law exempts the carrier from liability for injury occasioned by the "act of God," or by such agencies as human foresight and prudence cannot successfully guard against. Deception or misrepresentations by the owner of the goods, as undervaluation, etc., will also avoid or limit the carrier's liability. Common carriers cannot legally give undue and unjust preferences nor make unequal or extravagant charges. All applying have an equal right to be transported, or have their freight transported, in the order of their application, and at the same rate as is given to others under similar circumstances. Questions of preference have been decided upon common-law principles in this country until the passage of what is known as the Interstate Commerce Act by Congress in 1877. That act makes it unlawful for any common carrier to charge an unreasonable rate for its services, to discriminate in favor of one person or locality, to make a greater charge for a short than for a longer distance over the same line, or to enter into any pooling contract with any other common carrier or divide earnings with such carrier. The act also provides for an interstate commerce commission, whose duty it is to investigate all complaints against common carriers for violation of any of the provisions of the act, and require satisfaction for such violation; and in case such satisfaction is not granted within a limited time, to institute proceedings against the offending company. It is also made the duty of all railroad companies to furnish reports to this commission, at stated periods, as to their rate of charges established. The act also provides that a schedule of rates shall be kept in each depot or office of the company for public inspection, and that such rate shall not be increased except upon ten days' public notice, stating the time such change will go into effect, and shall not be decreased except upon three days' notice. This act applies only to such carriers as operate in more than one state, and therefore are subject to regulation by Congress under its power to regulate interstate commerce. The act has been several times amended since its passage, and has had quite a wholesome effect in avoiding, to some extent, the unjust discriminations which common carriers are inclined to make. See also CARRIER, Vol. V, p. 122.

CARRIER PIGEON, the name commonly given to several varieties of pigeons supposed to have the homing instinct, or ability to return to a given place from a long distance, and used to carry messages from place to place. The birds most used for this purpose, however, are not carrier pigeons, but homers, the former being of large size and reared for show, while the latter resemble the common domestic variety of pigeons. True carriers are long in body, neck and beak, and at the base of the beak and around the eyes there are great masses of white flesh resembling an excrescence of some kind. They are probably descended from the Persian messenger pigeon that was utilized for postal service so long ago as the 12th and 13th centuries, but many years of breeding for show purposes only have caused them to lose the characteristics that gave them their name. The true homing pigeon is a product of crossing among certain varieties of Belgian pigeons, where the sport of pigeon-racing is very popular. The nature of the faculty by which they find their way home from long distances has been much discussed by naturalists, but no satisfactory explanation of it has ever been made. Inasmuch as the young have to be trained before they can find their way over long distances, some regard the mysterious power as an acquired char-

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acteristic, while others define it as instinct. (See INSTINCT, Vol. XIII, p. 164.) Even the older birds that have been trained, if kept too long before being allowed to begin the homeward journey, will lose the power to find their way, and have to be retaught by means of short flights gradually increased in length. A large percentage of both old and young, however, is generally lost in training. Strong, well-trained homers can find their way from a distance of 500 miles and in favorable weather can often travel that distance in a single day. In exceptional cases they can retrace their course over a distance of 1,000 miles. Homing pigeons have been used in several countries for military purposes, and during the siege of Paris (1870–71) they were sent out of the city by means of balloons and used very effectively for conveying despatches. At that time as many as 40,000 messages, greatly reduced in size by means of photography and fastened in goose-quills to the legs, wings, or tail-feathers of the birds, were carried into the beleaguered city by a single bird in one journey. R.W.C.

CARRIÈRE, EUGÈNE, a French painter; born at Gournay-sur-Marne, Seine-et-Oise, Jan. 17, 1849. After studying in the provinces he went to Paris and entered the School of Fine Arts, becoming a student of Cabanel, and made his *début* at the Salon in 1870 with a *Portrait de Femme;* and afterward exhibited *Portrait de Mlle. Stern* (1877); *Jeune Mère* (1879); *La Nymphe Echo* (1880); *Le Baiser de l'Innocence* (1882); *Deux Amis* and *Marguerite* (1884); *L'Enfant Malade* (1885); *Femme à sa Toilette* (1888); *Intimité* (1889), and at the exhibition on the Champs de Mars, in 1890, *Sommeil*, *Tendresse* and *Le Déjeuner*, etc. He was one of the decorators of the Hotel de Ville, obtained several medals from the Salon, and was decorated with the Legion of Honor in 1889.

CARRIERE, MORITZ, German philosophical writer; born at Griedel, in Hesse, March 5, 1817; studied at Giessen, Göttingen and Berlin, and in 1853 became professor of philosophy at Munich. He was one of the founders of the modern school of thought, which endeavors to reconcile deism and pantheism. His important work, *Die Kunst im Zusammenhang der Kulturentwicklung und die Ideale der Menschheit* (5 vols., 1863–74), was so popular that a third edition was commenced in 1876. He also published *Die Sittliche Weltordnung* (1877), a thoughtful monograph on Cromwell, and works on æsthetics, poetry and art. He commenced the publication of a series comprising his complete works in 1886. Died in Munich, Jan. 19, 1895.

CARRINGTON, EDWARD, military officer; born in Charlotte County, Va., Feb. 11, 1749; brother of Paul; was appointed lieutenant-colonel of artillery in 1776, and was later promoted quartermaster-general. He served throughout the Revolution, and was second in command to General Greene in his celebrated campaign in the South. He was commander of all of the artillery during the actions at Hobkirk's Hill and Yorktown, and was publicly thanked three times at the head of the army. He served in the Continental Congress and was foreman of the grand jury before which Aaron Burr was tried. He died in Richmond, Va., Oct. 28, 1810. G.J.H.

CARRINGTON, HENRY BEEBEE, an American soldier and author; born in Wallingford, Connecticut, March 2, 1824. He was graduated from Yale in 1845, studied law and was admitted to the bar, beginning practice at Columbus, Ohio, in 1848. In Ohio he was active in the antislavery movement, and at the convention which met in 1854 to organize the Republican party he was on the committee appointed to correspond with the different states and make the movement national. In 1857 he was on the staff of Governor Chase and helped to organize the Ohio state militia, in preparation for war. In 1861 he was appointed colonel of the 18th United States infantry, served through the war, and afterward was in several Indian campaigns in the west. He was retired in 1870, when he became professor of military science and tactics in Wabash College, Indiana, a position which he held until 1873. He has written *Russia as a Nation*, *American Classics; Ab-sa-ra-ka, Land of Massacre*, *Battles of the American Revolution; Battle Maps and Charts of the American Revolution; Beacon Lights of Patriotism; Washington, the Soldier; Lafayette and American Independence*, and other works. W.M.C.

CARRINGTON, PAUL, jurist; born in Charlotte County, Va., Feb. 24, 1733; brother of Edward; was graduated at William and Mary College; was admitted to the bar in Virginia, and became eminent in his profession. In 1765–75 he held a seat in the House of Burgesses, where he opposed the stamp act resolution of Patrick Henry. He was also a delegate to the convention that framed the State Constitution and that voted for state rights. Prior to the Revolutionary War he was a member of the Committee of Safety, and also became judge of the Virginia Court of Appeals. He died in Charlotte County, Va., June 22, 1818. G.J.H.

CARRION-CROW OR BLACK VULTURE (*Cathartes atratus*), a bird of the crow family (*Corvidæ*), abundant in the Gulf states, Central and South America. They are useful as scavengers. See CROW, Vol. VI, p. 546.

CARRION-FLOWER, a name which has been given to the flowers of various species on account of their odor, which resembles that of putrid meat, an odor, which attracts certain insects, such as flies, and thus secures cross-pollination. The carrion odor is usually accompanied by livid colors. Notable among the carrion-flowers are the species of *Stapelia* of the Cape of Good Hope, and *Smilax herbacea* of the United States.

CARROLL, a town and capital of Carroll County, western central Iowa, on the Chicago and Northwestern railroad, 67 miles E. N. E. of Sioux City. It is chiefly an agricultural center. Population, 1890, 2,448; 1900, 2,882.

CARROLL, CHARLES, statesman; born in Annapolis, Md., Sept. 20, 1737; received instruction in his native town till 1748, when he was sent to French Flanders, where, under the Jesuits, he ap-

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plied himself to classical studies. Later he went to Paris and took a course in mathematics and metaphysics at the College of Louis le Grand. In 1757–62 he studied law in London and two years later returned to his native land, where he found relations with England much strained. His sympathies were immediately given to the patriot cause. In writing to a friend in England he said: "Wicked is the only word which I can apply to the government of the colonies. You seem to regard them as mere material mines from whence the mother country is to draw the precious ore for her own luxury and splendor." He threw all his ability and influence against the stamp act, though he knew that its repeal would precipitate hostilities with England. The principal question at issue in Maryland was whether the government had the right to tax the people for the support of the clergy and officers. He contributed a number of strong articles on the subject to the *Maryland Gazette*. These brought him great popularity, and won him the sympathies of the people. After the stamp act was repealed a tax was levied on tea, and soon a cargo of it sailed into the Chesapeake Bay. When the advice of Carroll was asked as to what should be done he replied: "Gentlemen, set fire to the vessel and burn her, with her cargo, to the water's edge." Accordingly, the vessel was set on fire and destroyed. Mr. Carroll was a delegate to the convention which was held in Annapolis, Dec. 7, 1775, and a few months later was elected a member to the Continental Congress. He was re-elected to this body in 1777, and in that year became also a member of the Board of War. He was chosen by this board a member of the committee to investigate the accusations against General Washington. Several members of the board were known to be identified with the "Conway Cabal," which was scheming to have General Gates supersede the commander-in-chief. When the friends of Gates sought to turn Mr. Carroll against Washington he said: "Remove General Washington, and I shall withdraw." He was the last of the signers of the Declaration of Independence. He died in Baltimore, Md., Nov. 14, 1832. G.J.H.

CARROLL, Henry King, journalist and author; was born at Dennisville, New Jersey, on November 15, 1848. From 1876 to 1898 he was the religious and political editor of *The New York Independent*, in 1890 he had charge of the census of churches under the Federal Census Bureau, and in 1898–99 was a special commissioner of the United States to Porto Rico. He has written *Religious Forces of the United States*, *Churches of the United States*, and many magazine and review articles. W.F.J.

CARROLL, John, clergyman; born in Upper Marlboro, Md., Jan. 8, 1735; was admitted at St. Omer's, a Jesuit College, in French Flanders, and was ordained in the Roman Catholic Church in 1759. During the same year he became a professor at St. Omer's, and later was professor of theology and philosophy at Liége. In July, 1773, he went to England and there became chaplain in the castle of Lord Arundel, but when it became certain that war was inevitable between the American colonies and the mother country, he determined to return to his native land and devote himself to its cause. Accordingly, he set sail in June, 1774, in one of the last vessels that left England for America prior to the Revolution. He immediately went to Maryland and settled in Rock Creek, where he built a frame chapel on his father's estate, and for a time ministered there. At this period there was no place of public worship for Catholics in Maryland. Notwithstanding the fact that the colony had been founded by Catholics, its laws for a century had discriminated against them. Catholic schools were forbidden, the celebration of mass was prohibited, and no Catholic was allowed to bear arms. Feeling deeply this condition of affairs, Father Carroll eagerly espoused the cause of the colonies, seeing in that cause a hope of liberty for his people. He became of great service to the country during the Revolutionary War by securing for it the sympathies and aid of well-known men all over Europe. Prior to the struggle between the colonies and England, the Catholic clergy of Maryland and Pennsylvania were amenable to the bishop of London. When it was recognized, however, that the colonies were likely to achieve their independence, Father Carroll, with others, petitioned the Vatican to appoint direct from Rome a superior over the American church. Among the prominent names mentioned for this important office was that of Father Carroll. Through the recommendation of Benjamin Franklin, who was in France at the time, Dr. Carroll was appointed superior of the clergy in the United States near the close of 1784. Later a movement was started for the founding of an episcopal see, and Baltimore was chosen as the most convenient city for its establishment. This movement was exceedingly favorable to the clergy and on Nov. 14, 1789, Father Carroll was appointed first bishop of the United States by the Vatican. He was consecrated Aug. 15, 1790, in Ludworth Castle, by the Rt. Rev. Charles Warmsly, vicar-apostolic of London. In 1800 he was selected by Congress to give an address on George Washington, on February 22, of that year. He died in Georgetown, D. C., December 3, 1815. G.J.H.

CARROLL, Lewis, the pseudonym of Dodgson, Charles Lutwidge; q. v., in these Supplements.

CARROLL, Samuel Sprigg, soldier; was born at Washington, D. C., on September 21, 1832, the son of a grandnephew of Charles Carroll of Carrollton. He was graduated from West Point in 1856, and served with distinction throughout the Civil War, in the Shenandoah Valley, at Cedar Mountain, at Chancellorsville, Gettysburg, Spottsylvania, and elsewhere. He was brigadier-general in 1865, acting inspector-general in 1868, retired as major-general in 1869, and died on January 28, 1893. W.F.J.

CARROLLTON, Georgia, a town and the county seat of Carroll County, on the western border of the state. It lies about 40 miles west and south of Atlanta, and is reached by the Cen-

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tral railroad of Georgia. Its population was 1,451 in 1890 and 1,998 in 1900. W.F.J.

CARROLLTON, city and capital of Greene County, southwestern Illinois, on the Litchfield, Carrollton and Western and the Chicago and Alton railroads; by the latter, 58 miles N. of St. Louis. It contains manufactories of iron, machinery, carriages and flour. Population, 1890, 2,258; 1900, 2,355.

CARROLLTON, town and capital of Carroll County, Kentucky, situated on the Ohio River, at the mouth of the Kentucky, 62 miles from Louisville. It is the seat of a seminary, and contains manufactories of cotton goods, woolen goods, and flour. Population, 1900, 2,205.

CARROLLTON, a township of Saginaw County, east-central Michigan, on the Saginaw River, and on the Michigan Central, the Cincinnati, Saginaw and Mackinaw, and the Flint and Pere Marquette railroads; by the last, it is eight miles S. of Bay City. It is situated in a rich agricultural district, and exports a large quantity of leaf-tobacco. Population of township, 1900, 1,952.

CARROLLTON, city and capital of Carroll County, northwestern Missouri, on the Wakenda Creek; on the Atchison, Topeka and Santa Fé and the Chicago, Burlington and Kansas City railroads, 66 miles E.N.E. of Kansas City. It contains flour mills and a woolen factory, and has a school building which cost $40,000. It is the seat of a Roman Catholic convent. Population, 1900, 3,854.

CARROLLTON, village and capital of Carroll County, central eastern Ohio, on the Cleveland, Canton and Southern railroad, 27 miles S.E. of Canton. It is principally an agricultural station. In 1900 the population was 1,271.

CARRONADE, a short piece of ordnance, usually of large caliber, having a chamber for the powder like a mortar, chiefly used on shipboard. It was originally made at Carron, near Falkirk in Scotland, and is said to be the invention of Gen. Robert Melville. For an illustration of this gun, see Vol. XI, p. 272. W.R.B.

CARROT. See AGRICULTURE, Vol. I, p. 328; HORTICULTURE, Vol. XII, p. 292.

CARRUTHERS, ROBERT, a Scotch journalist and author; born at Dumfries, Nov. 5, 1799, where he was educated and apprenticed to a bookseller and bookbinder. After his apprenticeship he went to Huntingdon, where he was the master of the national school, and published a *History of Huntingdon*. In 1828 he went to Inverness, and conducted the Inverness *Courier*, one of the leading weekly journals of the north. Here he "discovered" Hugh Miller, many of whose earliest writings appeared in the *Courier*. Carruthers became associated with Robert Chambers in the publication of the *Cyclopædia of English Literature*, and contributed numerous articles to this ENCYCLOPÆDIA. He was for several years lecturer at the Philosophical Institution, Edinburgh, and received the honorary degree of LL.D. from Edinburgh University. He published a *Life of Pope* in 1858, and edited that poet's works. He died May 26, 1878.

CARRUTHERS, WILLIAM A., an American novelist; born in Virginia in 1800. He studied medicine and began practice as a physician but abandoned his profession to write novels based on incidents in American history. His best work is *The Cavaliers of Virginia; or, The Recluse of Jamestown, an Historical Romance of the Old Dominion* (1832). He also wrote *Knights of the Horseshoe* (1845); *The Kentuckian in New York* (1846); *Tale of a Cocked-Hat Gentry in the Old Dominion* (1847), and a *Life of Dr. Caldwell*. He died in Savannah, Georgia, in 1850. W.M.C.

CARS, FREIGHT. See RAILROADS, in these Supplements.

CARS, PASSENGER. See RAILROADS, in these Supplements.

CARSE, a term applied in Scotland to low lands along river mouths. Carse soils usually consist of argillaceous deposits, which produce crops of great luxuriance. See SCOTLAND, Vol. XXI, p. 547.

CARSON, CHRISTOPHER, frontiersman, popularly known as "Kit" Carson; was born in Kentucky on December 24, 1809. At the age of seventeen he joined an expedition going down the old Santa Fé trail, and thereafter his life was spent on the frontier. He joined John C. Frémont in 1842, and was of great service to him in exploring the Rocky Mountain region, and in conquering California in 1847. Later he was a United States Indian agent in New Mexico, and did admirable service. In the Civil War he was an efficient officer of the Federal army and was made brevet brigadier-general of volunteers. He was twice married, first to an Indian and second to a Spaniard. He has been made the subject of many tales and ballads, largely imaginary, but his actual adventures were more romantic than any fiction. He died on May 23, 1868. W.F.J.

KIT CARSON.

CARSON, EDWARD HENRY, lawyer and statesman; was born in Ireland in 1854, and was educated at Trinity College, Dublin. He was called to the Irish bar, where he won distinction and was made a Queen's Counsel in 1889. During Mr. Arthur Balfour's tenure of the chief secretaryship for Ireland Mr. Carson (who was not knighted until 1900) was one of his close counselors. In 1892 Mr. Carson became solicitor-general for Ireland, and was elected to the House of Commons as a Conservative from Trinity College. He was called to the English bar in 1893, and became solicitor-general for England in 1900. W.F.J.

CARSON CITY, the county seat of Ormsby County, Nevada, and capital of that state. It lies upon the western border of the state, nine miles east of Lake Tahoe, and near the foot of the Sierra Nevada. In the heart of the mining region, its interests are chiefly mineral. It contains numerous smelting and refining works, a

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branch mint of the United States, and the offices of the state government. It had 2,190 population in 1900. W.F.J.

CARSON RIVER is a stream in the western part of the state of Nevada, which rises on the eastern slopes of the Sierra Nevada not far from Lake Tahoe, and flows in an easterly direction to Carson Lake, which is connected with a chain of other lakes and "sinks." W.F.J.

CARSTENS, Asmus Jakob, an eminent Danish painter; was born near Schleswig on May 10, 1754, and was at first apprenticed to a wine merchant. He went to Copenhagen in 1776 to study art, and from 1783 to 1788 painted portraits at Lubeck. He then went to Berlin, and after two years of hard struggling won fame with his picture of *The Fall of the Angels*, one of the world's masterpieces. This secured for him a court pension and a professorship at the Academy. He next visited Rome, and studied the works of Raphael and Michael Angelo, to his own great profit, and to the inestimable gain of German art, for he was thereafter an important factor in turning German painters to a study of those masters, and in the general elevation of German art. He painted many scenes illustrating Shakespeare, Ossian, and the classic poets. He died in Rome on May 25, 1798. W.F.J.

CARTEL, a writing or agreement between warring powers for the exchange of prisoners or some other mutually advantageous end. It also means a challenge to a duel. A cartel ship is one used for the conveyance of exchanged prisoners. W.F.J.

CARTER, Franklin, an American educator; born in Waterbury, Conn., Sept. 30, 1837. He graduated at Williams College in 1862; was professor of Latin at Williams, 1865–72; and professor of German at Yale, 1872–81. From 1881 to 1901 he was president of Williams College, and, later, acting president. He is the author of a *Life of Mark Hopkins*. E.E.T.

CARTER, Robert, publisher; born near Abbottsford, Berwickshire, Scotland, Nov. 2, 1807; died in New York City, Dec. 28, 1889. His father was a weaver by trade, and his son had little opportunity for gratifying his love of study, being compelled to help in supporting the family. He diligently improved his opportunities, acquired some education, and at the age of fifteen opened a night-school in his father's cottage. He entered the University of Edinburgh, and made rapid progress, but in 1831 came to America, where his first occupation was school-teaching in the city of New York. Schuyler Colfax was one of his pupils in Latin and Greek. In 1848 he established the publishing firm known as Robert Carter and Brothers. He was a Presbyterian, and frequently a delegate to the Synod and the General Assembly.

CARTER, Robert, journalist, was born in Albany, New York, on February 5, 1819, and early adopted a literary career. He was associated with James Russell Lowell, in 1841, in the publication of a magazine known as *The Pioneer*, which was abandoned after the third number. Next he was private secretary to William H. Prescott, the historian, of whom he wrote a memoir. He became identified with the Free Soil party, and edited its organ, *The Commonwealth*, of Boston. He was also in turn editor of *The Telegraph* and *The Atlas*, of Boston, of *The Democrat*, of Rochester, New York, and of *Appleton's Journal*, of New York. At one time he was a correspondent of the New York *Tribune*. He was one of the authors and editors of *Appleton's American Encyclopædia*, and wrote *A Summer Cruise on the Coast of New England*. He died on February 15, 1879. W.F.J.

CARTER, Samuel Powhatan, naval and military commander, was born at Elizabethtown, Tennessee, on August 6, 1819, and was educated at Princeton. He entered the navy and served in the Mexican War and at the capture of the Canton forts in China, after which he was an instructor in the naval academy at Annapolis. In the Civil War he served for a time in the army, and was engaged in organizing troops and in field duty in eastern Tennessee. One of his chief exploits was the leading of a cavalry raid which destroyed nearly a hundred miles of railroads and seriously crippled the communications and supply lines of the Confederates. He also participated in the siege of Knoxville. He was made major-general by brevet in 1865 and was mustered out of the army in 1866, when he returned to the navy and again served at the Annapolis Academy. He was promoted to be commodore in 1878, and retired from the service as rear-admiral in 1882. He died at Washington, D. C., on May 26, 1891. W.F.J.

CARTER, Thomas Henry, lawyer and Senator, was born in Ohio on October 30, 1854, and received a common school education. After spending several years at farming, railroad work, and school teaching, he studied law and was admitted to the bar. In 1882 he settled in Montana and identified himself with the rising interests of that territory. He was its delegate in Congress in 1889, and its first representative in Congress when it was admitted as a state in the fall of that year. He was appointed in 1891 commissioner of the general land office of the United States, and in 1892–96 was chairman of the Republican national committee. From 1895 to 1901 he was a United States Senator from Montana, and in 1900 was appointed United States commissioner to the Louisiana Purchase Centenary Exposition at St. Louis, Mo., in 1904. W.F.J.

CARTER, William Henry, soldier, was born in Tennessee, educated at West Point, has served with distinction in Indian wars, and has the rank of Brig.-Gen. He has written several books. W.F.J.

CARTERET, Philip, English navigator, sailed around the world from 1764–66 under Byron, and from 1766–69 under Wallis. April 11, 1767, while clearing the Straits of Magellan, Carteret's vessel, *Swallow*, was separated from the others. Proceeding alone, he discovered the islands of Pitcairn and two other islands of the Paumotu group; the St. Cruz Islands, the George Canal i

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the Bismarck archipelago; the Carteret Bay; New Hanover and the Admiralty Islands. He drew a map of the west coast of Celebes, and reached Mangkassar, Dec. 15, 1767, Batavia, June 3, 1768, and Spithead, England, March 20, 1769. He retired from active service in 1794 with the rank of a rear-admiral, and died in Southampton, July 21, 1796. G.A.S.

CARTERSVILLE, city and capital of Bartow County, northwestern Georgia, on the East and West and the Western and Atlantic railroads, 51 miles N W. of Atlanta. Gold and copper are found in the vicinity. It is a shipping-point for pig-iron and cotton. Population, 1890, 3,171; 1900, 3,151.

CARTERVILLE, a mining city of Jasper County, Missouri, near the southwestern corner of that state. It is reached by the Missouri Pacific railroad, about 137 miles south of Kansas City. Its population was 4,445 in 1900. W.F.J.

CARTESIAN DEVIL DIVER OR BOTTLE-IMP, a philosophical toy, consisting of a small hollow figure, usually in the fancied form of a demon, with a hole near the top. This figure, filled partly with air and partly with water, floats in a tall glass vessel nearly full of water, and covered with an air-tight piece of bladder or India-rubber. When this cover is pressed down, the air beneath is compressed, and water enters the floating figure until the air within is brought to an equal degree of compression. In consequence the figure sinks, not rising again till the pressure is removed.

CARTHAGE, town and capital of Hancock County, western Illinois, 15 miles E. of Keokuk, on the Toledo, Peoria and Western, and the Chicago, Burlington and Quincy railroads. It is the seat of a Lutheran college and of a high school. Population 1890, 1,654; 1900, 2,104.

CARTHAGE, a city and the county seat of Jasper County, Missouri, near the southwestern corner of that state, and in the valley of Spring River, a tributary of the Neosho River. It is a well built and attractive city, reached by the Missouri Pacific and the St. Louis and San Francisco railroads, and is about 133 miles south of Kansas City. It lies in a rich mineral region, and has various establishments for the refining of lead and zinc ores, together with varied manufactories. There are also some valuable limestone and other quarries in the vicinity. Carthage was the scene of an important minor conflict of the Civil War, which involved small numbers, but went far toward deciding whether the state should remain in or leave the Union. It occurred on July 5, 1861, between General Sigel on the Federal side, and Generals Price and Jackson on the Confederate side. The latter force was by far the stronger, and the Federals were compelled to retire, but they inflicted much the heavier losses upon the Confederates, and were regarded as winning a moral victory. The population of Carthage was 9,416 in 1900. W.F.J.

CARTHAGE, a village and railroad junction of Jefferson County, northwestern New York, on the Black River, and on the New York Central and Hudson and the Rome, Watertown and Ogdensburg railroads, 17 miles E. of Watertown. Its extensive water-power is utilized in forges, foundries and manufactories, where leather, nails, furniture and machinery are made. Population 1900, 2,895.

CARTHAGE, CAPE, a headland of North Africa, projecting into the Mediterranean, opposite the island of Sicily. Traces of the ancient city of Carthage are found on it to the north of the Tunis lagoon.

CARTHAGO, NOVA. See CARTAGENA, in Spain, Vol. V, p. 123.

CARTHAMINE, a dye obtained from safflower. See SAFFLOWER, Vol. XXI, p. 153.

CARTILAGE. See ANATOMY, Vol. I, pp. 747–752.

CARTRIDGE. See AMMUNITION, Vol. I, p. 653.

CARTRIDGE-CASE. See GUNMAKING, in these Supplements.

CARTWRIGHT, PETER, clergyman, was born in Virginia on September 1, 1785, and spent his boyhood in the Kentucky wilderness, where he had little schooling and grew up a devotee of the race track and gambling table. His mother, a devout Methodist, finally persuaded him to give up his evil habits and read the Bible, and after a struggle in which he became almost insane he was converted and joined the Methodist Church. This was in his sixteenth year. Three years later he was licensed as a traveling preacher or circuit rider in the Methodist Episcopal Church. His appointments at the outset involved 600 miles of travel. Eight years later he was made presiding elder, and filled that office for more than fifty years. He was a delegate to thirteen General Conferences. In 1824 he moved from Kentucky to Illinois, chiefly to get away from slavery, and for the rest of his life made his home in the latter state. He was one of the most successful of all the pioneer preachers and missionaries of the Methodist Church, and for many years was its most venerable figure, ranking as the "Grand Old Man" of Methodism. He died Sept. 25, 1872, leaving a most interesting *Autobiography*. W.F.J.

CARTWRIGHT, RICHARD JOHN, statesman, was born at Kingston, Canada, on December 4, 1835, and was educated at Trinity College, Dublin. He entered the Canadian Parliament in 1863, and has ever since been a prominent figure therein. He was knighted in 1879 (K.C.M.G.), and in 1896 became Minister of Trade and Commerce. In this office he has exercised great influence in Canadian affairs, especially in the direction of making closer trade relations with Great Britain and of seeking such relations with the U. S. W.F.J.

CARUS, JULIUS VICTOR, was born at Leipsic on August 25, 1823, and was educated at Leipsic, Würzburg, Freiburg, and Oxford, devoting himself chiefly to comparative anatomy. In 1853 he became professor of comparative anatomy at Leipsic, and in the summers of 1873 and 1874 lectured at the University of Edinburgh in place of Wyville Thomson, during the latter's absence on the *Challenger* expedition. Among his important books are a *System of Morphology;*

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Handbook of Zoölogy; Compendium of Zoölogy, and *Fauna of the Mediterranean*. All of his writings are of standard value, and some of them rank among the most valuable monographs extant upon their respective subjects in special departments of natural history. W.F.J.

CARUS, PAUL, author and editor, was born in Germany on July 18, 1852, was educated at Strasburg and Tübingen, and came to America in 1880. He founded and is editor of *The Open Court* and *The Monist*, in Chicago, and is the author of numerous books, chiefly on philosophical and theological topics, including *The Ethical Problem*, *The Soul of Man*, *Monism and Meliorism*, *The Religion of Science*, *Our Need of Philosophy*, *The Gospel of Buddha*, *Nirvana*, *Karma*, *The History of the Devil*, *The Idea of God*, and *Sacred Tunes for the Consecration of Life*. W.F.J.

CARVALHO, MARIE CAROLINE FÉLIX (MIOLAN), French opera-singer; born at Marseilles, Dec. 31, 1827. She received her first instruction from her father, Felix Miolan, an oboe-player, and then from Duprez at the Paris Conservatoire (1843–47), receiving the first prize in singing, and making her *début*, at Duprez's benefit, Dec. 14, 1849, in the first act of *Lucia*, and in the trio in the second act of *La Juive*. From this year until 1856 she sang at the Opera Comique, making her reputation as Isabelle in *Le Pré aux Clercs*, and as the heroines in *Giralda* and *Les Noces de Jeanette*. In 1853 she married Leon Carvalho, then engaged at the same theater. Mme. Carvalho sang for the next ten years at the Lyrique, appearing in a new opera, *La Fanchonnette*, and during this period established her right to be regarded as the first female singer of the lyric stage in France. She retired from the stage, June 9, 1885. Just two years later she appeared in a benefit concert given for the sufferers at the fire of the Opéra Comique, singing in a duet from *Mireille* with Faure. She died at Dieppe, July 10, 1895.

CARVER, JOHN, an American colonizer; born in England. He was a member of the Leyden colony and was deputed to obtain a patent in North America from the Virginia Company. He embarked on the *Mayflower*, and was elected the first governor of Plymouth Colony. His administration was a brief one; but he conducted it skilfully, notably in his dealings with the Indians. He died in April, 1621, four months after landing at Plymouth. E.E.T.

CARY, ALICE, author, sister of Phœbe Cary (q. v.), was born near Cincinnati, Ohio, on April 26, 1820, and while yet in her teens began to write poems for publication. Some prose sketches of rural life in the *National Era* also attracted favorable attention. Her first book was published in 1849—*Poems of Alice and Phœbe Cary*. In 1850 she settled in New York with her sister and spent the rest of her life there. In addition to her many charming poems she wrote *Clovernook*, *Hagar*, *Married, Not Mated*, *The Bishop's Son*, and other works of fiction, and several books for children. She died on Feb. 12, 1871, leaving a number of unpublished works. W.F.J.

CARY, ANNIE LOUISE (Mrs. Charles M. Raymond), singer, was born at Wayne, Maine, on October 22, 1842, was educated at the Gorham, Maine, Seminary, and studied music in Boston and Milan. She made her first appearance in grand opera at Copenhagen, and thereafter for many years sang under the management of Strakosch, Mapleson, and others, in the chief capitals of the world, easily ranking as one of the greatest contralto and mezzo-soprano singers of her time and of all time, and being much esteemed personally. She was associated in Italian opera with Patti, Gerster, Nilsson, Campanini, and other famous singers. In 1882 she was married to Charles Monson Raymond, of New York, and retired from the stage. W.F.J.

ANNIE LOUISE CARY.

CARY, PHŒBE, author, sister of Alice Cary (q. v.), was born in Ohio on September 4, 1824, and became a writer for periodicals, in both prose and verse. Her first volume of poems was published in 1854, and a second volume of devotional poems appeared in 1868. Other volumes were issued in association with her sister. She was also associated with the Rev. Dr. Charles F. Deems in editing a volume of *Hymns for All Christians*. One of her devotional poems, beginning, "One sweetly solemn thought comes to me o'er and o'er," has attained world-wide popularity and is a favorite hymn among all denominations of Christians. She was much devoted to her sister, and did not long survive her death, dying at Newport, Rhode Island, on July 31, 1871. W.F.J.

CARY, SAMUEL FENTON, politician, was born in Cincinnati, Ohio, on February 18, 1814, and was educated at Miami University. He became a lawyer and politician, and was a representative in Congress in 1867–69, when he was the one Republican who voted against the impeachment of Andrew Johnson. In 1876 he was the "Greenback" candidate for Vice-President of the United States. He died on September 29, 1900. W.F.J.

CARYATIDES, a columnar ornament. See ARCHITECTURE, Vol. II, p. 357.

CARYOCAR, a genus of large trees of the order *Rhizobolaceæ*. They are all native of Brazil and Guiana and are sometimes called "pekea trees." They produce the delicious nuts known as "butternuts." The fruit is a sort of drupe containing, besides the nuts, a butter-like substance that is used in cookery. The timber of the trees is used in ship-building. W.R.B.

CARYOPHYLLACEÆ, a natural order of plants characterized by a corolla having five petals, with long claws, as the clove-pink. There are upwards of 1,000 species, mostly natives of temperate and cold countries. Most are only weeds, some produce beautiful flowers. To this

order belong the pink, carnation, sweet-william, chick-weed, cockle, etc. W.R.B.

CARYOPSIS (Gr., *karuon*, nut, *opsis*, appearance), in botany, the one-celled fruit, or grain, of grasses, in which the seed and pericarp are so intimately connected as to be inseparable. The grain of wheat, barley, maize, rye, etc., is a caryopsis. W.R.B.

CARYOTA, a beautiful genus of palms of the order *Palmaceæ*, growing to the height of 80 feet. *C. urens* is a native of India and is a very valuable tree. Its fruit, a yellow berry, which is about the size of our plum, is intensely acrid if applied to the skin. The stem during the hot season yields "toddy," the material from which palm wine is made; while the pith affords an excellent sago. W.R.B.

CARYSFORT REEF is an insignificant coral islet off the southeast coast of Florida, about five miles from the beach of Key Largo, and 37 miles south of Miami. Its value is confined to being the site of a lighthouse. W.F.J.

CASABIANCA, Louis, a French naval officer; born at Bastia about 1755; sat in the National Convention of 1792, and in 1798 was captain of the flagship *L' Orient* in the expedition to Egypt. He was mortally wounded at the battle of the Nile, Aug. 1, 1798; the ship caught fire; his ten-year-old son would not leave him, and both perished. Mrs. Felicia Hemans has immortalized the boy and incident in one of her most popular poems.

CASAS, Bartolome de las. See Las Casas, Vol. XIV, p. 320.

CASATI, Count Gabrio, Italian statesman; born in 1798 at Milan; in 1848 president of the provisional government and premier; 1853–57, president of the Senate; in 1859, minister of public institution; died in 1873 at Milan. G.A.S.

CASATI, Gaetano, born at Lesmo, Upper Italy, in 1838. He studied mathematics at the Athenæum of Pavia, entered the army in 1859, and participated as captain in the expeditions of 1867–78 for the suppressing of brigandage in the southern provinces. Having resigned in 1879, he was sent to Africa by the Società d'Explorazione Commerciale, and arrived in the territory of Bahr-el-Ghasal in 1880. He traveled to the countries of the Niam-Niam and Monbuttu, where he met Dr. Junker, a Russian-German explorer. Proceeding to Lado he received a most hospitable reception by Emin Bey, whom he materially assisted in his wars against the Mahdists down to 1886. On May 16, 1886, he went to King Kahrega of Unyoro, who sentenced him to death, but gave him his freedom when he learned of the approach of Stanley. In 1889 he joined Stanley and Emin Pasha at the Victoria Nyanza, and, with them, reached Bagamayo, Dec. 3, 1889. He published reports on the political, commercial, meteorological and ethnographical affairs and condition of the countries visited by him, and *Dieci Anni in Equatoria e Ritorno con Emin Pascia* (2 vols., 1891). G.A.S.

CASCADE RANGE. See Oregon, Vol. XVII, p. 845; Washington, Vol. XXIV, p. 405.

CASCARILLA, a name given to a number of South American bitter barks used in medicine, notable among which is the bark of *Croton Eleutheria*, a genus of the family *Euphorbiaceæ*.

CASCO BAY, a large and beautiful bay in the coast of Cumberland County in the southwestern part of Maine. It is dotted with some 300 islands. The city of Portland is upon its shore. W.F.J.

CASE, as a legal term, means any action or proceeding in law or equity. It is synonymous with "cause," or "cause of action." The word has also another and distinct signification. In this latter sense it is a shortening of the term "trespass on the case," and is the technical name applied to a form of action which may be maintained to recover damages for injuries to the person or property. In its broadest sense, *case* includes what have now become known as distinct forms of action, *assumpsit* and trover. In the sense in which it is now used it is a form of action to recover damages for injuries committed without force, or if forcible, which damage the plaintiff consequentially, and does not include damages for the breach of a contract. Thus an action for damages on account of slander, malicious prosecution, deceit or injuries which result from negligence, is properly brought in case.

CASE, Augustus Ludlow, naval commander, was born at Newburg, New York, on February 3, 1813, entered the navy at the age of fifteen years, served in the Mexican War and the Civil War, was fleet-captain of the European squadron in 1865, and had command of the great fleet which was assembled at Key West, Florida, in 1874, at the time of the *Virginius* incident, in anticipation of a war with Spain. He was made a rear-admiral in 1872, and under the age law went upon the retired list in 1875. He died at Washington, D. C., on February 17, 1893. W.F.J.

CASE-HARDENING. See Iron, Vol. XIII, p. 351.

CASELLI, Jean, an Italian inventor; born at Sienna, May 25, 1815; pursued his studies at Florence, where he had for his master the famous physicist, Leopold Nobili. The first writing of Caselli was on the life and work of his master. Caselli was made a member of the Italian Athenæum, and read many interesting papers before that society, notably a critical discourse on the *History of the Italian Republics of the Middle Ages*, by De Sismondi. In 1836 he took religious orders and accepted a benefice. In 1841 he was called to Parma as tutor to the children of Count Sanvitale. After a short period of exile on account of a political vote Caselli returned to Florence and devoted himself entirely to the study of electrical science. He worked with apparatus constructed by himself, with the assistance of his son, Ludovic, a distinguished mechanician. In 1854 he founded *La Recreazione*, a journal for the purpose of popularizing physical sciences. In 1856, as a result of his labors, he succeeded in perfecting a new system of telegraphy, which he termed "pantelegraphy," by which the message was transmitted as originally written. This system of autograph

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telegraphy was at once adopted in France and in Russia, and was also extended into China and Persia. For many years Abbé Caselli was engaged in perfecting a practicable electric motor, and constructed one, at the expense of Napoleon III, in 1865. He was made an officer of the Order of St. Maurice and Lazarus. Died at Florence, Oct. 7, 1891.

CASEIN. See CHEESE, Vol. V, pp. 394, 395.

CASEMATE, originally a loopholed gallery excavated in a bastion, through which artillery could fire upon an enemy who had gained possession of the ditch. As defence from shells became more important, the term was subsequently applied to a bomb-proof vault in a fortress for the security of the defenders, without direct reference to the annoyance of the enemy.

CASE-SHOT. See AMMUNITION, Vol. I, p. 653.

CASEY, SILAS, soldier, was born at East Greenwich, Rhode Island, on July 12, 1807. He was educated at West Point, in the class of 1826, and saw his first service in Indian wars in Florida. In the Mexican War he led the assault at Chapultepec with distinguished gallantry, and was seriously wounded. In the Civil War he served chiefly as a drill-master and member of an examining board at Washington, though he saw some field service, notably at Fair Oaks. In 1868 he was retired with the brevet rank of major-general of the regular army. He was the author of two standard works on military tactics. He died on January 22, 1882. W. F. J.

CASEY, SILAS, JR., naval commander, son of General Casey, was born in Rhode Island in 1841, was educated at Annapolis, and served in the Civil War, at Pensacola, Fort Sumter, and Fort Fisher. He led the landing party in the capture of the Corean forts near Seoul in 1872. He was made commodore in 1898, rear-admiral in 1899, and was put on the retired list for age on September 11, 1903. W. F. J.

CASEY, THOMAS LINCOLN, military officer; born in Sackett's Harbor, N. Y., May 10, 1831; was graduated at the United States Military Academy in 1852, and entered the army as brevet 2d lieutenant of engineers; colonel, March 12, 1884; brigadier-general and chief of engineers, July 6, 1888; and was retired May 10, 1895. He was assistant professor of engineering at the Military Academy in 1854–59, and for the next two years commanded the engineering corps on the Pacific coast. When the Civil War broke out he was ordered to Fort Monroe, Va., but later had charge of the fortifications on the Maine coast. In 1877–88 he superintended the erection of the State War and Navy Departments building at Washington, D. C. He also completed the construction of the Washington National Monument and the Washington aqueduct. He died March 25, 1896. G. J. H.

CASHMERE. See KASHMIR, Vol. XIV, p. 11.

CASHMERE GOAT. See GOAT, Vol. X, p. 632.

CASILINUM, an ancient city of Campania, lower Italy, situated on the river Vulturnus, and of great strategical importance, as the Appian highway led over the nearby and strongly fortified bridge. Casilinum is memorable from its siege and capture by Hannibal; taken in 214 B.C. by the Roman Consuls Quintus Fabius and Marcus Claudius, the town became the principal basis for Romans in their operations against Capua. G. A. S.

CASIMIR OR KAZIMIERZ, five Polish kings. See POLAND, Vol. XIX, pp. 298–302, 306, 307.

CASIMIR-PERIER, JEAN PAUL PIERRE, fifth President of the French Republic; born Nov. 8, 1847, at Paris; son of August Casimir-Perier, Minister of the Interior from 1871–72, and grandson of Casimir Perier, Prime Minister from 1831–32. (The family name of Perier was changed to Casimir-Perier in 1874.) He distinguished himself as captain of the Mobile Guard at the defense of Paris in 1870. In 1871 he became chief of cabinet to his father in the Ministry of the Interior, and was, in 1876, elected to the Chamber of Deputies, where he ranged with the left Center. From 1877–79 he was under-secretary in the Ministry of Public Instruction and Worship and from 1879–85 in the Ministry of War. In 1890 he was elected vice-president, and, in 1893, president of the Chamber of Deputies. After the resignation of Dupuy, Dec. 1, 1893, he was intrusted with the formation of a new cabinet, in which he acted as Minister of Foreign Affairs. Forced to resign on May 22, 1894, by the combination of the Right with the extreme Left, he became on June 3, president of the Chamber, and was, on the assassination of Carnot, elected President of the Republic on June 27. In his message of July 3 to the Senate and the Chamber of Deputies he declared his intention to exercise a greater influence on the government than that manifested by any of his predecessors. As he found this to be an impossibility, he handed in his resignation on June 15, 1895, one day after the demission of the cabinet of Dupuy. Subsequently he did not take any part in active politics. G. A. S.

CASINO, a game of cards, in which the object is to obtain the most points, consisting of certain counts and cards of a recognized value. The game can be played by two or more, by single or individual opponents or partners. The cards are dealt one, two or three at a time, provision being made also for a hand dealt to the table, the faces of which are turned up. The game proceeds by taking tricks, in three ways: *by pairing*, that is, by matching a card on the table by one in the hand, of equal denomination; *by combining*, that is, by collecting from the board all the cards whose united number of spots equal that of a card in the hand; and *by building*, that is, by combining cards on the table with one in the hand, the trick, if it comes round without being captured by an opponent, being taken by the card of equal denomination reserved for that purpose. The points in the regular game are: cards, 3; big casino (the ten-spot of diamonds), 2; little casino (the two-spot of spades), 1; spades, 1; each ace, 1; the total points being 11 for each deal. If the cards are equal (26) in each party's hand at the end of the rubber, cards are said to be "not out," and are not counted to either party. Sometimes another coun-

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is introduced, called "sweeps"; that is, when, by any of the three modes above described, a trick is taken which clears or sweeps the board; this necessitates the next in hand playing out a card without any advantage, in fact at a loss. When "sweeps" are played, each counts one point. Casino is a game of skill, as will be at once seen; for it needs a memory of the cards which are out and taken, so as to avoid the capture of a trick in process of building up before it comes round, of preventing similarly the capture of the other counting-points, especially the casinos. The number of points to a game are usually 51, but any number can be agreed upon.

CASINO. See MONTE CASSINO, Vol. XVI, p. 804.

CASPARI, KARL PAUL, a Norwegian exegete and church historian; born at Dessau Anhalt, Feb. 8, 1814; became professor of theology at Christiania in 1857. His Arabic grammar (4th ed. 1875) is in high repute, and his contributions to the study of the Old Testament include works on Obadiah, Isaiah, Micah and Daniel. Besides his *Kirchenhistorische Anekdota* (1883) he published at Christiania *Quellen zur Geschichte des Taufsymbols und der Glaubensregel* (2 vols., 1866–69), extensions of which appeared in 1875 and 1879. Died at Christiania, April 11, 1892.

CASPER, town and capital of Natrona County, east-central Wyoming, on the North Platte River, and the terminus of a branch of the Fremont, Elkhorn and Missouri Valley railroad, 230 miles N.E. of Cheyenne. It is supported by its mining industries. Population 1890, 544; 1900, 883.

CASSAGNAC, PAUL ADOLPHE DE. See GRANIER DE CASSAGNAC, in these Supplements.

CASSAREEP, an antiseptic and condiment. See CASSAVA, Vol. V, p. 159.

CASSATION, COURT OF. In the law of France, the act of annulling the decision of a court or judicial tribunal is called cassation; and the function of cassation, as regards the judgments of all the other courts, is assigned to a special tribunal, called the court of cassation. See FRANCE, Vol. IX, p. 451.

CASSATT, ALEXANDER JOHNSTON, railroad manager, was born at Pittsburg, Penn., on December 8, 1839, and was educated at the Rensselaer Polytechnic Institute, Troy, N. Y., and the University of Heidelberg, Germany. He began railroad work in Georgia in 1839–61, then came north on account of the Civil War, and entered the service of the Pennsylvania Railroad as a rodman. He remained continuously in the service of that company, with the exception of less than a year, in 1882–83, being promoted from place to place and elected to offices, until in June, 1899, when he became its president, which place he still occupies. W. F. J.

CASSATT, MARY, an American artist; born in Pennsylvania, and residing in Paris, where she studied under Soyer and C. Bellay, making her *début* at the Salon of 1874 with *Ida*. She has studied in Spain, and shows a partiality for Spanish subjects. In 1878 she exhibited, in Paris, works exhibiting the influence of the impressionist school. She has exhibited in America *The Music Lesson*; *After the Bull Fight;* and *At the French Theater*.

CASSELL, JOHN, founder of the English publishing firm of Cassell and Company, the son of a Manchester innkeeper; born Jan. 23, 1817; died April 2, 1865. He had no early educational advantages, but fitted himself for his later work by careful self-culture while employed as an apprentice joiner. He went to London in 1836, where he was for some time established as a tea and coffee merchant. Turning his attention to literary work, he issued his *Working Man's Friend* (1850); *Illustrated Exhibitor* (1851); *Popular Educator* (1852), the most popular of all his works, which, in a revised form, is still on sale; and *Family Paper* (1853). In 1859 he entered into partnership with Messrs. Petter and Galpin, and before his death he shared in the prosperity of one of the largest publishing houses of modern times.

CASSELTON, a thriving town of Cass County, southeastern North Dakota, situated in the fertile wheat-producing valley of the Red River of the North, about 25 miles W. of Fargo, on the Northern Pacific and Great Northern railroads. Population 1890, 840; 1900, 1,207.

CASSIA, a plant. See SENNA, Vol. XXI, p. 697.

CASSICAN, a South American bird of the genus *Cassicus*, resembling the orioles. They are gregarian, and prefer to live near human habitations. They have remarkable power of imitating other birds.

CASSIDARIA, a genus of gasteropod mollusks of the family of helmet-shells (*Cassidæ*). The living species live in the warmer seas. There are many fossil species in the Cretaceous and Tertiary formations.

CASSIMERE, a name sometimes given to the fabric of which the famous cashmere shawls are made. It is manufactured from a fine kind of down which is obtained in great quantities from the goats of the Cashmere region, Hindustan, and from the yak and wild sheep of Tibet. It takes from 16 to 20 weeks to manufacture sufficient material for a single shawl. The name cassimere is also applied to a thin, twilled woolen cloth woven in imitation of true cashmere, and used for men's clothing. R.W.C.

CASSINI, A., COUNT, diplomat, was born in St. Petersburg, Russia, and was educated at the Imperial Alexander Lyceum in that city, being destined for the diplomatic service. He became secretary of legation at Copenhagen, and afterward minister resident at Hamburg. Thence he was sent as minister to China, where he did exceptional work in the furthering of Russian interests, securing concessions for Russian railroads, and practically establishing a Russian protectorate over Manchuria — the policy which led to the conflict with Japan in 1904. From China he was transferred to Washington, as the first Russian ambassador to the United States, and has there been a particularly efficient servant of the Imperial Government. W.F.J.

CASSINO, a town of Campania, Italy, in the province of Casenta. Pop. 1903, about 14,000.

CASSIOPEIA, one of the oldest known northern constellations, otherwise known as "The

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Lady in Her Chair," containing 7 double stars, 4 variable stars and 8 star clusters. It extends from the pole-star to Andromeda on the side opposite to the constellations of Ursa Major and Ursa Minor. The largest stars are of the 5th magnitude and 7th magnitude respectively. W.R.B.

CASSIQUIARE, South America, a river about 150 miles long, flowing southwestward in Southern Venezuela from the Orinoco to the Rio Negro at the boundary with Columbia. It is also called the CASSIQUIARE CANAL, and connects the Orinoco and Amazon valleys, affording navigable communication from Venezuela to the plains of Brazil. C.L.S.

CASSITERIDES, islands. See PHŒNICIA, Vol. XVIII, p. 819.

CASSITERITE, an ore of tin. See MINERALOGY, Vol. XVI, p. 402.

CASSIUS PARMENSIS, a Latin poet; was born at Parma, who joined his namesake, Caius Cassius, and Brutus, after the murder of Cæsar, and fought with them until their overthrow at Philippi. He then fled to Athens, where he was put to death by Varus, an officer who was sent thither for the purpose by Augustus Cæsar. He was a writer of merit, who is not to be confused with Cassius of Etruria, who is ridiculed by Horace for his facility of composition and poverty of invention. W.F.J.

CASSIUS, PURPLE OF, a coloring substance of very ancient use, which is prepared by adding a mixed solution of protochlorid and bichlorid of tin gradually to a solution of chlorid of gold, when a more or less abundant precipitate of double stannate of gold and tin is thrown down. Purple of cassius is employed by the potter to communicate a rich purple or rose tint to fine china, and it also imparts the red color to Bohemian glass.

CASSIVELLAUNUS OR CASSIBELAN, a Celtic chief. See BRITANNIA, Vol. IV, p. 318.

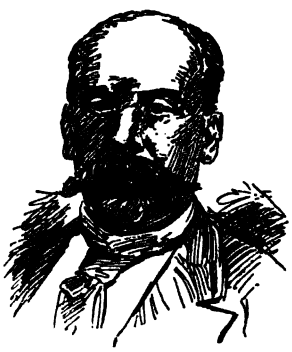
CASSOCK, a long, close-fitting frock, or tunic, worn by the Anglican and Protestant Episcopal clergyman, like the *soutane* of Roman Catholic priests, apart from their vestments, as a kind of ecclesiastical garb. It is also worn by vergers and choristers. It is a long coat buttoning over the breast and reaching to the feet. The collar is made to fasten around the throat. It is black, and for bishops purple. W.R.B.

CASSOPOLIS, village and capital of Cass County, southwestern Michigan, on the Michigan Central and the Chicago and Grand Trunk railroads, 98 miles S.W. of Lansing. It contains manufactories of lumber, iron, sash, blinds and furniture. Population, 1900, 1,330.

CASTALIO, SÉBASTIEN, theologian; was born in the province of Dauphiné, France, in 1515, his real name being Châteillon. At first a friend and follower of Calvin, he was made by the latter professor of classical literature at Geneva. Later he quarreled with Calvin, and was accordingly banished from Geneva, in 1544, when he went to Basle, and there became a teacher of Greek, also cultivating a small farm in order to maintain his family. His best known works are a Latin translation of the Bible, of which the best edition appeared at Basle in 1573, and a compilation of maxims and opinions in support of freedom of discussion, in vindication of his stand against Calvin. He died at Basle on December 20, 1563. W.F.J.

CASTEGGIO, a town of Lombardy, northern Italy, 28 miles S. of Milan. It was an important military position as early as the times of the Gallic and Punic wars. Near here was fought, in 1800, the battle of Montebello, in which Bonaparte defeated the Austrians. Some Roman antiquities still remain, and numerous curious inscriptions and coins have been found. Population, 3,685.

CASTELAR, EMILIO, statesman, journalist and historian; was born at Cadiz, Spain, on September 8, 1832; was educated at the University of Madrid, and in 1856 became its professor of history and philosophy. At the same time he began writing for newspapers and magazines, and interesting himself in politics. His predilections were strongly republican, and in 1864 he established and edited the paper, *La Democracia*, which he made an organ of violent attack upon the monarchical government, which was then at its nadir of corruption and incompetence. After the futile insurrection of 1866 he was condemned to death, but escaped to Paris. In the revolution of 1868 he returned to Spain, and passionately but vainly protested against the re-establishment of the monarchy under Amadeus. He was a leader in the overthrow of Amadeus in 1873, and in September of that year was made president of the Spanish republic. Deserted by his friends and bitterly attacked by his foes, he resigned office in 1874, and upon the accession of Alfonso XII went again into exile. In 1876, however, he returned to Spain and re-entered the Cortes, where he ranked as the foremost orator of his time. He wrote a *Life of Columbus*; a *History of the Republican Movement in Europe; The Eastern Question*, and other works. He died at Madrid on May 25, 1899. W.F.J.



EMILIO CASTELAR.

CASTELBUONO, Italy, a town of Sicily, 50 miles east of Palermo, noted for its mineral waters and the production of manna. Pop., 8,945. C.L.S.

CASTEL-GANDOLFO, Italy, a village 12½ miles southeast of Rome on Lake Albano. Prior to 1870, its castle was the favorite summer residence of the popes. C.L.S.

CASTELLAMONTE, a town of Piedmont, northern Italy, 21 miles N. of Turin. It has an old castle, manufactories of earthenware and a trade in the agricultural produce of the district. Pop., 6,375.

CASTELLANA, Italy, a town of Apulia, in the province and district of Bari, 26 miles by rail

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S. E. of the seaport city of Bari on the Adriatic. It is the market town of a productive agricultural region, and has manufactures of cotton and other textiles. Pop., 9,177. C.L.S.

CASTELLANETA, Italy, a town in the province of Lecce, Apulia, 20 miles by rail northwest of the southern seaport of Taranto. It is a cotton raising center. Population, 8,800. C.L.S.

CASTELNAU, FRANCIS, COMTE DE, French traveler and naturalist; born in London, 1812. From 1837–41, he traveled through the country of the Canadian lakes, of the United States, and Mexico; from 1843–47, through equatorial South America, going from Rio de Janeiro to Goyaz, the upper Paraguay, Potosi, and Lima, returning to Para. The results of the expedition he described in the work *Expédition dans les Parties Centrales de l'Amérique du Sud.* Later on he was French consul at Bahia, Cape Town, and Singapore, and consul-general at Melbourne, where he died, Feb. 4, 1880. G.A.S.

CASTELNUOVO, a seaport town of Dalmatia, southern Austria, situated near the western entrance of the Gulf of Cattaro. It is surrounded by walls, and defended by two forts and a citadel. It has manufactories of brass, and a trade in the produce of the district, which is fertile. Population, 7,369.

CASTELTERMINI, Italy, a town of Sicily in the province, and about 15 miles north by rail of Girgenti. Sulphur mines and rock-salt deposits employ the inhabitants and supply a lucrative trade. Pop., 9,321. C.L.S.

CASTIGLIONE, LAKE, Italy, a marshy lagoon of the Tuscan Maremma in the Province of Siena, north of Grosseto. It is 10 miles long and from one to three miles wide and is fed by the Bruna, through which it overflows into the Mediterranean at Castiglione della Pescaja. C.L.S.

CASTILE, a village of Wyoming County, western New York, on the New York, Lake Erie and Western railroad, 9 miles S. of Warsaw. Population, 1900, 1,088.

CASTILHO, ANTONIO FELICIANO. See PORTUGAL, Vol. XIX, p. 573.

CASTILLA, RAMON, soldier; was born in Peru in 1796, and became a general in the Peruvian army. He participated in the struggles of Generals Gamarra, Salverry and Santa Cruz for leadership in the new republic, and finally overthrew the weak government of Vivanco in 1844, and gave the country peace and a strong government of his own. He was elected President in 1845 and served until 1851, and again from 1854 to 1862. He abolished slavery and had too much ambition for personal power and greatly improved the government of Peru. He died in 1868. W.F.J.

CASTILLO, BERNAL DIAZ. See DIAZ DEL CASTILLO, in these Supplements.

CASTINE, Maine, a port of entry in Hancock County, founded by the French in 1667 on a peninsula dividing northeastern reaches of Penobscot Bay in the estuary of the Penobscot River, 34 miles south of Bangor. It has a state normal school, a small shipping trade, and some local industries. Population, 1900, 925. C.L.S.

CASTING, COMMON STEEL. See IRON AND STEEL, in these Supplements.

CASTING-VOTE, a vote given by the presiding officer of a deliberative assembly to decide its action on any measure when the members are equally divided or tied. The vote must be authorized by law or under the rules of the assembly, otherwise it cannot be validly cast. Without this authority a tie vote of the assembly is a negative, on the principle that what is not clearly adopted is lost. The Vice-President of the United States, when he is presiding over the Senate, is authorized by the constitution to give a casting-vote when the members are equally divided. A president of a senate, chosen from its members, has no casting-vote, unless it be so provided by the rules. In the 28 states of the Union that choose lieutenant-governors, these officers usually preside over the senate of their respective states, but have only a casting-vote. Speakers of Congress, and usually of the lower houses of legislation, have conferred upon them, by rule, the right to cast a vote decisive of a tie, in addition to their vote as representatives of a constituency. It is the practice of such presiding officer so to decide a tie as to leave the question open for reconsideration under the rules. In the British Parliament there is no casting-vote in the House of Lords, but in the House of Commons the Speaker may use it to resolve a tie. When the presiding officer is chosen from among the members of a deliberative body, he may call some other member temporarily to the chair, and, descending to the floor, participate in the proceedings there; where the presiding officer is such merely *ex officio*, he cannot take part in the deliberations of the body over which he presides.

D. O. KELLOGG.

CAST-IRON. See IRON, Vol. XIII, pp. 326–344.

CASTLE, EDMUND, (1606–85) an English Oriental scholar. See POLYGLOTT, Vol. XIX. p. 431.

CASTLEFORD, a town in the West Riding of Yorkshire, northern England, on the Aire, 10 miles S.E. of Leeds. It was formerly a Roman station, and is now the seat of extensive glass-works, manufacturing especially large quantities of bottles. Population, 14,143.

CASTLE GARDEN, New York City, in Battery Park, at the southern end of Manhattan Island, was a pleasure garden laid out in 1822 around Fort Clinton, then occupying a rocky islet approached by a drawbridge. The fort had been superseded subsequent to the War of 1812 by superior fortifications around New York harbor. Castle Garden for a long time was the social center of amusement for New York City, and Jenny Lind was one of the most distinguished among celebrated foreign artists who appeared there. Castle Garden subsequently became the Federal immigration station, until the latter was transferred to Ellis Island in 1891. Transformed into the well-stocked Public Aquarium, Castle Garden is still a source of attraction to New Yorkers and visitors to the metropolis. C.L.S.

CASTLEMAINE, Australia, a town of Talbot County, Victoria, 78 miles by rail N.W. of Mel-

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bourne. It was one of the earliest gold mining centers of the country. Pop., 8,000. C.L.S.

CASTLE ROCK, town and capital of Douglas County, central Colorado, situated near the famous Castle Rock, on the Atchison, Topeka and Santa Fé and the Denver and Rio Grande railroads, about 30 miles S. of Denver. The chief industries are dairying and cattle-raising. Population, 1900, 304.

CASTLEREAGH, Lord. See Londonderry, Vol. XIV, pp. 864–867.

CASTLETON, Vermont, a town in Rutland County on the Castleton River, 13 miles E. of Whitehall, on two branch lines of the Delaware & Hudson railroad. It is the seat of a state normal school and of a medical college. Farming implements are manufactured and slate exported. Pop., 1900, 2,089. C.L.S.

CASTOREUM, a secretion of the beaver, used in the manufacture of perfumes. See Beaver, Vol. III, p. 411. R.W.C.

CASTRO, a seaport town of Asiatic Turkey, capital of the island of Mitylene, situated on the east coast, about 55 miles N.W. of Smyrna. It is surrounded with walls and defended by a castle. Pop., 6,500.

CASTRO, Cipriano, soldier and statesman; was born in Venezuela and became an inn-keeper and then a soldier. In 1899 he led a revolution against President Andrade, captured Caracas, and drove Andrade into exile in October, and proclaimed himself provisional president. In October, 1901, he was elected president for six years, and his election was ratified by Congress in February, 1902. He has since suppressed several rebellions against himself, and has shown himself a strong if sometimes unscrupulous ruler. W.F.J.

CASTRO, José Maria or Joseph, statesman; was born in Costa Rica about 1818, and on reaching manhood entered public life. He was so prominent in separating Costa Rica from the Central American Confederation that he was officially called "The Father of Costa Rica." He was president of that republic in 1847–49, and again in 1866–68, being deposed by a revolution in the year last named. W.F.J.

CASTRO, Thomas, one of the names of Arthur Orton, "the Tichborne Claimant." See Tichborne, in these Supplements.

CASTUERA, a town in the western part of the province of Badajoz, Spain, on the Madrid-Saragossa railroad, about 245 miles E. of Lisbon. It is situated on the right bank of the Guadalefra, and has manufactories of brick, earthenware, etc., and a trade in agricultural products. Population, 7,133.

CASUARIIDÆ, a family of large cursorial birds related to the ostrich, and also known as cassowaries. Their coarse, black plumage is used in New Guinea, where the birds abound, in the manufacture of rugs and mats. R.W.C.

CASUARINA, a genus of trees of the order *Amentaceæ*, of which more than 20 species are known, growing chiefly in Australia, the South Sea Islands and East Indian Archipelago. The trees are chiefly valued for their wood which is extremely hard and durable. The "Toa" of the Society Islands (*C. equisetifolia*) is known as "Ironwood" and is used to make clubs, spears and paddles. The same tree is known as the swamp oak in Australia. It also grows in India where it is highly valued for its uses as a timber tree. All of the trees have long branches, with slender, wiry, drooping, jointed sheaths instead of leaves. The fruit consists of hardened bracts, collected in a cone and enclosing small winged nuts. W.R.B.

CASWELL, Alexis, educator, was born in Taunton, Massachusetts, on January 29, 1799, and was educated at Brown University, from which he was graduated in 1822. For four years he was a teacher in Columbia College, meantime studying theology. He next became a Baptist preacher, but soon left the pulpit for the professor's chair at Brown University, where he presided over the department of mathematics and natural philosophy for thirty-five years. In 1868 he was elected president of Brown, and filled that office for five years. He was the author of a number of works on mathematics and astronomy. He died at Providence on January 8, 1877. W.F.J.

CASWELL, Richard, an American statesman; born in Maryland, Aug. 3, 1729. In 1746 he removed to North Carolina; was a member of the colonial Assembly, 1754–71; later Speaker of the House and State treasurer; was president of the State Constitutional Convention and first governor, fought at Camden, S. C., 1780; comptroller-general, 1782; governor in 1784, and twice re-elected; and delegate to the Federal convention at Philadelphia in 1787. He died Nov. 10, 1789. E.E.T.

CASWELL, Thomas Hubbard, lawyer, and one of the most conspicuous members of the Masonic Order, was born at Exeter, New York, on August 10, 1825, and was educated for the legal profession, which he has practiced since 1848 with much success. He was a judge for eight years in California. He was the sovereign grand commander of the supreme council, Ancient and Accepted Scottish Rite Masons, 33rd degree, for the southern jurisdiction, from 1895 to 1899. W.F.J.

CATABOLISM, a term in physiological botany applied to all those chemical processes in a plant which lead to the formation of simple substances from more complex ones. Such processes are associated with the conversion of potential into kinetic energy; therefore it is through its catabolism that a plant liberates the energy which expresses itself in growth, movement, etc. Catabolism is carried on either by the protoplasm itself, or by substances which it produces, known as *ensymes*. In the former case the changes are usually associated with the absorption of O and the evolution of CO^2. This gaseous interchange, known as *respiration*, is taken as the indication of catabolic activity.

CATABROSA, a genus of grasses formerly included in *Aira*. *Catabrosa aquatica* grows in very moist situations, and is only cultivated in irrigated meadows or on the banks of rivers subject to be overflowed by high tides. Its foliage is peculiarly

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sweet and much relished by cattle. Its foliage and seeds also afford much food to water-fowl and to some kinds of fish, particularly carp. Its leaves often float, and its stalks seldom rise more than a foot or 15 inches above the surface of the water. It abounds throughout Europe and in the torrid regions of South America.

CATACAUSTICS, the caustic curves formed by rays of reflected light. W.R.B.

CATALANI, ANGELICA, singer; was born at Sinigaglia, States of the Church, Italy, in 1784, the daughter of a musician and jeweler, and at the age of seven years won attention by her singing. She was carefully educated, and in 1800 made her first appearance on the stage as an operatic prima donna, as *Lodoisca* in Mayer's opera of that name. Her success was great, and she soon went upon a tour of Europe. At Madrid the receipts of her first concert were $11,000, and in London she was paid $13,000 for her first and $17,000 for each of seven following seasons. In eight years she netted $400,000, and at her death she left $1,600,000. She married Captain Valabrègue of the French army, and died in Paris on June 12, 1849. She was one of the most powerful and brilliant sopranos. W.F.J.

CATALAUNIAN PLAIN, France, the name given by mediæval authors to the plains of Champagne anciently occupied by the Catalauni, and the scene of the defeat of Tetricus by Aurelian in 273; the destruction of a German army in 394 by the Roman general Jovin; and of the sanguinary battle of Châlons-sur-Marne in 451, when Attila, the "scourge of God," was defeated by the Roman general Ætius. C.L.S.

CATALINA, Newfoundland, a town and port of entry on Catalina Bay, N. of the entrance to Trinity Bay, 60 miles N. W. of St. John's. Fisheries and transit trade employ the inhabitants. Population, 1,300. C.L.S.

CATALPA, a genus of hardy trees, order *Bignoniaceæ*, of which two species (*C. bignonioides* and *C. speciosa*) are natives of the United States, and are common in cultivation as ornamental trees. The catalpa has large simple leaves, terminal panicles of showy flowers, and long pods with winged seeds. Its wood is light and soft, but exceedingly durable, and is used for fence-posts, railway sleepers, etc. *C. longissima* of the West Indies yields excellent timber known as French oak, and the bark is a source of tannin. The Japanese catalpas are small and unimportant.

CATALYSIS, a term applied in chemical physics to a force supposed to be exerted by one substance upon a second, whereby the latter is subjected to change or decomposition, while the former, or acting substance, remains comparatively unaltered, and does not combine with it. See ALCOHOL, Vol. I, p. 416.

CATAMARAN (Tamil *katta*, tie, bond, *maran*, wood), a kind of raft or float, consisting of two or three logs tied together side by side, the middle one being longer than the others; used in the East Indies, and especially on the Coromandel Coast for communication with the shore. The name is also applied to similar craft used in the West Indies for shore voyages, and to others of much larger size, used off the coast of South America. They are usually propelled with paddles. It is also applied to two boats fastened together side by side such as are used on the St. Lawrence and its tributaries. W.R.B.

CATAMENIA. See *Menstruation*, under REPRODUCTION, Vol. XX, p. 420.

CATAMOUNT. Same as PUMA, Vol. XX, p. 110.

CATAPLASM, an application to diseased or painful parts, for the purpose of promoting suppuration, relieving pain, and stimulating or soothing the skin, according to circumstances. A cataplasm may be composed of any moist pulpy substance of sufficient consistence to retain the water without soaking through the thin muslin covering in which it is wrapped. The flaxseed poultice is the most easily made, and is the most satisfactory of all soothing applications.

CATARACT. See OPHTHALMOLOGY, Vol. XVII, p. 804.

CATARACTS, portions of a stream where the decline or descent is abrupt and sudden, and the water falls or leaps to the lower part. (See *Waterfalls*, under GEOLOGY, Vol. X, p. 245.) The more notable falls in the United States are as follows:

Niagara, the most celebrated cataract in the world, is on Niagara River, 22 miles north of Lake Erie, and 14 miles south of Lake Ontario. Goat Island separates the falls into the American, 164 feet high, and the Canadian, or Horseshoe, 158 feet high.

Trenton Falls are on West Canada Creek, 15 miles northwest of Utica, New York. The falls consists of a series of six cascades and cataracts, having an aggregate descent of 312 feet in two miles.

The Waterfalls of New York State are a noteworthy feature of its natural scenery. Baker's Falls are 70 feet high; Birmingham, 70; Black Chasm, 300; Buttermilk, 100; Carthage, 75; Cauterskill, 180, 80 and 40; Claverack, 90; Cohoes, 70; Corinth, 60; Fawn-leap, 30; Genesee, 96, 25 and 84; Glen's, 60; Hadley's, 60; Haines's, 150, 80 and 60; Hoosac, 40; Ithaca, 160; Little, 44; Lodi, 125; Lyon's, 63; Luzerne, 25; Portage, 70, 110 and 90; Roaring Brook, 500; Sawkill, 80; Split Rock, 100; Taghkanic, 215; Tekaharawa, 100; Ticonderoga, 100 and 30. Piercefield and Rainbow falls in the Adirondacks, Shelving Rock Fall near Lake George, and the falls in Watkins Glens, are pretty cascades.

Yosemite, the highest waterfall in the world, is in Mariposa County, California, where the Yosemite Creek plunges 2,600 feet into the Yosemite Valley. There is first a clear fall of 1,500 feet, then a series of cascades aggregating 600 to 700 feet, and finally a plunge of 400 feet to the base of the precipice. In the same valley are the beautiful Bridal Veil Fall, 900 feet; Virgin's Tears, 1,000; Illilouette, 600; Vernal, 400; and Nevada, 600.

Other Famous Falls in the United States are the Austin, in Maine, 100 feet high; Belden's, Vermont, 37; Bellows, New Hampshire and Vermont, 40; Berlin, New Hampshire, 80; Carp, Michigan, 200; Chattahoochee, Georgia, 110; Clifton, Ohio, 50; Crystal Cascade, New Hampshire, 80; Dead River,

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Michigan, 96; Georgiana, New Hampshire, 80 and 80; Glen Ellis, New Hampshire, 80; Great, Nebraska, 88; Housatonic, Connecticut, 60; Lewiston, Maine, 100; Minnehaha, Minnesota, 60: Passaic, New Jersey, 70; Potomac, Virginia, 76; Puncheon Run Cascades, Virginia, 1,800; Rumford, Maine, 150; St. Anthony, Minnesota, 18; Saco, Maine, 72; Shelburne, Massachusetts, 150; Shoshone, Idaho, 200; Silver Cascade, New Hampshire, 800 Sylvan Glade, New Hampshire, 174; Tallulah Falls and Rapids, Georgia, 86; Willamette, Oregon, 40; Yellowstone, Montana, 140 and 360.

CATARRHINA, the name of several kinds of mammals, of the order *Quadrumana*. They include the apes of the Old World and those monkeys that have the nostrils near together, with the aperture pointing downward. R.W.C.

CATASAUQUA, a railroad town of Lehigh County, eastern central Pennsylvania, situated on the Lehigh River, and on the Catasauqua and Vogelsville, the Central of New Jersey and the Lehigh Valley railroads, three miles N. of Allentown It contains blast-furnaces, rolling-mills, machine-shops and manufactories of fire-brick and railroad cars. Population, 1900, 3,963.

CATAWBA OR GREAT CATAWBA RIVER, North Carolina, an upper reach of the Wateree affluent of the Santee River. It flows E. S. E. from its sources in the Blue Ridge Mountains, and after a course of 250 miles joins the Wateree at Catawba Junction, S. C. C.L.S.

CATAWBA WINE, a light, sparkling, rich-flavored wine made from the Catawba grape (*vitis labrusca*), which is largely cultivated in the central United States. It was first made in 1830. The name is derived from the river Catawba in South Carolina, where the grape was first discovered. It is scarcely known in Europe, but its extensive use in America is superseding that of the imported Rhenish and French sparkling wines. See WINE, Vol. XXIV, p. 644. W.R.B.

CATAWISSA, Pennsylvania, a borough and a township of Columbia County on opposite banks of the Susquehanna, 9 miles east of Danbury on the Philadelphia & Reading, the Pennsylvania, and the Delaware, Lackawanna & Western railroads. Foundry products, cars, paper, shoes, and novelties, represent the industries. Pop., 1900, of borough, 2,023; of township, 560. C.L.S.

CAT-BIRD. See MOCKING-BIRD, XVI, p. 564.

CATCHFLY, in botany, a name given to the various species of *Silene*, as *S. armeria*, *S. anglica*, or lime wort. Parts of the stem, leaves and flowers are covered with a thick and clammy exudation like bird-lime which proves fatal to insects settling thereon. W.R.B.

CATCHPOLE OR CATCHPOLL, in England, a sheriff's officer, or bailiff, whose duty it is to make arrests. In various places a long pole was in use for catching or holding criminals by the neck, having at the end of it an iron collar with a V-shaped opening, occasionally armed with spikes on the inside. The catchpole was also used by soldiers for unhorsing knights.

CATE, WILLIAM HENDERSON, a lawyer and Congressman; born in Rutherford County, Tennessee, Nov. 11, 1839. He graduated from the university at Knoxville, Tennessee, in 1857; was a teacher in the West and South, and served in the Confederate army during the war of the Rebellion. He settled at, Jonesboro, Arkansas, in 1865, and entered the profession of law in 1866. In politics he was a Democrat, and was elected a member of the state legislatures of 1871 and 1873. He was prosecuting attorney of the second circuit in 1878, and elected judge of that circuit in 1884. He was declared elected a Democratic representative from the first Congressional district of Arkansas to the Fifty-first Congress, but the House of Representatives decided that he was not entitled to the seat. He was elected from the same district to the Fifty-second Congress.

CATENÆ, commentaries. See HERMENEUTICS, Vol. XI, p. 667.

CATENARY PROBLEM. See MECHANICS, Vol. XV, pp. 747–751.

CATENIPORA OR HALYSITES, a genus of fossil corals peculiar to Palæozoic strata. See HALYSITES, in these Supplements.

CATERPILLAR, the larva of a lepidopterous or scaly winged insect. See BUTTERFLIES, Vol. IV, pp. 528, 529.

CATESBY, MARK, an English naturalist; born in 1679. He spent many years in botanical and zoölogical research in America. Between 1730 and 1748 he published his *Natural History of Carolina, Florida, and the Bahama Islands*. He died in London in 1749. E.E.T.

CATESBY, ROBERT, a Northamptonshire Roman Catholic; born in 1573, of good fortune and lineage; sixth in descent from Richard III's Catesby, who was hanged three days after Bosworth. He was the originator of the Gunpowder Plot of 1604. When Fawkes was arrested, Catesby, with the remaining conspirators, made a resistance, and in the fight which ensued he was killed at Holbeach House, Nov. 8, 1605. See FAWKES, Vol. IX, p. 51.

CATFISH. See SILURIDÆ, Vol. XXII, p. 75.

CATHA (*Catha edulis*), a shrub of the spindle tree family *Celastraceæ*. It is a native of Yemen and other parts of Arabia, and is known as "Kât." It is extensively cultivated for its leaves which have properties similar to those of tea and coffee. W.R.B.

CATHARI (Gr., pure), a name given to various sects that appeared in the church during the Middle Ages, who professed a greater purity of doctrine and morals to that which generally prevailed in the church. It became a common designation of sects that appeared in Lombardy in the beginning of the 11th century. The names "Albigenses" and "Cathari" are often used as equivalents of each other. While not anticipating the doctrines of the Reformation, yet their rejection of tradition, the authority of Rome, of the worship of saints and images, are points of agreement with the views of the Reformers. W.R.B.

CATHARINE. See CATHERINE in these Supplements.

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CATHARINE ISLANDS, a name once given to the ALEUTIAN ISLANDS; q.v., Vol. I, p. 424.

CATHARTICS, a name, originally, for all medicines supposed to purify the system from the matter of disease, which was generally presumed by the ancients to exist in all cases of fever and acute diseases and to require to be separated or thrown off by the different excretions of the body. The term is now used, however, for purgatives, medicines used in cleansing the bowels by promoting the evacuation of excrement and to remove irritating matters, to produce counter-irritation and an increased secretion from a mucous surface to relieve distant parts, as the head. The principal cathartics are aloes, colocynth, rhubarb, scammony, jalap, senna, Epsom and other salts.

CATHARTIDÆ. See VULTURE, Vol. XXIV, p. 322.

CATHARTINE OR BITTER OF SENNA. The bitter, or purgative, principle of senna (*Cassia acutifolia*), a slender annual of the bean family, about 2 feet high, having winged leaves which constitute the senna of commerce. It has a very bitter, nauseous taste, a characteristic odor, and is soluble in water, or alcohol. W.R.B.

CATHCART, WILLIAM SHAW, EARL OF, soldier and diplomat; was born in Scotland on September 17, 1755; was educated at Eton and Glasgow, and was called to the bar in 1773, in which year he succeeded his father as Baron Cathcart of Cathcart. He did not practice law, but entered the British army, and served with distinction in the first year of the American revolution. He was next sent on the Walcheren expedition with the rank of brigadier-general, and again distinguished himself. He was commander-in-chief in Ireland in 1803, commander of the land forces at Copenhagen in 1807, ambassador to Russia in 1812, British plenipotentiary at the Congress of Vienna, and British signatory of the treaty of peace after Waterloo. He was made a viscount in 1807, and an earl in 1814. He died on June 17, 1843. W.F.J.

CATHELINEAU, JACQUES, chief leader of the Vendeans in their resistance to the French revolution; was born at Pin-en-Mauges, France, on January 5, 1759, and at the outbreak of the revolution was a poor linen peddler, but so devout that he was known as the "Saint of Anjou." He put himself at the head of a body of Vendeans at St. Florent, in March, 1793, and a few months later was made commander-in-chief of all the Vendean forces. He was fatally wounded in his attack upon Nantes, and died on July 11, 1793. W.F.J.

CATHERINE HOWARD, fifth wife of Henry VIII of England; was a member of the illustrious family of Howard, of which the Duke of Norfolk was the head. She was born in 1521, and was married to Henry in 1540. Soon afterward she was charged with unfaithfulness, and was put to death in 1542. W.F.J.

CATHERINE PARR, the sixth and last wife of Henry VIII of England; was a daughter of Sir Thomas Parr, and was born about 1513. She was twice married and twice widowed before she became the wife of Henry, on July 12, 1543. She was a fine scholar and zealous Protestant, and risked her life in religious discussions. Once she was ordered to be sent to the tower on charges of heresy and treason, but succeeded in reasserting her intellectual influence over the king. After Henry's death she married Lord Seymour, and died on September 30, 1548. W.F.J.

CATHETER (Gr., *katheter*, anything let down into), a long tubular instrument of metal, or rubber, more or less curved at the end for passing into the bladder in order to draw off the urine, etc. Also a similar tube for use with other canals, as the eustachian catheter. The ancients made theirs of copper, which is objectionable, as it accumulates verdigris. It is frequently made of flexible, or hard rubber, and of German silver, or of pure silver. See RESPIRATION, Vol. XX, p. 496. W.R.B.

CATHODE AND CATHODE RAYS. See ELECTRICITY, § 95, in these Supplements.

CATHOLIC APOSTOLIC CHRISTIANS. See GERMAN CATHOLICS, Vol. X, pp. 399, 400.

CATHOLIC BENEFIT SOCIETIES. See BENEFIT SOCIETIES, in these Supplements.

CATHOLIC EMANCIPATION, in England the repeal, in 1829, of the laws which restrained Roman Catholics from enjoying civil rights and the privilege of disposing of their own property. Up to 1780, according to the law, it was high treason for a native of the kingdom to perform the rites of the Roman Catholic Church, and Catholics were debarred from purchasing land. Gradually one law after another was repealed, until the Duke of Wellington moved the repeal of all anti-Catholic laws; although a few clauses continue in force, among them being the one prohibiting a Catholic priest from holding a seat in the House of Commons.

CATHOLIC EPISTLES, the name given, according to Clemens Alexandrinus, to certain epistles addressed not to any particular churches or persons. They were seven epistles of the New Testament: the epistle of James; the three epistles of John; the one to Jude; and the two of Peter. The term was in distinction from the fourteen epistles of Paul.

CATHOLIC LEAGUE, in France (see FRANCE, Vol. IX, pp. 495, 497); in Germany (see GERMANY, Vol. X, p. 448).

CATHOLIC PAROCHIAL SCHOOLS. See SCHOOLS, PRIVATE, in these Supplements.

CATHOLIC UNIVERSITY OF AMERICA, THE, is an important institution of higher learning, belonging to the Roman Catholic Church, at Washington, D. C. It was founded in 1887, and was opened in 1889. Its chief individual benefactor was Miss Mary Caldwell, who gave it an endowment of $300,000, and other rich gifts, for which she received the "golden rose" from Pope Leo XIII. Her renunciation of the Catholic faith in 1905 was regarded as a grievous loss to the university. W.F.J.

CATHOLICOS, the title of the patriarch, or chief ecclesiastic, in the hierarchy of the Armenian

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Church and of the Christians of Georgia and Mingrelia. This high dignitary resides at Etchmiadzin, in Russian Armenia. W.R.B.

CATIPUNAN. See PHILIPPINE ISLANDS, these Supplements, pp. 404, 405.

CATKIN, a cluster, or spike of small, unisexual, apetalous flowers, having scale-like bracts instead the whole inflorescence, finally falling off in a single piece. W.R.B.

CATLETTSBURG, village and capital of Boyd Co., Ky., a railroad juncton on the Chesapeake and Ohio railroad, and on the Ohio River, at the mouth of the Big Sandy River. Has a state normal school, a large lumber trade, and several factories. Pop., 1900, 3,081.

CATLIN, ISAAC S., soldier and lawyer; was born at Owego, N. Y., on July 8, 1835, and became a lawyer in Brooklyn, N. Y. He raised a company of volunteers on the very day of Lincoln's first call for troops, and served with distinction in the Civil War, losing his right leg in battle and winning the medal of honor. He was mustered out as brevet major-general of volunteers. He has been U. S. district attorney and district attorney of Brooklyn, and has been in political affairs. W.F.J.

CATMINT OR CATNIP (*Nepeta cataria*), a plant of the family *Labiatæ*, widely diffused throughout Europe, Asia, and North America; has erect stems, two or three feet high, dense whorls of many whitish flowers, and stalked, heart-shaped, velvety leaves whitish and downy beneath, and its fragrance is very attractive to cats. Also used as a domestic remedy.

CATOCHE, CAPE, the northeastern extremity of Yucatan, Central America, Lat. 21° 36′ N., long. 87° 6′ W. Here the Spaniards first landed in America.

CATOPTRICS, that part of optics that explains the properties of incident and reflected light, particularly that which is reflected from mirrors or polished surfaces. See LIGHTHOUSE, Vol. XIV, pp. 623–625. W.R.B.

CATORCE, a silver-mining city in San Luiz state, Mexico, with steep and winding streets; has a fine cathedral. Population varies from 8,000 to 40,000, according to the yield of the mines.

CATOSTOMIDÆ OR CATASTOMIDÆ, according to some classifications, a family of teleostean fishes of the sub-order *Eventognathi*. The carp of the genus *Catostomus* form a typical group. R.W.C.

CATRON, JOHN, jurist; was born in Wythe County, Virginia, in 1778, and was educated in the common schools of that state, and Kentucky. In 1815 he was admitted to the Tennessee bar, and in 1824 was elected a justice of the supreme court of that state. He won honorable fame by his energy in suppressing dueling. He retired from the state bench in 1836, was appointed an associate justice of the United States Supreme Court in 1837, and filled the latter place until his death on May 30, 1865. W.F.J.

CAT'S EYE, in mineralogy, a variety of quartz very hard and semi-transparent, and from certain points exhibiting a yellow, opalescent radiation, or *chatoyant* appearance, somewhat resembling a cat's eye. See MINERALOGY, Vol. XVI, p. 402. W.R.B.

CATSKILL, a village and the capital of Greene County, southeastern New York, situated on the right bank of the Hudson and on the West Shore railroad, 35 miles below Albany. A railroad runs from Catskill Landing, a mile below, on the Hudson, through Catskill up into Catskill Mountains, for summer visitors. It has an academy and various factories, including woolen and paper mills, stoneyards, and icehouses. Pop., 1900, 5,484.

CATSKILL GROUP, in geology. See GEOLOGY, Vol. X, p. 306.

CATTAIL (*Typha latifolia*), a genus of plants inhabiting marshes and ditches having rigid linear leaves and smooth stems with unisexual flowers arranged on a scaly, or hairy spadix, the fruit dry, consisting of seed with adherent pericarp. The young shoots are much eaten by the Cossacks. W.R.B.

CATTEGAT OR KATTEGAT, a strait between Sweden and Denmark. See BALTIC, Vol. III, p. 253.

CATTELL, ALEXANDER GILMORE, statesman; was born at Salem, N. J., on February 12, 1816, was elected to the New Jersey legislature in 1840, and was a member of the State constitutional convention of 1844. He became a banker in Philadelphia, but remained a citizen of New Jersey, and represented that state in the United States Senate from 1866 to 1871. In 1873 he was fiscal agent of the U. S. in England, and refunded $100,000,000 of American bonds. He also arranged the plan for payment of the $15,000,000 Geneva award to this country. He died on April 8, 1894. W.F.J.

CATTELL, WILLIAM CASSIDY, educator; was born at Salem, New Jersey, on August 30, 1827, and was educated at Princeton. He was professor of Greek at Lafayette College, Easton, Penn., for five years, pastor of a Presbyterian church for three years, and in 1863 became president of Lafayette College, where he did a great work. Through his exertions more than a million dollars were raised for the college, and its rank in scholarship was materially raised. He was its president for twenty years, after which he was engaged in various works for the Presbyterian Church. He died on February 11, 1898. W.F.J.

CATTLE, in the United States. See AGRICULTURE, in these Supplements.

CATTLE-PLAGUE. See MURRAIN, Vol. XVII, pp. 65, 66.

CATTLE TRAFFIC. See RAILROADS, in these Supplements.

CATTLEYA, a genus of magnificent orchids, natives of South America, having rich and varied colors and growing to a size of 7 or 8 inches across. They are epiphytes, or air plants. W.R.B.

CATTY, Chinese weight. See CANTON, Vol. V, p. 35.

CATULUS, QUINTUS LUTATIUS, a Roman commander, orator, and epigrammatist, consul with Marius IV, 102 B.C. In July, 101 B.C., Marius and he met the Cimbri, near Vercellæ, gaining a decisive victory. Catulus claimed the honor, though at Rome Marius was given the

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whole credit. He was among the proscribed of 87 B. C.; and suffocated himself with the vapors of charcoal. He was familiar with Greek literature, and was a prolific writer. R.C.A.

CAUB, a town of Nassau, North Germany, on the right bank of the Rhine, 21 miles N.W. of Weisbaden. It has underground slate-quarries. It is celebrated as the place where Blücher crossed the Rhine with his army in 1814.

CAUCA, a river and province. See COLOMBIA, Vol. VI, pp. 137, 140.

CAUCASIAN RACE. See ANTHROPOLOGY, Vol. II, p. 100; GEORGIA, Vol. X, p. 389.

CAUCHON, JOSEPH EDWARD, statesman, was born in Canada East, and founded *The Quebec Journal*, a French newspaper, of which he was the editor for more than forty years and through which he exerted a great political influence in Canada. For nearly twenty-five years he was a member of the provincial assembly of Quebec, and also a Crown Commissioner and member of the Executive Council. For some time he was Commissioner of Public Works. For five years he was President or Speaker of the Senate. After the formation of the Dominion he became a member of the Canadian Privy Council, was President of the Council from December, 1875, to June, 1877, and Minister for Inland Revenue from June to December, 1877. He was appointed lieutenant-governor of the province of Manitoba in December, 1877, and filled that place until September, 1882. He died in 1885. W.F.J.

CAUCHY, AUGUSTIN LOUIS, mathematician; was born in Paris, France, on August 21, 1789, the son of a poet. He showed remarkable mathematical genius, and enriched with his researches almost every branch of mathematical science. He is most remembered for his studies of the differential and infinitesimal calculus, and of the dispersion of light. He was professor of astronomy in Paris in 1848–52, and died on May 23, 1857. W.F.J.

CAUCUS, a meeting for adopting a plan of action in any future business or meeting. The term is generally used in relation to political parties and the working of those parties. It may be, and is, used in speaking of any preliminary gathering of purely business organizations, as, for instance, the board of directors of a large corporation in which the number of members is so large that they are likely to divide on some important question, and it is desirable that each side shall be prepared to follow a concerted line of action. In politics the caucus may be a meeting of citizens to nominate some one of their number for a town office, or to elect delegates to some larger convention. Such a caucus often is composed of citizens, irrespective of political party. The members of a political party may gather to nominate their candidates and outline their course of action. A caucus is frequently held in legislative bodies, by the members of one side or the other, to agree upon leaders and tactics. The action of a caucus is generally binding upon its members. It is semi-secret in its nature. The word is said by some to have originated from the Indian *cau-cau-as-u*, defined by Trumbull as "one who advises, urges, encourages." The generally accepted derivation, however, is that it is a corruption of the word *calkhouse*. During pre-revolutionary and Revolutionary times, secret meetings were held by the calkers of ships, and others, in the calkhouses of Boston, to devise means of resisting the British oppression, and, in time, to govern the town. Secret meetings of influential citizens were frequently held for political purposes. To these meetings the term *calkhouse*, or *cauk-hus*, was applied in ridicule. This application gradually spread until it has come into general use. Of late years, in the larger cities of England, the caucus, called by that name, has been introduced. John Adams first makes use of the word in his diary, under the date of February, 1763. The large nominating conventions of the United States are, in every sense of the word, caucuses. The caucus is regulated by law in some states, owing to the abuse of its powers by a few. Where it is so regulated it is called a *primary*, and the voting is done by ballot, and a system of registration is used.

CAUL, a thin membrane which occasionally is around the head of a child at its birth. It is a part of the amnion which envelops the fœtus in the womb, and remains on the head of the child only when the amnion is broken in an unusual place. It was thought to bring luck not only to the child, but also to the person who gained possession of it. It was especially sought after by sailors on account of the belief that it was a sure preservative from drowning. On account of this superstitious value, it was frequently sold at a high price.

CAULAINCOURT, ARMAND AUGUSTIN LOUIS DE, Duke of Vicenza, was born at Caulaincourt, Aisne, France, on December 9, 1773, and became a soldier in the French army. Being an "aristocrat" he suffered confiscation of his property and personal imprisonment in the revolution, but through the intervention of General Hoche was liberated and restored to his place in the army. He distinguished himself under Moreau in 1800; after the peace of Luneville was sent by Bonaparte to congratulate Alexander I of Russia on his accession, and thereafter was a member of Bonaparte's staff. In 1805 he was made a general and Duke of Vicenza. He accompanied the "Grand Army" on the march to Moscow, and during the disastrous retreat was the emperor's traveling companion. He was Minister of Foreign Affairs in 1813, and in the Hundred Days. He died Feb. 19, 1827. W.F.J.

CAULONIA OR CAULON, now Castelvetere, a town once called Aulon, in Calabria. It was founded by the Achæans. It was destroyed and rebuilt three times, being destroyed the last time in the Second Punic War. The Delphian Apollo was worshiped there.

CAULOPTERIS, in geology, fossil tree ferns that flourished in the Carboniferous era. They

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are typical examples of the trunks of fruit-bearing, or arboreal cryptograms, frequent in the ancient formations. W.R.B.

CAURA, a considerable river of Venezuelan Guiana. It rises among the Sierras of the southern frontier, and flows northwest to the Orinoco. Length, about 150 miles.

CAUS, SALOMON DE, also called CAULS OR CAULX, engineer; was born at Dieppe, France, in 1576. Being a Protestant he spent most of his time in England or Germany, and devoted himself ardently to mathematical studies. In 1612 he went to London and from 1614 to 1620 was at Heidelberg. In 1624 he was invited to return to France and to become engineer and architect to the king, which he did. He was the author of several scientific works, including one on *Raisons des Forces Mouvantes*, in which he discussed the expansion and contraction of steam in a way strongly suggesting the alternating action of the piston and the fundamental principle of the steam engine. Arago therefore declared him to have been the real inventor of the steam engine, a claim for which there is little real foundation. He died in Paris on June 6, 1626. See STEAM ENGINE, Vol. XXII, p. 491. W.F.J.

CAUSE, in metaphysic, is generally understood to be that by which something known as the effect is produced, and without which it could not have existed. Causes are divided by Aristotle into four classes: the material, formal, efficient and final. To these is added the exemplary by Plato. The first is that of which anything is made; as, the brass or marble of a statue. The formal is the form, idea, pattern, of a thing; as, the artistic idea of the statue. The efficient is the power acting to produce the work; as, the mechanical labor employed in producing the statue. The final is that which led to the production, the end or motive in view in producing the statue. The cause does not precede the effect, but is in conjunction with it. There can be no cause without an effect, nor can there be an effect without a cause. See METAPHYSIC, Vol. XVI, pp. 85 et seq.

CAUSE CÉLÈBRE from the French signifying "celebrated case," a term which has been introduced into several languages including English, as a more striking title for civil or criminal cases of great notoriety. French history bristles with these; notable recent examples are the Dreyfus case (q. v.), and the Humbert frauds; the latter finds a parallel in the United States in the Chadwick frauds. C.L.S.

CAUSE OF ACTION is a matter for which a suit or action in law or chancery may be maintained. If a suit is brought upon a claim, and the plaintiff cannot maintain it in that or any other form, he is said to have no cause of action. A cause of action accrues to any person when that person first has the right to bring and maintain a suit thereon.

CAUSERIE, a name applied to a somewhat short and informal essay on any subject in a newspaper or magazine. More familiar in manner and slighter in structure than the formal essay as usually understood, it is an excellent medium for a writer whose personality interests the reader as much as the value of his thoughts. The name owes its literary currency mainly to the famous *Causeries du Lundi* of Sainte-Beuve.

CAUSSIN DE PERCEVAL. See PERCEVAL, AMAND PIERRE CAUSSIN DE, Vol. XVIII, p. 532.

CAUSTIC (Gr., *kaustikos*, burning), a name given to substances which have the property of burning, corroding, or disintegrating organized matter. The principal caustics are nitrate of silver, known as "lunar caustic" when cast into sticks for the use of surgeons, sulphate of copper, red oxide of mercury, and the nitric and acetic acids. Besides those there are caustic soda (protoxide of sodium), and caustic potash (hydrate of potassium), used in making soap; iodine caustic for the removal of warts, corns, etc.; vegetable caustic made from the lye of burnt wood for the cure of ulcers, cancers, etc. Caustic is also used in chemistry in an adjective sense, thus caustic lime, or pure lime (CaO) as distinguished from the carbonate of lime (CaO, CO_2); caustic magnesia (MgO) and mild magnesia (MgO,CO_2), etc. In optics, caustic is a term given to the curved line formed by the intersection of rays reflected from a curved surface. W.R.B.

CAUTERETS, a fashionable French watering-place, in the department of Hautes-Pyrénées, southern France, situated 3,250 feet above sea-level, in the valley of the Laverdan, 42 miles S.E. of Pau. The permanent population is less than 2,000, but it is annually swelled in summer by from 15,000 to 20,000 visitors, for whose accommodation numerous sumptuous hotels and bathing establishments have been built. It is a good center and guide-station for ascents among the Pyrénées. The sulphur springs, 25 in number, have been known from Roman times, though their modern reputation dates from the sixteenth century, when Margaret, sister of Francis I, held her literary court and wrote much of her *Heptameron* at Cauterets.

CAUTERY (*cauterium*, branding iron), a heated metallic instrument for burning or searing organic tissue. It also refers to a caustic drug, or medicine, used for the same purpose. The former is an *actual*, and the latter a *potential*, cautery. The use of the cautery is to prevent bleeding, or to limit the spread of a disease. It is usually made of steel, or platinum heated in a fire or spirit lamp. The *thermo cautery* is made of platinum and is self heating, having a hollow interior in which a flame of benzol is kept burning. The *galvano-cautery* consists of a platinum wire which is made red hot by a galvanic current. The *electro-cautery* consists of a loop of platinum wire attached to a handle for its manipulation, the wire being connected with a battery creating a current strong enough to heat it. In a figurative sense, a conscience killer. W.R.B.

CAUVERY OR CAVERY, a river of India. See KAVERI, Vol. XIV, p. 21.

CAVAIGNAC, JACQUES MARIE EUGÈNE

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GODEFROY, statesman, son of Louis Eugène Cavaignac (q. v., Vol. V, p. 226); was born on May 22, 1853, and won honors in college, but refused to accept them from the hands of a Bonaparte. In the war of 1870–71 he served with gallantry, and afterward became a civil engineer. In 1881 he became a lawyer, in 1882 was elected to the Chamber of Deputies, in 1885 was Under-Secretary of War, in 1891 was Minister of Marine, and in 1898 was Minister of War. The last office he was forced to resign a few months after taking it because of his attitude toward the Dreyfus case. Died Sept. 25, 1905. W.F.J.

CAVALCASELLE, GIOVANNI BATTISTA, Italian art critic; born at Legnago, Jan. 22, 1820; early visited the art centers of Italy, and in 1846 went to Germany, where he met J. A. Crowe, with whom he returned to Italy. Banished for his share in the revolution of 1848, he accompanied Crowe to London, where their first joint work, *Early Flemish Painters* (1857; 3d ed. 1879), was published. Cavalcaselle returned to Italy in 1858, and in 1861 commenced, with Crowe, the *History of Painting in Italy* (London; 5 vols., 1864–71). Other joint works are *Titian* (1876) and *Raphael* (1883). Cavalcaselle became head of the art department in the Ministry of Public Instruction at Rome, inspector of the National Museum at Florence, and of the Museum of Antiquities at Rome. Died in Rome, Nov., 1897.

CAVALIER, in fortification, is a defense-work constructed on the *terre-plein*, or level ground of the bastion, and behind another fortification over which it has a command of fire. It is used to command any rising ground held by the enemy within cannon-shot.

CAVALIER, a title formerly given to a gentleman who followed the profession of arms. Also a title of honor formerly given to an unknown gentleman when addressed. W.R.B.

CAVALLI, a fish. See HORSE-MACKEREL, Vol. XII, p. 211.

CAVE, ALFRED, clergyman; born in London, England, Aug. 29, 1847; was educated at New College, London, and ordained a Congregational minister. In 1880 he was called to the chair of Hebrew and Church History in Hackney College. His publications include *Spiritual Doctrine of Sacrifice and Atonement; The Battle of the Standpoints*, etc. He died December 19, 1900. G.J.H.

CAVEAT, a formal warning entered in the books of a court or a public office, that no step shall be taken in a particular matter without notice to the person lodging the caveat, so that he may appear and object. Thus caveats are frequently entered at the patent-office to prevent the unopposed granting of letters patent.

CAVEAT EMPTOR, a rule of sales concerning public property. The expression is from the Roman law, and means "let the buyer beware," or that he takes the responsibility as to the quality of the goods purchased. It does not relieve the seller from making a good title, or from the consequences of fraud. See SALE, Vol. XXI, p. 218.

CAVE-DWELLERS. See CAVE, Vol. V, p. 232; ANTHROPOLOGY, Vol. II, p. 102; TROGLODYTES, Vol. XXIII, p. 620.

CAVELIER, PIERRE-JULES, French sculptor; born in Paris, Aug. 30, 1814; studied under d'Angers and Delaroche; obtained a grand prize in 1842 for the work *Diomède Enlevant le Palladium*. He was made a member of the Institute and an officer of the Legion of Honor. His best known works are *Pénélope Endormie; La Vérité; Le Néophyte*, and *La Sculpture* (1891). Died in Paris, Jan. 28, 1894.

CAVENDISH, LORD FREDERICK, son of the seventh Duke of Devonshire, and brother of the eighth duke (better known as the Marquis of Hartington); was born on November 30, 1836, and was graduated from Trinity College, Cambridge, in 1858. He was a member of the House of Commons from Yorkshire as a Liberal, from 1865 to 1882, having previously been private secretary to Mr. Gladstone, and being financial secretary of the treasury in 1880–82. After the Gladstone government's repudiation of Mr. Forster's vigorous administration as Chief Secretary for Ireland, and his consequent retirement, Lord Frederick Cavendish was appointed to that arduous place in the spring of 1882, the purpose of the government being to send him as a messenger of conciliation. The extremists among the Irish agitators feared his success in that mission, and therefore planned his destruction. He arrived in Dublin on May 6, 1882, and that very evening he and his secretary, Mr. Burke, were brutally stabbed to death in Phœnix Park. Twenty Irish agitators were arrested for the crime, and five of them were hanged. W.F.J.

CAVIARE, a table delicacy prepared from the roe of the sturgeon and other fishes. See STURGEON, Vol. XXII, p. 644. R.W.C.

CAVITE, in Luzon Island, Philippines, was the scene of the naval battle of May 1, 1898, wherein an American squadron, under Commodore George Dewey, destroyed a Spanish squadron, under Admiral Montojo. Population of town and port, 1903, 4,494. See Vol. V, p. 237; also MANILA, these Supplements.

CAWDOR, a village in Nairnshire, northeastern Scotland, 5½ miles S. W. of Nairn. Cawdor Castle, near by, is the seat of the Earl of Cawdor. It was founded in 1454, but is one of the three places which tradition has assigned as the scene of King Duncan's murder by Macbeth in 1040.

CAXIAS, Brazil, a town, formerly ALDEAS ALTAS built around a Jesuit mission in the state of Maranhão, on the river Itapicuru, 185 miles from its mouth. The river is navigable and facilitates the export of cotton, rice and other agricultural produce. Pop., 10,000. C.L.S.

CAYAMBI OR CAYAMBURO, the highest mountain on the equatorial line in the world, and the only one on that line with a perpetual snow-cap. It is an extinct volcano of Ecuador, 15,534 feet high. It is one of the eastern Cordilleras of the Andes, about 45 miles N. E. from Quito, rises with conical symmetry from a very extensive base, and is a conspicuous landmark.

CAYLEY, ARTHUR, English mathematician;

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born at Richmond, Surrey, Aug. 16, 1821; died Jan. 26, 1895. He was educated at King's College, London, and Trinity College, Cambridge, and was graduated as senior wrangler, and first Smith's prizeman in 1842. Called to the bar at Lincoln's Inn in 1840, he was for a time established in business as a conveyancer. He was elected, in 1863, Sadlerian professor of pure mathematics in Cambridge, and in 1875 was called to a fellowship of Trinity College; was president of the Royal Astronomical Society (1872–73), and of the British Association at its Southport meeting in 1883, where his address on the ultimate possibilities of mathematics attracted much attention. In 1882 he gave a course of mathematical lectures at the Johns Hopkins University, Baltimore, and in the same year received the Copley medal of the Royal Society. He received honorary degrees from Oxford, Dublin and Leyden. His chief book is an *Elementary Treatise of Elliptic Functions* (1876); but his papers were numerous, and are collected into 10 volumes in process of publication by the Pitt Press. He contributed mathematical articles to this ENCYCLOPÆDIA, among the most important of which are FUNCTIONS; GEOMETRY, ANALYTICAL; NUMBERS; and SERIES. He was a founder of the *Quarterly Journal of Pure and Applied Mathematics*, propounded a "theory of invariants," and was distinguished not only for general scientific information, but for his originality and scope of mathematical analysis, that opened new fields of thought. In 1890 he was made an officer of the French Legion of Honor. R.C.A.

CAYMAN. See CROCODILE, Vol. VI, p. 525.

CAYMAN ISLANDS, three islands in the Caribbean Sea, off the south coast of Cuba, nearly in lat. 19° N. They are British possessions, attached to Jamaica, and are governed by a body called "Justices and Vestry." Grand Cayman, on the west, is the largest, and is 17 miles long by 4 to 7 broad, and has a population of about 4,500. Little Cayman is in the center, and Cayman Bræ on the east. Exports are cocoanuts and turtles.

CAYUGA, a village of Cayuga County, central New York, situated on the eastern shore of Cayuga Lake, two miles from its outlet, which is here crossed by a railroad bridge of the New York Central and Hudson River railroad, about a mile long. Population 1900, 390.

CAYUGA, Ontario, the seat of Haldimand County on Grand River, 20 miles from its outlet in Lake Erie, and by rail 25 miles south of Hamilton. Cement, grain and other products are exported. Pop., 1901, 771. C.L.S.

CAYUGA INDIANS, a tribe of North American Indians who originally lived at the foot of Cayuga Lake, New York, and from which they take their name. In the sixteenth century they became a member of the Iroquois, or Five Nations, which afterward, in 1712, became the Six Nations. The stronghold of the powerful Iroquois was in the basin of lakes Erie, Ontario and Champlain. The Cayugas, like the other members of the confederation, preserved their tribal distinctions. They suffered the same decline with the others at the close of the American Revolution. At present the tribe numbers 1,300, and is located, for the most part, near the Grand River, in Ontario, Canada. A few of them are in the Indian Territory and Wisconsin. See *Iroquois*, under INDIANS, Vol. XII, p. 871.

CAYUGA LAKE, New York, extending northward from Tompkins County, between Cayuga and Seneca Counties, is 40 miles long, from 1 to 3½ miles wide, and has a maximum depth of 500 feet. It is 390 feet above sea-level and drains through the Seneca River into Lake Ontario. It is a favorite boating and angling resort, and is traversed by steamers touching at various points, including Ithaca, the seat of Cornell University. C.L.S.

CAZALES, EDMOND DE, educator; born in Grenada-sur-Garonne, France, Aug. 31, 1804. He studied law and became judge-auditor of the tribunal of Province, but after 1829 devoted himself to religious questions, and in 1835 became a professor in the Catholic University of Louvain. He was ordained priest in 1843; was made director of the Seminary of Nimes in 1845, and later became vicar-general of the Seminary of Montauban. After the establishment of the republic, he served two terms in the Chambers. He died in 1876. G.J.H.

CAZENOVIA, an educational village of Madison County, central New York, situated on a small lake 18 miles S.W. of Syracuse. It has some manufactories, and is the seat of Central New York Conference Seminary. Population 1890, 1,987; 1900, 1,819.

CAZIN, JEAN CHARLES, French artist, born at Samer, about 1840; studied under Lecocq de Boisbaudran; went to England, and while there executed his first Salon painting, *Le Chantier*. He is best known as a landscape-painter, but has equal art in the decorative. His *Flight into Egypt; Ishmael; Judith;* and *The Travellers*, are the best known of his works. Died March 27, 1901.

CEANOTHUS, a North American genus of shrubs of the family *Rhamnaceæ*, most largely displayed in California. A common eastern form is the *C. Americanus*, known as "New Jersey tea" or "red-root." Some of the species of the Rocky Mountains and California are tall shrubs or low trees with a profuse display of showy flowers.

CEBALLOS, José, soldier, was born in Mexico in 1830, and became an army officer under the Presidency of Juarez. He at first opposed President Diaz and entered into a conspiracy to overthrow him, which being discovered he was compelled to flee from the country. Later he returned to Mexico, and was made a Senator and governor of the federal district. W.F.J.

CEBIDÆ, a family of apes. See APE, II, p. 134.

CEBÚ, capital of the island of Cebú, Philippine Islands, also a port of entry, post-office, and money-order station. The country in the vicinity is level and fertile. The streets are wide and are laid out on a regular plan. The government house is a good building and the Episcopal palace is large

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and noted for its interior decorations. Outside the town are located a fine cemetery, a large leper hospital, and an artillery fort. It is an important city commercially. Population, 1903, 31,079.

CECIDOMYIA, a gall-making cereal pest. See WHEAT, Vol. XXIV, p. 565.

CECIL, RICHARD, clergyman; born in London, Nov. 8, 1748; died at Tunbridge Wells, Aug. 15, 1810. He was ordained a minister of the Church of England in 1776; minister at St. John's, London, and Risley in Surrey. He wrote a series of biographies, which include some of Rev. John Newton; a series of miscellaneous tracts; a volume of sermons; and a volume of *Remains*, a work eminently useful to ministers.

CECROPIA, a South American and West Indian genus of *Urticaceæ*, known as "trumpet-trees." The pith is divided into chambers, and these partitions being removed, the branches are made into water-pipes and wind-instruments. The wood is very light, and is used to make floats for nets, and by the Indians in kindling fires, by friction against a harder piece of wood. The bast yields a cordage fiber, and the outer bark is astringent. The fruit resembles a raspberry, the buds furnish a potherb and the juice hardens into caoutchouc. The pith-chambers are inhabited by ants, which feed upon small food-bodies formed on the leaf-petioles, and serve as a police-protection against dangerous ants and other insects. The leaves are a favorite food of the sloth.

CECROPIA, a moth of the genus *Platysamia*, widely distributed in the United States. The wings are brown, with a red and black crescent-like spot near the center. The young caterpillars are black, but the mature specimens are of a green color. They construct cocoons of very fine silk. In California an attempt is being made to cultivate the cecropia silk-worm.

CEDAR, BASTARD BARBADOS (*Cedrela odorata*), a tree of the family *Meliaceæ*, a native of the tropical parts of America. It is often upward of 80 feet high, with a trunk remarkable for its thickness. The wood has an agreeable fragrance, and, being light and soft, it is used for canoes, shingles and cigar-boxes. In France it is used in making black lead-pencils. True Barbados cedar is *Juniper barbadensis*, and is of much less importance. The true cedar belongs to the coniferous genus *Cedrus* (q.v.).

CEDAR-BERG, a mountain range in Cape Colony, stretching north and south on the east side of Olifant River valley, in Clanwilliam division. The name is from the plantations of Cape Cedar (*Widdringtonia juniperoides*), which are now, however, being fast destroyed. This is the only locality where this species is found.

CEDAR-BIRD. See WAX-WING, Vol. XXIV, p. 487.

CEDAR CREEK, Virginia, an affluent of the North Fork of the Shenandoah River, forming the boundary between Shenandoah and Frederick counties, midway between the respective county seats, Woodstock and Winchester. It gives its name to the battle fought in the vicinity on the 19th October, 1864, when the Confederate general Early was defeated by Gen. Sheridan. Gen. Sheridan on the 10th October, 1864, encamped on the north bank of Cedar Creek, after commissariat failures had obliged him to retire from the pursuit of Gen. Early defeated at Fisher's Hill on the 22nd September. Called to Washington to consult with the military board, Sheridan left Gen. Wright in command. Reinforced with cavalry and troops, Gen. Early, who had followed the Union forces, attacked early on the 19th September, and inflicted a severe loss in guns and men especially on the Nineteenth Corps, the following up of which, however, was checked by the Sixth Corps under Gen. Ricketts. Wright had reformed his lines when Gen. Sheridan, who had returned from Washington, rode over from Winchester. Soon after noon, Early again assumed the offensive only to be repulsed. Near the end of the afternoon, Sheridan, expecting another attack, ordered a general advance which was obstinately opposed, but at length succeeded in routing the whole Confederate line, which fled across Cedar Creek pursued by the Union troops. The Confederates had 320 dead, 1,540 wounded and 1,050 missing; the Union loss was 644 killed, 3,430 wounded. C.L.S.

CEDAR FALLS, a city of Blackhawk County, northeastern Iowa, situated on the Cedar River, 100 miles W. of Dubuque, on the Burlington, Cedar Rapids and Northern, Chicago Great Western and Illinois Central railroads. It is the seat of a state normal school, and contains oatmeal and paper mills, and various other manufacturing industries, most of them utilizing the water-power obtained from the fall of the Cedar River as it passes through the town. Population 1900, 5,319.

CEDAR KEYS, a seaport and city on one of the Cedar Keys, Levy County, western central Florida; terminus of the Florida Central and Peninsular railroad; 35 miles S.W. of Gainesville, It is on the Gulf of Mexico, and its harbor is formed by several small islands, on one of which stands a lighthouse. The town has an ice factory, a large trade in lumber, oysters and pencil-wood, and has a very healthful climate. Population 1900, 739.

CEDAR MOUNTAIN OR CEDAR RUN, Virginia, eight miles S. W. of Culpeper Court-House, gives its name to the conflict, also called the BATTLE OF SLAUGHTER'S MOUNTAIN, fought here on the 9th August, 1862. The Confederates commanded by Gen. Jackson were attacked by the Union forces under Gen. Banks. A sanguinary battle ended without material advantage to either side. The Union loss was 1,500, the Confederate over 1,300. C.L.S.

CEDAR RAPIDS, a city of Linn County, central eastern Iowa, on the Cedar River, 79 miles S.W. of Dubuque, at the junction of the Chicago and Northwestern and the Burlington, Cedar Rapids and Northern railroads, also on the Illinois Central and on the Chicago, Milwaukee and St. Paul railroads. It is also the terminus of the

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Dubuque and Southwestern railroad. The Coe Collegiate Institute (Presbyterian) is situated here. The rapid current of the river at this point provides ample water-power for flour-mills and various manufactories of machinery, carriages and agricultural implements. It has a pork-packing establishment, and the extensive car-shops of the Burlington, Cedar Rapids and Northern railroad. Population 1890, 18,020; 1900, 25,656.

CEDAR RIVER rises in southeastern Minnesota, enters Iowa at Mitchell County, runs southeast past Waverley, Waterloo and Vinton, and enters the Iowa River some 25 miles above its junction with the Mississippi. Its length has been estimated to be between 375 and 400 miles. It flows through a very fertile prairie region.

CEDAR SPRINGS, a village of Kent County, in the central western part of the southern peninsula of Michigan, on the Toledo, Saginaw and Muskegon and the Grand Rapids and Indiana railroads, 18 miles N. of Grand Rapids. It has a number of lumber-mills. Population 1900, 950.

CEDAR SPRING, a village of Spartanburg County, N. W. South Carolina, about 90 miles N. W. of Columbia, and 4 m. W. of Spartanburg. It has the deaf, dumb and blind state institutions.

CEDARTOWN, Georgia, the seat of Polk County, a farming, mining, and manufacturing center, on Cedar Creek, 65 miles N. of Atlanta, on the East & West, and the Chattanooga, Rome & Southern railroads. Pop., 1900, 2,823. C.L.S.

CEGLIE, a town in Southern Italy, province of of Lecce, 18 m. N. E. of Taranto. It produces grain, olive oil, lime, etc. Pop. 1903, 15,000.

CEILING. See BUILDING, Vol. IV, pp. 452, 453; also, for churches, see ARCHITECTURE, II, p. 405.

CELAKOVSKY, FRANZ LADISLAUS, Bohemian poet and professor of Slav philosophy; born in Strakonitz, March 7, 1799; died at Prague, Aug. 5, 1852. His principal works are *Echoes of Russian and Bohemian Folk-Songs* (1833–40), and a cycle of love-songs and didactic and political poems (1840). He also translated the works of Herder, Goethe and Scott.

CELANDINE, a popular name applied to two dissimilar plants: (1) *Chelidonium majus*, a member of the poppy family, common to Europe and the United States. It is a tall perennial branching herb, with pinnate leaves, and small yellow flowers in umbels. The whole plant is full of an acrid yellow juice, which has some reputation in medicine. Its nearest ally (*Stylophorum diphyllum*) is known as "celandine poppy." (2) *Ranunculus Ficaria*, one of the early "buttercups" of Europe, otherwise known as "pile-wort."

CELAYA, Mexico, a town of the state of Guanajuato, on the Rio Grande de Santiago, at a junction of the Mexican Central and the Mexican National railroads, 12 miles S. E. of Guanajuato. Fine public buildings include the richly decorated Carmelite basilica. Cotton and other textiles, leather and saddlery are manufactured. Pop., 21,300. C.L.S.

CELESTIAL PHOTOGRAPHY. See ASTRONOMICAL PHOTOGRAPHY, in these Supplements.

CELESTINE. See MINERALOGY, Vol. XVI, p. 417.

CELINA, Ohio, the seat of Mercer County, at the outlet of the Wabash from the northwest corner of Grand Reservoir, and a junction for branch lines of the Cincinnati, Hamilton & Dayton, Cincinnati Northern, and the Lake Erie & Western railroads, 32 miles S. W. of Lima. Its industries include lumbering, canning, steel and brick manufactures. Pop., 2,812. C.L.S.

CELLE, a Prussian town. See ZELLE, Vol. XXIV, p. 813.

CELLIER, ALFRED, musician; was born at Hackney, England, on December 1, 1844, of French parentage. He became a composer and conductor, for a time associated with Sir Arthur Sullivan. He wrote a number of operas, chiefly of a light character, including *Charity Begins at Home*; *The Sultan of Mocha; Pandora; The Tower of London; The Mountebanks; Dorothy*, etc. He died on December 28, 1891. W.F.J.

CELL-LIFE, ANIMAL. See EMBRYOLOGY, in these Supplements.

CELL-LINEAGE. See EMBRYOLOGY, in these Supplements.

CELLS. See BIOLOGY, Vol. III, pp. 589–591; MORPHOLOGY, Vol. XVI, pp. 867, 868.

CELLS, DEVELOPMENT OF PLANT. See MORPHOLOGY, in these Supplements.

CELLS, PRIMARY AND SECONDARY. See ELECTRICITY, §97–109, in these Supplements.

CELLULAR CARTILAGE. See ANATOMY, Vol. I, p. 747.

CELLULOID, a dried solution of gun-cotton (pyroxylin) first made at Birmingham in 1856 by W. A. Parkes. It is also known as "Parkensine" and "xylonite." The product is a light yellowish-brown colored body, which can be carved, planed, turned, sawn, stamped, or polished, and made either opaque or transparent. It may be made as hard as ivory, which it closely resembles, but is always elastic, and can be moulded into any form. It is non-explosive and burns only when in direct contact with a flame. The pyroxylin is prepared by treating cellulose (q. v.) from such vegetable materials as cotton, or flax waste, rags, or paper, with a mixture of one part of strong nitric acid and four parts of strong sulphuric acid. The distillate obtained by distilling wood naphtha with chloride of lime is used as a solvent for the pyroxylin, but other solvents, such as nitro-benzol, or aniline and some camphor are added to advantage. When the excess of solvent is removed it is mixed with castor oil, or cotton-seed oil, and made into a dough, or paste, between heated rollers. Consistency depends on the proportions of oil used. The uses of celluloid are infinite. Billiard balls, piano-keys and combs are made of it. In imitation of red coral it can be used for jewelry. It is made into brush backs, knife-handles, buttons, napkin rings, card cases, memorandum books, menu-covers, thimbles and dolls; is useful for surgical and optical instruments and one of its most recent

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applications is for shirt fronts, cuffs and collars. It can be colored to represent amber, tortoise shell, onyx, or malachite. The manufacture of celluloid, although an English invention, has been most largely developed in the United States. It is also made in France. W.R.B.

CELLULOSE ($C_6H_{10}O_5$), a carbo-hydrate, known also as *lignin*, which constitutes the solid framework of plants and occurs to some extent in the animal body. It is amorphous, tasteless, inodorous, insoluble in water, alcohol, ether, dilute acids, and alkalis. The name, introduced by Payen, has become the type of other chemical terms in –OSE. Although so universal a characteristic of vegetable life, the conditions of its formation are still very obscure. From the passive, cellulose-walled condition to an active and wall-less one, which is characteristic of the lowest forms of life, it would appear that there is some relation between the passive state and the formation of cellulose. Thus arises the speculation that it may be a mechanically coherent and useful secretion, a utilized waste product, corresponding to the carbonic acid and water given off by the completer respiratory oxidation and larger evolution of energy of the active phase.

Cellulose is chemically allied to sugar, dextrine and starch, but differs from these in the following particulars. Sugar and dextrine are soluble in cold water and occur in the cell-sap in the solution; starch is insoluble in cold water, and is found in granules in the cell contents; while cellulose is insoluble in cold, or boiling water, and is only slightly soluble in strong mineral acids, its only perfect solvent being a solution of oxide of copper in ammonia. From this solution it may again be precipitated in unchanged chemical form. It is obtained in a pure state by treating any unaltered cellular tissue with alkalis and acids to remove mineral matter and protoplasm and successive washings with water, alcohol and ether, to remove soluble substances. Iodine stains cellulose yellow or brown, but blue when strong sulphuric acid has been previously added; strong hot sulphuric acid clears it, while brief immersion in the cold converts it into a tough and dense modification well-known as vegetable parchment paper, and prolonged treatment dissolves it altogether. By heating it in closed vessels under pressure a dense coal-like mass is formed, while in ordinary dry distillation, gas tar and acetic acid and are given off, processes that throw light on the formation of coal in nature and on the chemistry of gas-making. By immersion in a mixture of strong nitric and sulphuric acid it is converted into a nitrate known as gun-cotton (q. v.), while dilute nitric acid, or potash oxidizes it into oxalic acid. A solution of gun-cotton in a mixture of ether and alcohol produces collodion. Cellulose possesses the quality of swelling up enormously when it absorbs water, hence it is utilized in warships as a measure of safety in battle. Prepared from corn pith, an inner belt of it is laid below the water line, some three feet in thickness. Should the vessel's side be penetrated by a shot the inrush of water causes the cellulose to swell up and close the hole completely. It is used in the navies of the United States, France, Japan and Russia. See BIOLOGY, Vol. III, p. 598; GUN-COTTON, Vol. XI, p. 245; PHYSIOLOGY OF PLANTS, Vol. XIX, p. 50; VEGETABLE HISTOLOGY, Vol. XII, p. 12. W.R.B.

CELLULOSE SILK. See SILK, ARTIFICIAL, in these Supplements.

CELMAN, MIGUEL JUAREZ, Argentine Republic statesman; born in Cordoba, Argentine Republic, September, 1844; governor of the province of Cordoba in 1880; a member of the National Congress in 1884. He was elected President of the republic in 1886, and retained the office until 1890, when he was compelled to resign, owing to the national financial panic and bankruptcy, the blame for which was laid on Celman and his Cabinet.

CELSUS, AURELIUS CORNELIUS, physician. See ANATOMY, Vol. I, p. 703.

CELT, the name by which certain weapons or implements of early inhabitants of western Europe are known among archæologists. The term is generally applied to a stone instrument of wedge-like form found in barrows and other repositories of Celtic antiquities. See ARMS AND ARMOR, Vol. II, p. 485.

CELTIC CHURCH. See CELTIC LITERATURE, Vol. V, pp. 263–266; CULDEES, Vol. VI, p. 613.

CELTS OR KELTS. See CELTIC LITERATURE, Vol. V, pp. 258–265.

CEMBRA PINE. See PINE, Vol. XIX, p. 114.

CEMENTATION, a process in metallurgy. See IRON, Vol. XIII, pp. 349–353.

CEMENTITE. See IRON AND STEEL, in these Supplements.

CEMETERIES, NATIONAL. There are eighty-three cemeteries kept in condition and cared for by the United States government. In such cemeteries are buried soldiers and officers who have died in battle during a war, or who have died while in active service. Special provisions are made at times to provide for the burying there of ex-soldiers who die paupers. These eighty-three national cemeteries are scattered throughout the states of the Union, but are principally near the larger battle-fields of the Civil War, and near United States army posts. They are in charge of the quartermaster's department.

CENIS, MONT, France, a mountain in the department of Savoie, on the Italian border at the junction of the Cottian and Graian Alps. Its highest peak is 11,454 feet above sea-level; the pass reaching a height of 6,773 feet has been famous since Roman days. The military road 30 miles long built over it by command of Napoleon I from Lans-le-Bourg to Susa in Italy, has lost its importance since the construction between 1856–71 of the railway tunnel 7½ miles long connecting France with Italy. C.L.S.

CENOZOIC, CAINOZOIC OR CÆNOZOIC PERIOD. See GEOLOGY, Vol. X, pp. 319–324.

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CENSER (Lat., *incendo*, to burn), a vase, or other sacred vessel used for burning perfumes. The censer, as used in religious services, is intended to typify devotion and prayer. Censers were much used in the Hebrew service of the temple. In the Romish Church the censer is called a "thurible" from the Lat. *thuribulum*, a word derived from *thus*, meaning frankincense, and is used at mass, vespers and other offices. W.R.B.

CENSORSHIP OF THE PRESS. See BIBLIOGRAPHY, Vol. III, pp. 569, 570; PRESS LAWS, Vol. XIX, pp. 729–733.

CENT, in the United States, Canada, and other British colonies, a cent is the hundredth part of a dollar, a copper coin nearly equal to the halfpenny of Great Britain. The coin, $\frac{1}{100}$ of a dollar, was ordained by the Continental Congress on August 8, 1786. The Dutch cent is a copper coin, the hundredth part of a guilder. W.R.B.

CENSUS (TWELFTH) OF THE UNITED STATES. In the last session of the 55th Congress an act was passed (approved Mar. 3, 1899, by the President), for the taking of the Twelfth Census in 1900. For the expenses of the undertaking a million dollars were appropriated, the work to be done by some 40,000 enumerators, under 300 supervisors appointed by the President and confirmed by the Senate. On Mar. 4, 1899, ex-Governor Wm. R. Merriam, of St. Paul, Minn., was nominated Census Director, with Mr. F. H. Wines, of Illinois, as assistant-director. The specific work of the Census is to inquire into, collect and tabulate statistics, concerning the population of the United States, its mortality, the products of agriculture and the statistics relating to the manufacturing and mechanical establishments throughout the nation. This work was done during the year 1900 and schedules prepared in accordance with the requirements of the law. The new census gives the total population of the United States for 1900 as 76,303,387, an increase of 13,681,137 over the returns for 1890.

CENTENNIAL EXHIBITION. See EXHIBITION, Vol. VIII, p. 703; and WORLD'S FAIRS, in these Supplements.

CENTER COLLEGE, an educational institution for men at Danville, Kentucky; organized in 1819; is under the auspices of the Presbyterian Church. The president is Rev. W. Clark Young. In 1899, there were 17 in the faculty, 242 students, and a library of 12,535 volumes.

CENTER OF GRAVITY. See GRAVITATION, Vol. XI, p. 62.

CENTER OF OSCILLATION. See CLOCKS, Vol. VI, pp. 14, 15.

CENTER OF PERCUSSION. See MECHANICS, Vol. XV, p. 780.

CENTERING, a framework used by masons and bricklayers, upon which an arch, or vault, of stone, brick or iron is supported during its construction. This is merely made of a couple of boards having a curving edge on which the bricks, or stones of an arch are supported until they are keyed in. In the building of bridges, or of constructions where great space has to be spanned, the centering is usually made of framed timbers and iron, so constructed that the strain upon each will be mainly a thrust in the direction of its length. W.R.B.

CENTERVILLE, Iowa, the seat of Appanoose County, underlaid by a wide extending coal-field, 90 miles southeast of Des Moines City. It is entered by branch lines of the Chicago, Rock Island & Pacific, the Iowa Central, and the Keokuk & Western railroads, and exports coal and farm produce. Pop., 1900, 5,256. C.L.S.

CENTERVILLE, a town and the capital of Queen Anne County, central western Maryland, on the Corsica Creek, where it enters an arm of the Chester River inlet; on the Philadelphia, Wilmington and Baltimore railroad; 36 miles by water S.E. of Baltimore. It has a considerable oyster trade; marl is found in the neighborhood. Population 1890, 1,309; 1900, 1,231.

CENTIGRADE THERMOMETER. See THERMOMETER, Vol. XXIII, p. 309.

CENTNER, in metallurgy, a weight of 100 pounds; the pound is divided into 32 parts or half-ounces, the half-ounce into two quarters, and each of these into two drams. In many European countries centner is a common name for a hundredweight, but the centner of Germany, Austria, Sweden, Denmark and Switzerland is now fixed at 50 kilos, or 110.23 pounds avoirdupois. The cental (100 pounds) of the United States and Great Britain is often called centner.

CENTRAL AMERICAN ANTIQUITIES. See AMERICA, Vol. I, pp. 608, 609.

CENTRAL CITY, Colorado, the seat of Gilpin County, in the Rocky Mountains, at the terminus of the Forks Creek to Central City branch of the Colorado & Southern railroad, 40 miles northwest of Denver. It has gold mines, sampling and milling works, and a supply and distributing trade. Pop., 1900, 3,114. C.L.S.

CENTRAL CITY, capital of Merrick County, southeastern central Nebraska, on the Platte River, and on the Burlington and Missouri and the Union Pacific railroads; by the latter, 132 miles W. of Omaha. The surrounding country is fertile, producing principally grains and hay. Population, 1890, 1,368; 1900, 1,571.

CENTRAL FALLS, Rhode Island, a manufacturing city of Providence County and a suburb of Providence six miles north on the Blackstone River, entered by the Worcester and Boston divisions of the New York, New Haven, and Hartford railroads. It has factories for canned goods, paper boxes, thread and yarn, carriages, machinery, textiles, etc. Pop., 1900, 18,167. C.L.S.

CENTRAL FORCES When a body is once in motion, unless it be acted upon by some force, it will move uniformly forward in a straight line with unchanged velocity If, therefore, a body moves uniformly in any other path than a straight line — in a circle, for instance — this must be because some force is constantly at work which continuously deviates it from this straight line. If the deviating force acts toward a point, as, for

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example, the force of gravity in the case of planets, the force is called a *central force*.

CENTRALIA, Illinois, a city of Marion County, on Crooked Creek 58 miles S.E. of St. Louis, at the junction of the Centralia & Chester with divisions of the Jacksonville, Louisville & St. Louis, the Illinois Central, and other railroads. It is the market and distributing center of the grain and fruit raising industries of southern Illinois, and has exposition grounds, railway repair shops, mining industries, and glass, box, and other factories. Pop., 1900, 6,721. C.L.S.

CENTRALIA, Washington, a city of Lewis County on the Chehalis River and the Northern Pacific railroad, 4 miles north of Chehalis. It exports coal, lumber, wood wares, fruit, dairy products, etc. Pop., 1900, 1,600. C.L.S.

CENTRALIA, a city of Wood County, central Wisconsin, on the Wisconsin River, directly opposite Grand Rapids, and on the Chicago, Milwaukee and St. Paul, the Green Bay, Winona and St. Paul and the Port Edwards, Centralia and Northern railroads. It has several manufactories, principally of wooden articles. Population now included in Greater Grand Rapids city.

CENTRALIA, Missouri, a city of Boone County, 21 miles N. E. of Columbia on the Wabash, and the Chicago & Alton railroads. It is the market center of an agricultural and stock-raising region. Pop., 1900, 1,722. C.L.S.

CENTRAL PARK. See NEW YORK, Vol. XVII, p. 478.

CENTRARCHIDÆ, a family containing 10 genera of perch-like fresh-water fishes, of which the North American genus *Centrachus* is a type. All are carnivorous. R.W.C.

CENTRIFUGAL AND CENTRIPETAL, terms used in botany to define two different kinds of inflorescence, or modes of flowering in plants. Where the central flower bud is the first to expand and the others are developed in succession from the center outwards the inflorescence is said to be centrifugal. When the outermost flowers expand first, the inflorescence is centripetal, as is the case in catkins, in which the flowers nearest the base are the first to expand. W.R.B.

CENTRIFUGAL AND CENTRIPETAL FORCES. See MECHANICS, Vol. XV, p. 689.

CENTROSOME. See CENTROSPHERE, in these Supplements.

CENTROSPHERE, in botany, a name applied to a cell-body closely associated with the nucleus. Centrospheres usually occur as a pair of spherical bodies in contact with the nucleus, each of which consists of a small dense central body (*centrosome*), surrounded by a clear layer, and limited by granular substance. The centrospheres are observed to play an important part in nuclear and cell-division, in consequence of which they are often called "directive spheres"; also called "asters" from the fact that they are centers of radiating lines of structure. Their exact nature and function are still obscure. In fact, it is a question whether the centrosome is not the only essential part, and the rest of the somewhat indefinite so-called centrosphere simply a portion, of the cytoplasm. See figure under KARYOKINESIS, in these Supplements.

CENTURIES OF MAGDEBURG, Protestant ecclesiastical annals. See CHURCH HISTORY, Vol. V, p. 668.

CENTURY, in modern usage, a period of 100 years. It is also used figuratively of any long period of time. The term was used originally in reference to a division of the Roman tribes for the election of magistrates, passage of laws, etc., in which the voting was done by centuries (companies of 100 men each). It was soon applied to a company of cavalry; a division of the Roman army. See ROME, Vol. XX, pp. 753, 754.

CENTURY PLANT (*Agave Americana*), or "American aloe" belonging to the order *Amaryllidaceæ*, a giant tropical herb known as *maguey* in Mexico. It has no stem but consists of a crown of large, fleshy, spiny leaves, from the midst of which shoots up a straight stem from 24 to 36 feet high, at the base often a foot in diameter, with a terminal panicle, often bearing as many as 4,000 flowers. The juice not only yields sugar, but when fermented becomes *pulque*, a kind of cider, and when distilled becomes *mescal*, an intoxicating spirit, both highly popular beverages. See ALOE, Vol. I, p. 525. W.R.B.

CEPHALOPODA. See MOLLUSCA, Vol. XVI, pp. 689–710.

CEPHREN, CHEFREN OR KHAFRA, an Egyptian king. See CHEPHREN, Vol. V, p. 506.

*CERAMIC ART.—*Its Development in the United States since 1880.* Ceramic art, or the department of the plastic and decorative arts which deals with objects made of clay, has been developed to its present degree of excellence in the United States practically within the last twenty years. The chief causes contributing to bring about this rapid advance were the Centennial Exhibition of 1876 and the tariff act of 1883. The former event, with its extensive exhibit of European pottery, opened the eyes of the American manufacturer to his own inferiority, and fired him with the spirit of emulation; the latter, by rendering practicable, commercially, the production of finer wares, gave opportunity for the acquirement of that practice and experience which has since ripened into an established and perfected ceramic art in America. Imitation was the first and most natural characteristic of the attempt to introduce grace and beauty into the homely practice of utilitarian potting. The first effects of this movement were seen in the occasional production of ornamental single pieces, patterned closely upon the famous faience of Limoges, or the oddly shaped, gorgeously decorated wares of Japan, and in a gradual, though marked, refinement in the bodies of the dense and cumbrous stone and earthenwares which had contrasted so clumsily in 1876 with the delicate porcelains and semi-porcelains of Worcester, Doulton and Sèvres. A marked improvement in the handling of glazes and more frequent use of colors, both body and relief, man-

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ifested themselves at this time. Commercially, the demand for artistic wares was still imperfectly met by the liberal use of bands and lines, and the introduction of a few very cheap and common-printed patterns, mainly for toilet-ware. Until 1883 these conditions continued to prevail; porcelain was produced in quantity by two factories only; plain and cheap-printed wares made up the bulk of the crockery produced; and artistic ornamental pieces of any pretensions to excellence of shape or decoration were produced only by a few enthusiastic experimentalists and at prohibitive prices.

The first and most difficult step in the evolution of American ceramics was the substitution of a lighter and more vitreous body for the heavy earthenwares then being fired. From the ordinary yellow, cream-colored and white granite bodies, a great variety of intermediate consistencies has been developed, ranging all the way up through the semi-porcelains and porcelains to the fairy-like fragility of the Belleek or egg-shell china. Ivory-finish and underglaze print decorations, fashioned more or less upon the Japanese school, were the earliest original forms of artistic pretensions, and they were speedily followed by an increased attention to modeling and the production of shapes differing from the stereotyped forms hitherto almost universal. Heavy, colored and transparent glazes were slowly introduced, blended upon harmoniously tinted bodies. Rich mazarine-blues, relieved with paste and gold decoration in stipple and solid, were among the more handsome of the early achievements of the improving art. Majolica, in shapes which showed considerable originality of design and artistic treatment, was also soon produced. Spurred by a growing public demand for art in even the every-day form of pottery, printed and colored decorations supplemented the earlier lines and bandings, and the decorating-shop, employing girls and women, became a part of every pottery. The transference of the design from the copperplate to the wares it was intended to decorate was accomplished by taking upon tissue-paper, with specially prepared ink, an etching from the plate. This, while still wet, was applied to the surface of the biscuit-ware, glaze applied over it in turn, and the whole fired, the transparent glaze protecting the design and rendering it permanent. Where colors were further used, the printed ware after firing went to the decorating-shop, where deft-handed and skillful girls and women filled in with their brushes those portions of the design requiring embellishment, and the ware was again fired in what is technically called the "enamel-kiln." The growth of decoration in American pottery is best shown in the fact that where, only a few years prior to 1880, one man could do, and did, the decorating for every pottery in Trenton, which city produces almost one half of the goods made in this country, there are to-day over four hundred decorating-kilns in the potteries of the United States. The economic changes resultant upon the development of American ceramics, as seen in the increased production and importance of decorated wares, are more properly discussed under the heading of POTTERY INDUSTRY (q.v., in these Supplements), the manifestations of the dirigent and artistic forces active in shaping ceramic progress being more exclusively within the province of this article. The manufacture of Belleek porcelain, so called after the little Irish town where its manufacture has long been famous, was begun in this country, in Trenton, about 1882. It is the most fragile ware known, and is, hence, often spoken of as egg-shell china, and is noted for its lightness and translucency of body, as well as the pearly lustrousness of its glaze. Originally produced almost exclusively in fancy shell-like designs, American manufacturers have developed it to a distinctive degree in graceful and simple forms having the most artistic decoration. The extreme thinness of this ware prevents its handling by the potter in the plastic clay, and it is made by the casting process, slip or clay mixed with water, of the consistency of cream, being poured into plaster molds, where, a portion of the water being absorbed by the porous mold, a thin coating of the clay or body adheres to the sides, and after being sufficiently dried, can be removed and fired. Besides vases and other ornamental forms, this ware is now made in the most exquisite of cream-jugs, pitchers, cups and saucers, ice-cream holders, etc. In its decoration a new feature has been developed by the carving in relief of exquisite tracings and designs upon the unbaked body. The extreme thinness of this body, which renders the work much like carving brittle egg-shell, imparts, owing to its translucency, a soft moonlight effect to the whole, of indescribable beauty. In the Belleek porcelains, or egg-shell chinas, American manufacturers are to-day producing wares which are fully equal to and sell at as high prices as the best of the imported goods.

Of the other wares distinctively the outcome of the ceramic development of twenty years, and the product of the potteries, exhaustive discussion would require far too great a space. Descending the scale of fineness from Belleek, the porcelains and semi-porcelains run through all the varieties of vitrified, thin, Indian, bone, translucent, and hard chinas used in every kind of useful and ornamental ware, including table-service pitchers, jugs, vases, punch-bowls, candelabra, clock-cases, lamp-bodies, plaques, ornamental figures and fancy designs. In their modeling and decoration has been developed the highest form of the potter's art. The rich iridescence of the nacreous Belleek glaze over the soft-toned body-tints; the true overglaze colors and white enameled porcelain table-service wares; the silver and gold raised paste and relief work in exquisitely modeled traceries, sprays and figures; the deep, rich body-colorings, of every degree of mellowness and brilliancy; the soft ivory and vellum finishes; the mellow and marble-textured Parian,—all executed with most admirable art and chasteness of color, modeled with a purity of form and graceful sim-

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plicity of shape scarcely excelled by the most celebrated European designers, are the evidence visible to-day of the progress the American potter and ceramic artist has made. And in no branch of artistic endeavor has success been attained by such untiring patience, long and discouraging experiment and research, and the expenditure of such large sums without return, as in this branch of the fictile art. Every piece from the potter's hand, bearing the work of the decorator and glazer, must ultimately be proved, not once and twice, but often thrice, in the fierce heat of the great kilns. Materials must be mixed so that a degree of heat or a second of time shall determine their future consistency, and glazes with known co-efficients of expansion must be adjusted to the varying bodies, while even the mineral colors must be considered by the heat they must withstand.

Besides the porcelains, the greatest artistic success has been attained, perhaps, in the manufacture of faience, several true varieties of which are now made in this country, and to which the application of heavy colored glazes in rich transparent tones of amber, olive, red, black, green, and brown has been most successfully made in jardinières and heavy pieces, while the famous goldstone, tiger's eye and reflecting glazes, together with excellent *pâte-sur-pâte* work, have produced vases and ornamental pieces of rare and exquisite beauty. Decoration in colored slip has especially been carried to a point closely approaching the famous work of Limoges. Red earthenware, hammered and decorated with hand-modeled sprays and figures, or incised and inlaid with white clay in vivid mosaic, has been produced, in addition to the more familiar relief-patterns in this ware. Stoneware with incised decoration and relief-designs is also being made at the present time quite equal in shape and design to the well-known Doulton product. Rococo-relief and gold and colored decorations in porcelain clock-cases and candelabra are also among the promising American productions of later times.

Apart from the production of the pottery proper, a most important branch of the ceramic art, and one in which America to-day leads the world, is the manufacture of art and ornamental tiling. The introduction of the so-called "damp-dust" process, by which the dry, powdered clay, slightly moistened, is subjected to great pressure in dies containing the design, revolutionized the manufacture of tile. Within the four years preceding 1880 this branch of ceramics leapt from obscurity into the front rank of excellence. The process of manufacture after the impression has been taken, as above described, is to fire the tile and afterward glaze or enamel it in delicate colors. The old "wet-clay" process is still used in the so-called plastic sketches, and in some of the encaustic or inlaid floor-tiles. The plastic sketch is almost a picture in clay, and is the highest development of artistic modeling. Panels in relief and intaglio, embossed, enameled and printed tiles, and all the infinite variety of many piece-friezes and facings, are now produced for interior decoration, together with floor-tile, glazed and unglazed, in arabesque, mosaic and damask-finished effects. In the modeling of the many designs, and particularly in the so-called plastic sketch-work, a new and intermediate school of art, combining the painter and the sculptor, has been developed.

The increased use of tiling for interior decoration has been accompanied by a similar growth in the utilization of terra-cotta and ornamental brick for architectural purposes. The development of this branch of ceramics has been greatly aided by the reduced freight rates of later years. The different colored clays found throughout the country can now be obtained in the required quantities at sufficiently low rates by the manufacturer to enable him to produce terra-cotta, the most enduring of all building materials, at a reasonable price. The modeling of the designs for this material has been carried to a point of great artistic excellence, panels, mantles, supports, gargoyles and other architectural details, as well as ornate garden vases and statuary, being supplied in well-conceived forms. Red, buff and white are among the leading colors in architectural terra-cotta, but it is developing steadily in shades harmonious with the brick now being produced.

These last are the latest manifestation of the development of the public taste and of ceramic art, and, in their yellow, buff and soft white tones, are a great improvement in the architectural landscape Glazed and enameled fire-brick of a variety of shades are also being produced extensively. The enameling process is jealously guarded by the manufacturers as a trade secret, the composition of the peculiar enamel required being known to but a few. See POTTERY, Vol. XIX, p. 617, and in these Supplements.

W. D. WILLES.

CERAMICUS OR CERAMEICUS, an Athenian suburb. See ATHENS, Vol. III, pp. 4, 9.

CERASTES OR HORNED VIPER. See ASP, Vol. II, p. 624.

CERATITES, a genus of cephalopod mollusks, belonging to the family *Ammonitidæ*. The sutures are complex and the lobes serrated. They are found, as fossils, in Mesozoic formations.

CERATODONTIDÆ, one of the four families of the sub-class *Dipneusti* or *Dipnoi*—or lung fishes. There are two genera in the family, one of which, *Ceratodus*, lived in Mesozoic times and is now extinct; the other, *Neoceratodus*, now lives in the rivers of Queensland, having been discovered there in 1870. The former genus includes several species that have been identified by their fossilized remains found in England, Germany, India, South Africa, and North America, while the genus *Neoceratodus* is represented by but a single species, *N. forsteri*. It grows to a length of five or six feet and has an elongated and compressed body. P. W.C.

CERCARIA, a name applied to one of the larval stages of certain trematode worms, as the

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liver-fluke (*Distomum*). It was formerly supposed to be a distinct animal. See TREMATODA, Vol. XXIII, p. 570.

CERCIS CANADENIS. See JUDAS TREE, Vol. XIII. p. 771.

CERCOCEBUS, a genus of monkeys to which the mangabys and green monkeys belong. They are found chiefly in Asia and Africa. R.W.C.

CERCOPITHECUS. See APE, Vol. II, pp. 132, 136.

CERDOCYON, a genus of *Canidæ*, apparently intermediate between dogs and foxes, sometimes known as aguara foxes, natives of South America. Their aspect is thoroughly vulpine, as are also their manners. Some of them add to the dispositions of ordinary foxes a singular propensity to steal and secrete brilliant and gaudy objects. Some are natives of the coldest parts of South America, and have a rich fur.

CEREALS, in the United States. See AGRICULTURE, in these Supplements.

CEREBELLUM. See ANATOMY, Vol. I, pp. 765, 766; PHYSIOLOGY, Vol. XIX, p. 44.

CEREBRATION, UNCONSCIOUS. It has been definitely proven by Hudson that man possesses a dual mind, the conscious and sub-conscious. The conscious mind guides us in the everyday affairs of life; it learns only by experience. The sub-conscious is what is known as intuition; it is the mind that dreams; it is the seat of perfect memory, of imagination and emotion. Musical and mathematical prodigies prove its existence. It absorbs intelligence by telepathy, is extremely amenable to suggestion, and in the case of hypnotized individuals, obeys commands without question, and will accurately and intelligently discourse in foreign languages unknown to the same individual's conscious faculties. All this activity of the sub-conscious mind is unconscious cerebration, which was formerly explained as "the result of molecular changes in the cerebrum, without consciousness on our part until the fully elaborated mental result is presented." W.R.B.

CEREBRIN OR CEREBRIC ACID, an organic acid of very complex composition, found in the liver, blood and nerves, but especially in the brain of animals. It is composed chiefly of carbon, oxygen and hydrogen, with small amounts of nitrogen. It is a white solid of a fatty nature, obtainable in crystalline grains, soluble in boiling alcohol or ether, but insoluble in cold ether. The symbol is $C^{80}H^{120}N^{2}O^{16}$.

CEREBRO-SPINAL FLUID. See ANATOMY, Vol. I, p. 759.

CEREOPSIS, a genus of birds to which the New Holland goose belongs. See GOOSE, Vol. X, p. 692.

CERES, a planetoid. See ASTRONOMY, Vol. II, p. 705.

CEREUS, a plant. See CACTUS, Vol. IV, pp. 555, 556.

CERITHIUM, a genus of gasteropod mollusks with numerous and highly variable species. It is said to have led Lamarck to speculate upon the origin of species.

CERIUM. See CHEMISTRY, Vol. V, p. 470.

CERNUSCHI, HENRI, political economist; born in Milan, Italy, in 1821. He was a member of the assembly that proclaimed the Roman republic in 1848. After the restoration he became a naturalized French citizen, engaged in banking and industrial affairs, acquired enormous wealth, and became a large shareholder in *The Siècle*, newspaper. An ardent bimetallist, he published *Silver Vindicated*, *Gold and Silver*, etc. He died in Mentone, May 11, 1896. G.J.H.

CERRO DE POTOSI, a mountain rich in ores. See BOLIVIA, Vol. IV, p. 13.

CERRO GORDO, Mexico, the name of several mountains both in Mexico and other parts of Spanish America. Cerro Gordo in the mountain plateau 62 miles W.N.W. of Vera Cruz, the pass of which is now traversed by the Mexican International railroad to Mexico City, is celebrated as the scene of the defeat of the Mexicans by the United States troops, April 18, 1847. General Scott, with 9,000 men, advancing on Mexico City, was here opposed by Santa Anna at the head of 13,000 men and captured the pass by a general assault, making 3,000 Mexicans prisoners. The United States loss was 63 killed and 386 wounded. C.L.S.

CERROS OR CEDROS, an island off the coast of Lower California, lat. 28° 20′ N., lon. 115° 20′ W., belonging to Mexico. It is rugged and sterile, except at the northern end, where there is some vegetation, and herds of goats are plentiful. The surrounding sea abounds in fish, oysters and lobsters.

CERTHIADÆ, a family of birds. See TREE CREEPER, Vol. XXIII, pp. 567, 568.

CERTIFICATE, in the law of England and of the United States, is a written statement by a person having a public or official *status* concerning some matter within his knowledge and authority. In the United States the word is commonly applied to any formal statement made by a public servant in the execution of his duty, as by a collector of taxes, a postmaster, etc.

CERTIORARI, Latin, "to make more certain," is the name of an important writ, which is used in both civil and criminal courts in the United States, the use of which is to bring before a superior court for review the findings of a lower court. Under it all the proceedings of the lower court are subject to review, and the higher tribunal may determine whether the other had jurisdiction in the case, and whether the case was decided according to the facts, the law, and justice. It is often used for compelling a change of venue, when the superior court is convinced that justice cannot be expected in the court of first resort. In most of the states statutory provision is made for the issuance and execution of the writ, but where there is none, the writ is still regarded as one of the inherent powers of a court. There is an obvious parallel between the writ of *certiorari* and that of *habeas corpus*, the one dealing with a legal cause as the other deals with the person of a prisoner. In English jurispru-

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dence the *certiorari* has largely supplanted the *habeas corpus*, especially since the abolishment of imprisonment for debt. Its purpose there, as in America, is to remove a case from a lower to a higher court, and the removal may be effected either before or after the rendering of judgment by the lower court. Either party to a cause may sue out the writ, but there are certain limitations of time, and provisions for security for costs. The writ is also a right of the Crown in criminal prosecutions, to remove an indictment to the King's Bench. W.F.J.

CERUMEN (Lat., deriv. of *cera*, wax), or ear-wax, a wax-like substance secreted by certain glands in the external auditory canal; acts as a lubricant; possesses a peculiarly bitter taste, which is supposed to prevent insects from entering the auditory canal.

CERUSITE ($PbCO_3$), native carbonate of lead, a white crystalline mineral. W.R.B.

CERVERA Y TOPETE, DON PASCUAL, Conde de Jerez, Marques de Santa Ana, Spanish naval officer, born in Madrid in 1832. On his mother's side he comes from a stock whose name, Topete, has for generations been renowned in Spanish naval annals. His uncle, Admiral Topete, was one of Spain's naval heroes. From early childhood Cervera showed an inclination for a naval career, and he passed his examinations with ease, and gradually rose step by step until he reached the highest post in the Spanish navy. He won promotion under Prim in the war with Morocco in 1859–60, and subsequently did valuable service in the Philippines. In 1862 he was sent to Cochin China, as captain of a warship, and in 1868 to Peru. In 1870 he was sent to Cuba to take charge of the blockade, the "Ten Years' War" being then in progress. At one time he was naval attaché at Washington, where he learned to speak English fluently. Later he was Minister of Marine, and in 1887 he was made admiral. When the war with the United States broke out, Cervera was appointed admiral of a squadron which was ordered to cross the Atlantic. He reported officially that the squadron was in an utterly inefficient condition, and that to take it into Cuban waters would be to court certain destruction. He obeyed orders, however, and arrived in Santiago harbor, Cuba, May 19, 1898, where, seven days later, he was blockaded by a United States squadron. On July 3, Cervera, in obedience to positive orders from Captain-General Blanco at Havana, and in spite of his own belief that he was going to certain destruction, bravely left the harbor and attempted to get past the American blockading fleet. His squadron, however, was overtaken and destroyed; his flagship, the *Maria Teresa*, took fire and was beached; and he himself, though wounded in the arm, jumped overboard and, with his son's assistance, made his way to a life-raft. He was taken on board the *Gloucester*, where he surrendered to Lieutenant-Commander Wainwright. He was kept in honorable captivity as a prisoner of war, at Annapolis, Md., until the signing of the peace protocol on Aug. 12, 1898, when he was released, and on September 13th he sailed for Spain, where he received an enthusiastic welcome from the people.

ADMIRAL CERVERA.

CERVIDÆ. See DEER, Vol. VII, pp. 22–24.

CERVIN, MONT, same as the MATTERHORN, q. v., in these Supplements.

CESALPINO. See CÆSALPINUS, Vol. IV, p. 562.

CESNOLA, LUIGI PALMA DI, archæologist, was born in Sardinia, Italy, on July 29, 1832, and served in the Sardinian army in 1849, and in the Crimean War. He came to America and served in the Civil War. When United States consul to Cyprus he brought to America a number of statues and other antiquities, which he placed in the Metropolitan Museum of Art in New York. He has been director of that museum since 1877, and has published a book descriptive of his researches in Cyprus. W.F.J.

CESPEDES, CARLOS MANUEL DE, was a native of Cuba, but was educated in Spain, and rose to prominence as a lawyer and politician. He was involved in several revolutionary movements in Spain, and then returned to Cuba, where he put himself at the head of the Ten Years' Rebellion and was chosen president of the Cuban Republic. He is supposed to have been murdered in 1874. W.F.J.

CESSPOOL, a cistern excavated to receive the soil from a water-closet, kitchen sink, etc., usually made to retain the solid matter and allow the liquid to escape. It should be lined with brick, ventilated and cleaned out regularly. W.R.B.

CESTODA. See TAPE-WORMS, Vol. XXIII.

CESTUI QUE TRUST, in law, is a person for whose use another holds the title to real or personal property. See TRUST, Vol. XXIII, pp. 633–637.

CESTUS, a belt or girdle, worn by Greek and Roman women, placed between the "cingulum" and the "zone." The cestus of Venus was famed in mythology. A similar name, though of different origin, was given to the boxing-gloves worn by classic prize-fighters. W.F.J.

CETEOSAURUS OR CETIOSAURUS, a genus of large dinosaurian reptiles belonging to the Lower Lias. It reached 50 feet in length.

CETEWAYO OR CETSHWAYO, a Zulu king, noted for his resistance to the British in 1879. On Jan. 22 he surprised and massacred the 24th regiment at Isandula, and attacked Rorke's Drift; was defeated by Lord Chelmsford at Ulundi, on July 4th, and was captured and sent to England; was restored to part of his dominions in 1882, but in 1883 his subjects drove him out; gave himself up to the British, who kept him until his death, Feb. 8, 1884. See ZULULAND, Vol. XXIV, p. 868.

CEYLON. (See CEYLON, Vol. V.) Area, 25,365 sq. miles; pop. (1901), 3,576,990; capital, Colombo, pop. (1901), 158,093. Until recently the chief production for export was coffee, but now more attention is paid to tea, cinchona, cocoanut and other palms. There are 298 miles of railway in operation. The revenue for 1900 was 27,325,930 rupees, the expendi-

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ture 28,948,925 rupees. There are 826,147 acres of pasture-land, and under cultivation 2,331,948 acres, of which 753,872 are devoted to rice and other grains; 19,023 to coffee; 424,856 to tea; 864,296 to cocoanut-palms; 39,486 to Palmyra palms; 749 to chincona; 11,127 to tobacco; and 46,117 to cinnamon. The live-stock of the island in 1898 included 4,127 horses, 1,310,447 cattle, 163,987 goats, and 83,620 sheep. Plumbago is a valuable mining product, and in 1898 there were 1,692 plumbago-mines. In 1891, the product of the pearl-fisheries was valued at 960,000 rupees. Since then the value has been very small. In 1900, the imports were 122,339,758 rupees, and the exports, 108,926,257 rupees.

CEZIMBRA, a town in Estremadura province, Portugal, on the Bay of Setubal, 18 miles S. of Lisbon. It has active fisheries. Pop. about 3,700.

CHABANEAU, JEAN-EUGÈNE-CAMILLE, French philologist; born at Nontron, in Dordogne, March 4, 1831; while in the postal department, became interested in the study of dialects, and attracted such attention by his writings that in 1879 he was appointed professor of the French language in the middle ages at Montpellier. He wrote a *Grammar of the Peasantry; Unpublished Poems of the Troubadours of Périgord; Provincialisms*, etc.

CHABAS, FRANÇOIS-JOSEPH, French Egyptologist; born Jan. 2, 1817, at Briançon; died at Versailles, May 17, 1882. At first engaged in commerce, he became a linguist; but it was not until 1851 that he began the study of hieroglyphics, the first results of which appeared in 1856, followed by a series of invaluable books and papers on two important periods—the conquest of Egypt by the Hyksos, and the time of their expulsion. He wrote *Les Pasteurs en Égypte* (1868); *Histoire de la XIX Dynastie et Spécialement des Temps de l'Exode* (1873); and *Études sur l'Antiquité Historique d'après les Sources Égyptiennes* (2d ed. 1873). In 1873–77 he edited *L'Égyptologie*.

CHABRIER, ALEXIS EMMANUEL, a French symphonist and composer; born at Ambert, Jan. 18, 1841. Studied law at Paris, and was clerk in the Ministry of the Interior. His operetta, *l'Etoile*, was produced in 1871. *Gwendoline* was given at Brussels in 1886. *L'Roi Malgré Lui* was presented at the Opera Comique. He left much unfinished work at his death in Sept. 13, 1894. R.C.A.

CHACABUCO, Chile, a town on the Colina in the Andean foothills, 25 miles N. of Santiago by rail, near the mountain pass of the same name, where the republicans defeated the Spanish troops Feb. 12, 1817. C.L.S.

CHACHAPOYAS, a town in Amazonas department, Peru, on the Utcubamba, 220 miles N. of Lima. It is the see of a bishop, and is well laid out and kept. Elevation, 7,600 feet. In the district is an ancient Indian burial-place, with richly sculptured gates. Population, about 5,000.

CHACO. See GRAN CHACO, Vol. XI, p. 42.

CHACORNAC, JEAN, a french astronomer who discovered the minor planets or asteroids Phocœa in 1853 Polyhymnia in 1854, Leda and Lætitia in 1856, and Olympia in 1860. He prepared the star charts of the Observatory of Paris, and performed many great services for astronomical science. W.F.J.

CHAD OR CEADDA, SAINT, born in Northumbria, became a pupil of St. Aidan at Lindisfarne, and in 666 became Bishop of York. Doubt having been cast on the validity of his consecration, he withdrew in 669, but was immediately made Bishop of Mercia, fixing the see at Litchfield, where his shrine was placed, and the city is full of memorials of him. He died in 672 He became patron saint of medicinal springs; and his canonical day is March 2d.

CHAD, TCHAD OR TSAD, a fresh-water lake in central northern Africa, 1,200 feet above sea-level, forming the border of French Sudan with British Northern Nigeria and German Northern Kamerum. It is about 100 miles long E. to W. with a maximum width of 80 miles; its area varies according to seasons from 5,000 to 18,000 square miles, with a depth of from 8 to 15 feet. Its principal feeder is the Shari, and its outlet the Bahr-el-Ghazal. C.L.S.

CHADBOURNE, PAUL ANSEL, educator, was born at North Berwick, Maine, on October 21, 1823, and was educated at Williams College. After his graduation in 1848 he was made a tutor in the college, for five years, and then was elected professor of botany and chemistry. In 1859 he was made professor of the same branches in Bowdoin College, filling both places at the same time. In 1867 he was elected president of the University of Wisconsin and also professor of metaphysics, and did an admirable work for that institution for three years, when ill health forced him to resign. In 1872 he became president of Williams College, and for nine years directed its affairs with distinguished ability and success. At the same time he took much interest in public and political affairs, being a delegate to the national Republican convention of 1876 and chairman of the Massachusetts state Republican convention of 1880. He was gifted with fine scholarship, great executive ability, and never-failing tact and common sense. He was the author of several books, chief among them being *Natural Theology* and *Instinct in Men and Animals*. He died in New York City on February 23, 1883. W.F.J.

CHADRON, a city, the capital of Dawes Co., Neb., on the Fremont, Elkhorn and Missouri Valley railroad. The government has its land-office for the district—Dawes, Sheridan, and Sioux counties—here, it is also the site of Chadron Academy. It was founded in 1885, and has 5 churches, an academy, a high school, 3 newspaper offices, 4 banks, a packing-house, roller-mills, a foundry, brick-yards, sawmills, a creamery, and marble and broom factories. Iron, lead, silver, coal, gypsum, and excellent marble are found here. Population 1900, 1,665.

CHADWICK, SIR EDWIN, a social reformer; born at Manchester, England, Jan. 24, 1801; died at East Sheen, near London, July 5, 1890. He studied law and was called to the bar in 1830. He early devoted his attention to questions of social, sanitary, and political science, and was, by Lord Grey's govern-

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ment, appointed an assistant commissioner to inquire into the operation of the poor-laws. His report (1833) laid the foundation of the later systems of government inspection. In 1834 he was made secretary of the Poor Law Board. His report on interments in towns (1843) laid the foundation of later legislation on the subject. He brought about the sanitary commission and the creation of the office of registrar-general. R.C.A.

CHADWICK, French Ensor, American naval officer, was born in West Virginia in 1844. On Sept. 28, 1861, he was appointed from that state cadet to the Naval Academy, but the Civil War demanding the services of naval officers, he entered the navy two months later (November 28th) as midshipman, serving later as acting volunteer lieutenant. In 1865–66 he was attached to the steam-sloop *Susquehanna*, of the Brazil squadron, becoming ensign in 1866. In 1866–67 he was assigned to the steam-sloop *Juniata*, of the South Atlantic squadron, and was promoted to be master Dec. 1, 1866. He was next assigned to the steam-sloop *Tuscarora*, of the South Pacific squadron, 1868–70, being commissioned as lieutenant-commander Dec. 18, 1868. In 1870–72 he was with the *Guerrière* on the European station. From 1880 to 1882 he was on special lighthouse duty. In 1882–88 he was naval attaché in London, being promoted to be commander Sept. 27, 1884. While in command of the *Yorktown*, when her steering-gear broke during a terrible storm off the Azores, Feb. 13, 1889, he showed his seamanlike qualities by bringing his vessel safely through the tempest, with only a sea-anchor made of a boat filled with water to hold her to her bearing. In 1892–93 he was chief intelligence officer; in 1893–95 chief of the Bureau of Equipment, with the rank of commodore; and on Nov. 7, 1897, he was made captain. During the war with Spain (April–August, 1898), he was in command of the first-class armored cruiser *New York*, Admiral Sampson's flagship, and did excellent service in the blockade of Havana (April–May), the bombardment of the forts at San Juan, Puerto Rico (May 12), and the blockade of Santiago (May–July).

CHADWICK, George Whitefield, musician, was born at Lowell, Mass., on Nov 13, 1854, and studied music in Germany. He has composed a number of overtures, symphonies, and choral and orchestral works, and one opera, *Judith*. He wrote the dedicatory ode for the Columbian World's Fair, and is now director of the New England Conservatory of Music in Boston. W.F.J.

CHADWICK, John White, preacher, author and critic, was born at Marblehead, Mass., on October 19, 1840, and was educated at Phillips Exeter Academy and Harvard Divinity School. He has been pastor of a Unitarian church in Brooklyn, New York, since 1864, and has contributed much to current and permanent literature in prose and poetry, and in the form of literary and art criticism. Died Dec. 11, 1904. W.F.J.

CHÆREMON, a Greek dramatist who lived at Athens about 380 B. C. The fragments of his writings were published by Bartsh in 1843.

CHÆTODON, a genus of small, brightly colored fishes inhabiting tropic seas, and having scales on the spiny fin-rays. R.W.C.

CHAFER, a common name for scarabæid beetles, which, either in perfect or larval state, are destructive to plants, particularly those which devour the wood, bark, or roots of trees. The word *chafer* is seldom used alone, but generally with some prefix, as rose-chafer, bark-chafer, etc.

CHAFFEE, Adna Romanza, soldier; was born at Orwell, Ohio, on April 14, 1842, and was educated in the public schools. He entered the army in July, 1861, was promoted for gallantry at Gettysburg and at Dinwiddie C. H., becoming a captain in March, 1865. He was twice promoted for gallantry in operations against the Indians in Texas and Arizona, becoming lieutenant-colonel in 1890. He entered the Spanish war in 1898 as brigadier-general of volunteers, commanded a brigade at Santiago, and became major-general of volunteers and chief of staff in Cuba. He was commander of the United States forces in the international expedition to Pekin in 1900 for the rescue of the legations from the Boxer rebellion, was made a major-general of the regular army on February 5, 1901, was appointed commander of the Division of the Philippines and military governor on July 4, 1901, and on September 30, 1902, was put in command of the Department of the East, at New York. W.F.J.

CHAFFEE, Jerome Bunty, capitalist; was born in New York state on April 17, 1825. He went to Colorado and amassed a fortune in mining and other enterprises. He was a member of the territorial legislature for a number of years, then a delegate in Congress, and on the admission of Colorado as a state in 1876 he was chosen one of its Senators, serving until 1879. He died on March 9, 1886. W.F.J.

CHAGOS ISLANDS, an archipelago and administrative dependency of British Mauritius, S. of the Laccadive and Maldive islands in the Indian Ocean; area, 150 sq. m. Diego Garcia, on which is an imperial coaling station, and Peros Banhos, are the largest of the groups and export cocoanuts, oil and coral. Pop., 1,200. C.L.S.

CHAIN-MAIL or CHAIN-ARMOR, an armor much used in the twelfth and thirteenth centuries, consisting of hammered iron links connected into the form of a garment. It was much more flexible and convenient than one formed of steel or brass plates, but was less fitted to bear the thrust of the lance. See Arms and Armor, Vol. II, p. 487.

CHAINS. See Cable, Vol. IV, p. 552; Mechanics, Vol. XV, pp. 746–751.

CHAIN-SHOT, an obsolete kind of ammunition chiefly used in naval warfare, consisting of two balls, or hollow hemispheres connected with a short chain fired collectively from the gun. Now superseded by grapeshot. W.R.B.

CHALAZOGAMY, a term in botany applied to those cases in which the pollen-tube does not enter the ovule through the micropyle (the usual entrance), but penetrates the ovule at the chalaza (q. v.). This was first discovered in *Casuarina*, an Australian genus, but has since been found to

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occur in species of *Alnus*, *Betula*, *Carpinus*, *Corylus* and *Juglans*, all of which are amentaceous plants. Treub, the original discoverer, considered chalazogamy so important as to form the basis of classification, dividing Angiosperms into two groups: (1) *Chalazogams* (including *Casuarina*), and (2) *Porogams* (including all other Angiosperms). The discovery of chalazogamy, however, in many other species, has thrown discredit upon it as a basis of classification.

CHALCEDONY, a variety of quartz which constitutes the principal part of many agates, and is generally translucent. It is much used in jewelry and ornaments of all sorts. It occurs in old lavas and trap-rocks, and is found in all parts of the world where these exist. See AGATE, Vol. I, p. 248; MINERALOGY, Vol. XVI, p. 405.

CHALCEDONYX, a name given to agates formed of cacholong, or a white opaque chalcedony, alternating with a grayish translucent chalcedony.

CHALCHUITE, the "chalchihuitl," a green variety of turquoise from Mexico, also found in the Los Cerillos Mountains in New Mexico. It is a hydrous phosphate of aluminum colored by a copper compound. Some authorities regard the stone as the jade of the ancient Mexicans analogous to the *feitsui* jade of the Chinese. W.R.B.

CHALCIDIDÆ, a small family of short-tongued lizards, natives of tropical America. See LIZARDS, Vol. XIV, p. 739.

CHALCIS, a city of Eubia. See EUBIA, Vol. VIII, p. 568.

CHALCOCONDYLES, DEMETRIOS, a writer in modern Greek. See GREECE, Vol. XI, p. 133.

CHALDER OR CHALDRON, an English dry measure formerly used for any dry goods, but now confined exclusively to coal and coke. It was of uncertain quantity formerly, varying from 60 to 70 bushels. To-day it varies in value from 2,500 to 3,000 pounds. In the terms of the old system it was equal to 12 quarters Winchester measure, or 16 bolls.

CHALDÆA. See BABYLONIA, Vol. III, pp. 159 et seq.

CHALDEE, a language. See ARAMAIC LANGUAGE, Vol. II, p. 269.

CHALEUR OR CHALEURS BAY, Canada, on the Gulf of St. Lawrence, extends westward nearly 100 miles with a maximum width of 25 miles between the shores of New Brunswick and Quebec. Its name signifies "bay of heat"; the Indian name *Ecketaun Nemaachi* — sea of fish — describes a lucrative characteristic. C.L.S.

CHALICE, an ancient name for an ordinary drinking-cup, but now only applied to the cup in which the wine of the holy sacrament is administered. See PLATE, Vol. XIX, pp. 196, 197.

CHALLEMEL-LACOUR, PAUL ARMAND, statesman; was born at Avranches, France, on May 10, 1827, and received a liberal education. He became a lecturer on philosophy in Paris, but in 1851–54 was banished by Louis Napoleon because of his liberal principles. On his return to France he became a journalist and politician, was made Prefect of Lyons by Gambetta in 1871, and soon after entered the Chamber of Deputies, where he was one of the ablest Republican and anti-clerical leaders. He was successively Minister for Foreign Affairs, Senator, Ambassador to Great Britain, and Vice-President and President of the Senate. He was a member of the French Academy, and the author, translator and editor of a number of works on philosophical subjects. He was one of the most influential statesmen in France, and did a valuable work in confirming the Republican government in that country. He died on October 26, 1896. W.F.J.

CHALLENGER EXPEDITION. See DREDGE, Vol. VII, pp. 399, 400; THOMSON, SIR CHARLES WYVILLE, Vol. XXIII, p. 331.

CHALYBEATE WATERS. See MINERAL WATERS, Vol. XVI, pp. 453–456.

CHAM, the pseudonym assumed by the caricaturist, Amédée de Noé; born at Paris, April 26, 1819; died there, Sept. 6, 1879. He studied art under Delaroche, and soon acquired a great reputation as a skillful and witty delineator of the humorous side of Parisian life. In 1834 he began his famous connection with the *Charivari*, in which paper and in the *Journal des Pélerinages* he continued to delight his fellow-citizens until close upon his death. Two collections of his sketches have been published, *Douze Années Comiques* and *Les Folies Parisiennes*.

CHAMÆROPS, a genus of palms of wide habitat of which one species, *Chamærops humilis*, being the only palm indigenous to Europe. It is sometimes called the Palmetto and is so hardy that a specimen has lived in Edinburgh for over 40 years with only a protection of matting in winter. It has very valuable commercial uses. The leaves in tropic regions are used as thatch, and the fiber is exported to be made into hats, brooms, paper, cordage, oilcloth and carpets. W.R.B.

CHAMALHARI, a peak of the Himalayas, 23,944 feet high, between Tibet and Bhutan, 140 miles E. of Mount Everest.

CHAMBERLAIN, DANIEL HENRY, soldier and politician, was born at West Brookfield, Massachusetts, on June 23, 1835, and was educated at Yale College (1862) and Harvard Law School (1863). In the last two years of the Civil War he served as an officer of a Massachusetts negro regiment. After the war he settled in South Carolina as a cotton planter and identified himself with the politics of that state, as a Republican. He was a member of its constitutional convention in 1868, and was elected attorney-general. In 1874 he was elected governor of the state, and in 1876 he was re-elected for a second term. In the latter year, however, the result of the election in South Carolina was contested, and after holding office for three months Mr. Chamberlain resigned and engaged in law practice in New York. W.F.J.

CHAMBERLAIN, JOSEPH, was born in London, England, in July, 1836, and was educated at University College School. In early life he entered the screw-manufacturing establishment of

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his father at Birmingham, and remained in it until 1874, meantime amassing a fortune. He became interested in local politics at Birmingham, as a radical reformer, and in 1868 was a town councilor, and in 1873–76 mayor of Birmingham. In the latter office he earned a great reputation for administrative ability, and for his success in improving the city in all respects. He set the example for practically all the municipal reforms which have since been effected in English cities. He entered the House of Commons from Birmingham in 1876, and soon made his mark there. In 1880 he was president of the Board of Trade, with a seat in the Cabinet. He was regarded as a leader of the extreme radicals, and was credited with some extreme doctrines concerning the "ransom" of property. He advocated taxation reforms, free schools, and local self-government. At the beginning of 1886 he was president of the Local Government Board in the Cabinet, but in March resigned his place because of his disagreement with Mr. Gladstone's Irish home rule plans. Thereafter for several years he was the most effective leader of the "Liberal Unionists" who had seceded from the Liberal party because of opposition to Home Rule. In 1887 he visited America as a commissioner, appointed by Lord Salisbury, to settle the fishery dispute between the United States and Canada. In 1891, upon the accession of Lord Hartington to the House of Lords as Duke of Devonshire, Mr. Chamberlain became leader of the Liberal Unionists in the House of Commons, and in 1895 he became Secretary of State for the Colonies. In 1903 he voluntarily retired from the Cabinet in order to be more free to conduct a great campaign for tariff reform. He has frequently written important review articles on political, social and industrial topics. W.F.J.

JOSEPH CHAMBERLAIN.

CHAMBERLAIN, Joshua Lawrence, soldier and educator, was born at Bangor, Maine, on September 8, 1828, and was educated at Bowdoin College. He was professor of modern languages at Bowdoin from 1855 to 1862, served in the Civil War as major-general of volunteers, fought in twenty-six battles and was six times wounded, in 1865 resumed his professorship at Bowdoin, was governor of Maine from 1867 to 1871, and from 1871 to 1883 was president of Bowdoin College. He was United States Commissioner of Education at the Paris Exposition of 1900, and has written a number of books.

W.F.J.

CHAMBERLAIN, Sir Neville Bowles, British general; born at Rio, Brazil, Jan. 18, 1820; entered the Indian army in 1836; in 1843 became deputy quartermaster-general to the army in India; in 1856, adjutant-general of the Bengal division; lieutenant-general in 1872; commander-in-chief of the Madras army in 1875; general in 1877. He retired in 1886. Died in Feb., 1902.

CHAMBERLIN, Thomas Crowder, geologist, was born at Mattoon, Illinois, on September 25, 1843, and was educated at Beloit College and the University of Michigan. He has filled various professorships, was president of the University of Wisconsin in 1887–92, and since 1892 has been at the head of the department of geology of the University of Chicago. He was geologist of the Peary Arctic relief expedition in 1894.

W.F.J.

CHAMBERS, private rooms attached to most of the courts, in which the judges and chief clerks transact a large amount of judicial business. Counsel attend in chambers only in matters which are not required to be done in open court.

CHAMBERS, Julius, journalist and author; was born at Bellefontaine, Ohio, on November 21, 1850, and was graduated from Cornell University in 1870. He studied law, and then became a newspaper writer. In 1872 he discovered Elk Lake, Minn., which he claimed to be the source of the Mississippi River. He was managing editor of the New York *Herald* in 1886–89, first editor of the Paris edition of that paper, and managing editor of the New York *World* in 1889–91. He has written a number of books and more than a hundred short stories. W.F.J.

CHAMBERS, Robert William, an American author; born in New York in 1865, the son of a prominent member of the New York bar. In 1885 he went to Paris to study art, exhibiting in the Salon of 1889, and in eight years spent in Europe gathering the material for his future works. His *Red Republic*, a vivid, realistic, and in some ways the most valuable, account of the Commune that has been written, was one of the results of his visit to Europe. His first story, *In the Quarter*, was published in 1894, followed by *The King in Yellow*, a collection of remarkable short stories issued in the same year. Their power and originality was unmistakable. A vein of weirdness running through them all challenged attention and caused some of the critics to call him a decadent. Then came *A King and a Few Dukes* and *The Maker of Moons*, the latter a collection of eight remarkable short stories. *The Red Republic* and *The Ashes of Empire* (1898), coming after these, established Mr. Chambers's position as a writer of fiction of considerable merit.

CHAMBERS, Talbot W., clergyman; born in Carlisle, Pa., Feb. 25, 1819; was graduated at Rutgers College in 1834, and studied theology there and at Princeton; became pastor of the Second Reformed Church at Somerville, N. J., in 1839; and from 1849 until his death was one of the pastors of the Collegiate Church, New York city. He was president of the Western division of the Reformed churches; a trustee of Princeton and Rutgers Colleges; and a member of the American Bible Revision committee. His publications include *Memoir of Theodore Fre-*

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linghuysen; The Noon Prayer Meeting in Fulton Street, etc. He died in New York city, Feb. 3, 1896. G.J.H.

CHAMBERS, WILLIAM, publisher; born April 16, 1800, at Peebles, Scotland; died in Edinburgh, May 20, 1883. Owing to his father's misfortune, his schooling terminated with his thirteenth year. The family migrated to Edinburgh in 1813, and next year William was apprenticed to a bookseller. When his five years were up he started business in an humble way for himself. Between 1825 and 1830 he wrote the *Book of Scotland*, and in conjunction with his brother Robert (see Vol. V, p. 330) a *Gazetteer of Scotland*. His experience gained as a bookseller and printer resulted in the founding of *Chambers's Edinburgh Journal* in 1832. This was about six weeks in advance of the *Penny Magazine*, and may be considered the pioneer of that class of cheap and popular periodicals of a wholesome kind now so generally diffused. At the end of the fourteenth number he united with his brother Robert in founding the business of William and Robert Chambers, in which they were associated in writing, editing, printing and publishing. W. and R. Chambers issued a series of works designed for popular instruction, including, besides the *Journal*, *Information for the People* (2 vols.); the "Educational Course" series; *Cyclopædia of English Literature* (2 vols.); *Miscellany of Useful and Entertaining Tracts* (20 vols.); *Papers for the People* (12 vols.); and the *Encyclopædia* (10 vols.; 1859–68; new ed. 1888–92).

In 1859 William founded and endowed an institution in his native town for purposes of social improvement. Twice elected lord provost of Edinburgh, he occupied that office for four years, during which he promoted several important public acts, including one for the improvement of the older part of the city, which has resulted in a great diminution of the death-rate. He also carried out, at his own cost, a thorough restoration of St. Giles' Cathedral. He died May 20, 1883, shortly after being offered a baronetcy. He was made LL.D. of Edinburgh in 1872. A statue has been erected to his memory in Edinburgh. Besides many contributions to the *Journal*, he was author and editor of various volumes, and wrote the *Youths' Companion and Counsellor; Ailie Gilroy; Stories of Remarkable Persons;* and *Historical Sketch of St. Giles' Cathedral*.

CHAMBERS, WILLIAM SIR (1726–96), an architect of Scotch origin, and writer on *Civil Architecture*. See ARCHITECTURE, Vol. II, p. 389.

CHAMBERS OF COMMERCE are bodies of merchants, bankers, and other business men, associated for the promotion of their own business interests and also—sometimes chiefly—for the general welfare of the community or state. Their ends are gained through various agencies, including (1) the rousing and guidance of public opinion, (2) the influencing of legislation by representation and argument, (3) aiding in the preparation of legislative measures, with expert advice, (4) the collection of statistics and other data, (5) acting as a court of commercial arbitration, and (6) in some places acting as a semi-official adjunct to the municipal government. The oldest Chamber of Commerce is said to be that of Marseilles, which dates from about the beginning of the fifteenth century. Similar bodies were organized at Dunkirk and at Paris in 1700, and many others arose in France in that century. The earliest in Great Britain was that of Glasgow, founded in 1783, one at Edinburgh followed in 1785, while that of London, now the most important of all, was not organized until 1882. The Manchester Chamber of Commerce is remembered for its activity in securing the abolition of the Corn Laws. At the present time almost every important city in the United Kingdom and the colonies has a chamber of commerce, or a similar body under another name.

The foremost chamber of commerce in America is that of the state of New York, which has its seat in the city of New York. It is of venerable age, having been organized on April 5, 1768, incorporated by King George III on March 13, 1770, and reincorporated by the state of New York on April 13, 1784. Its object, as described in its original charter, is "to carry into execution, encourage, and promote, by just and lawful ways and means, such measures as will tend to promote and extend just and lawful commerce." During its career it has included in its membership the foremost business men of the American metropolis, and has been intimately identified with almost every great movement for the improvement of commercial and industrial conditions in New York. There are chambers of commerce in nearly all large American cities, some of them, as notably that of Chicago, being known as Boards of Trade. Various colonies of foreign merchants in New York have there their own chambers of commerce, and similarly the American business men in foreign countries have their American Chambers of Commerce there. There are several such organizations in Germany, but early in 1905 the German government refused to recognize them by that name and requested that it be changed, lest they be confused with the German chambers of commerce which are government organizations. W.F.J.

CHAMBERSBURG, a town and the capital of Franklin County, central southern Pennsylvania, situated on the east bank of the Conococheague Creek, about 50 miles S.W. of Harrisburg, on the Chambersburg and Gettysburg and the Western Maryland railroads. It is the seat of Wilson College, and of a great variety of manufacturing industries. Population 1900, 8,864.

CHAMBESI OR CHASI, an African river which rises on the southern plateau between lakes Tanganyika and Nyassa and flows southeast for about 300 miles into Lake Bangweoli, but when this lake disappears in the dry season, it flows through the lake bed into its outlet, the Luapula River. This river carries the waters north into the Lualaba, which conducts them to the Congo. See ZAIRE, Vol. XXIV, p. 801.

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CHAMBLY, a small county in the southern part of the province of Quebec, opposite Montreal, on the St. Lawrence. Capital, Longueuil. Chief products, oats, hay, wool, flax and tobacco. Pop. (1901), of the district, including Verchères, 24,318.

CHAMBLY, FORT, Que., Can., a garrison post built by the French in 1711, the remains of which are found at Chambly Canton, in Chambly County, south of the St. Lawrence, on the Richelieu River, and on a branch of the Central Vermont railroad, 12 miles N. of St. John. The fort is celebrated for its surprise and capture as a British stronghold in 1775 by Colonel Bedel of New Hampshire, acting under instructions from General Montgomery, who was besieging St. John. C.L.S.

CHAMBORD, HENRI CHARLES DIEUDONNÉ, COUNT OF, grandson of Charles X of France and son of the Duke of Berry; was born in Paris on September 29, 1820, seven months after the murder of his father. In 1830 Charles X abdicated the throne in his favor, but the people expelled the whole family of the Elder Bourbons and put Louis Philippe upon the throne. The exiled Bourbons fixed their court successively in Scotland, at Prague, and at Goerz, and in 1844 the young prince dropped his original title of Duke of Bordeaux for that of Count of Chambord, because of the château of Chambord which had been his baptismal gift. He was lamed for life by a fall from his horse in 1841, he married the Princess of Modena in 1846, but had no children, and his sentimental refusal to give up the ancient white flag of France for the Tricolor prevented him from gaining the throne on three occasions when it was offered to him in 1848, 1870, and 1873. He died at the castle of Frohsdorff, Austria, on August 24, 1883. W.F.J.

COUNT OF CHAMBORD.

CHAMBRE ARDENTE, or "fiery chamber," was the name of an extraordinary court of justice in France, which imposed the most severe punishments, including that of burning at the stake. One such court was established in 1535, for the purpose of pronouncing judgment upon heretics. This was under the reign of Francis I. Under Henry II other such courts were established, and as late as 1679–80 they were employed by Louis XIV, especially for dealing with certain cases of poisoning. W.F.J.

CHAMPAGNE WINES. See WINES, Vol. XXIV, p. 638.

CHAMPAIGN, a city of Champaign County, central eastern Illinois, 128 miles S.S.W. of Chicago, in the midst of a rich agricultural region, on the Illinois Central, the Wabash, and the Cleveland, Cincinnati, Chicago and St. Louis railroads. It is beautifully laid out, with broad, shaded streets and numerous parks; it has electric and gas lights, water-works, and electric-car lines, and a large number of factories, chiefly of ropes and twines. The University of Illinois is located here. Population, 1890, city, 5,839; 1900 (12th census), 9,098.

CHAMPAK (*Michelia champaca*), a large Indian tree of the Magnolia family venerated by both Brahmanists and Buddhists. Its flowers are like an unfolded tulip, of a deep yellow color and highly fragrant, having a sweet oppressive perfume. They are used to ornament the hair, both of men and women, and are much celebrated in the poetry of the Hindoos. The bark is an aromatic bitter tonic and is used medicinally; it yields an oil called "sumpunghee." Images of Buddha are made of its wood. W.R.B.

CHAMP DE MARS, Paris, France, a celebrated public square on the south bank of the Seine, connected by the Jena bridge, with the grounds and Palace of the Trocadero. Over 1,600 feet wide, it extends southeastward from the Seine for nearly a mile to the Military School, which connects by the Avenue de Tourville with the Hôtel des Invalides, containing the tomb of Napoleon I. A large sandy plain, used from ancient times for military maneuvers and displays, public meetings, etc., it is now laid out ornamentally, with the lofty Eiffel Tower, rising from its center, and various fine Exposition buildings ranging along its sides. C.L.S.

CHAMPERTY, from Norman French "champart," from Latin "campus partitus," or "divided field." Originally, the right of a feudal lord to take part of the produce of lands cultivated by his tenants. It is now applied to a bargain whereby one party is to assist another to secure certain property in which he (the first party) has no interest, on condition of his receiving a share of it after it is secured. More particularly, it is an agreement to provide funds for litigation, or to supply evidence or professional services, the repayment and reward to be conditional upon success. All such bargains are illegal, and thus null and void, the law granting to the maker of one only the actual worth of the services rendered by him. W.F.J.

CHAMPFLEURY. See FLEURY, JULES F.F.H., in these Supplements.

CHAMPIGNY, France, a village eight miles S.E. of Paris, on the Marne. During the German advance on Paris in 1870, a struggle raged here from the 30th of November to the 2d of December, which ended in the retreat of the French across the river. Pop., 1,500. C.L.S.

CHAMPION, in the judicial combats of the middle ages, the hired combatant who represented women, children and aged persons was called a champion. In the age of chivalry, a knight who entered the lists in behalf of a child, or one incapable of self-defense, or a knight deputed to see that no insult or injury should be offered to the assembled ladies. In England the crown had its champion on the occasion of a coronation, who entered Westminster Abbey on horseback, fully armed, and challenged all who would deny

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the king to be the lawful sovereign of the three realms. This practice was introduced by Richard II, and discarded by Edward VII. W.R.B.

CHAMPION HILLS, Mississippi, a range of hills in Hinds Co., 20 miles W. of Vicksburg, rising from Baker's Creek, and reached from Bolton, on the Alabama and Vicksburg railroad. Here on May 16, 1863, was fought the battle of Champion Hills, also sometimes called the battle of Baker's Creek. The Confederate general Pemberton, who had marched out of Vicksburg to unite with Johnson, was intercepted and defeated by General Grant after five hours' fighting, and retreated to the Big Black River. C.L.S.

CHAMPLAIN, a town of Clinton County, northwestern New York, on the Chazy River and on the Central Vermont railroad, 19 miles N. of Plattsburg. The river is navigable, and is used for exporting lumber. The town is the seat of the Champlain Academy. Pop. 1900, 1,311.

CHAMPLAIN, a town in a county of the same name, Quebec, Canada, about 58 miles S. of Quebec City on the Canadian Pacific railroad. The county contains about 35,000 inhabitants; area, 9,150 square miles; chief product, lumber. The town has about 2,000 inhabitants.

CHAMPLAIN FORMATION. See GEOLOGY, Vol. X. p. 328.

CHAMPLIN, JAMES TIFT, preacher and educator, was born at Colchester, Connecticut, on June 9, 1811, and was educated at Brown University, where he was an instructor for several years. In 1838 he became a Baptist preacher, in 1841 professor of ancient languages in Colby University, Waterville, Maine, and in 1857 president of that institution, in which office he served until 1872. He was the editor of a number of Greek classics, and author of text-books on ethics, political economy, Greek, Latin and English grammar, and other educational topics. He died on March 15, 1882. W.F.J.

CHAMPLIN, JOHN DENISON, author, was born at Stonington, Conn., on January 29, 1834, was graduated from Yale College in 1856, and was admitted to the bar in 1859. After a few years of practice he abandoned the law for literary pursuits. He has been a newspaper editor and writer, and is the author of numerous books. These include several cyclopædias and histories for young people, of much educational value. He has also edited Fox's *Mission to Russia*, a *Cyclopædia of Painters and Paintings*, a *Cyclopædia of Music and Musicians*, and *Liber Scriptorum*, and was an associate editor of *The American Cyclopædia* and *The Standard Dictionary*. W.F.J.

CHAMPLIN, STEPHEN, naval commander, was a native of Rhode Island, where he was born at South Kingston on November 17, 1789. In his boyhood he went to sea on a merchant vessel and thus gained familiarity with navigation. At the outbreak of the War of 1812 he offered his services to the government as a naval officer, and received a commission. He commanded the American ships *Scorpion*, *Tigress*, *Porcupine*, *Fulton* and *Michigan*, as well as several prize ships, and took part in the battle of Lake Erie under Commodore Perry. He is said to have survived every other officer of that battle. In 1855 he was placed upon the retired list with the rank of captain. His age forbade him to enter active service in the Civil War, but in 1862 he was promoted to the rank of commodore, on the retired list. He died Feb. 20, 1870. W.F.J.

CHAMPNEY, ELIZABETH WILLIAMS, was born at Springfield, Ohio, on February 6, 1850, was educated at Vassar College, and married James Wells Champney (q. v.) in 1873. She has traveled extensively and has written much, including innumerable magazine articles, some charming juvenile books, and a number of historical romances and sketches. Her home is in New York. W.F.J.

CHAMPNEY, JAMES WELLS, artist, was born in Boston on July 16, 1843, and served for a time in the Civil War. He studied art in Europe and became a successful and popular artist and illustrator, excelling in water colors. He was a member of the American Water-Color Society and an associate of the National Academy. He illustrated some of his wife's books. He died on May 1, 1903. W.F.J.

CHAMPNEYS, BASIL, an English architect; born in 1842 at Lichfield; was graduated at Trinity College, Cambridge, in 1864; studied architecture under Prichard. He designed many of the buildings at Cambridge, Oxford and other schools. He was architect of St. Luke's Church, Kentish Town, and other churches, aided in the restoration of St. Bride's, in Fleet Street, St. Dunstan's in Stepney, and was the author of *A Quiet Corner of England* (1875).

CHANAK-KALESSI, a town of Anatolia, southwestern Asia Minor, situated on the Dardanelles, about 28 miles S. W. of Gallipoli. It derives its name from its manufactures of crockery. Population, 6,000.

CHANCEL (Latin, *cancellus*, a screen), a slightly elevated portion of the church interior that was, and in some churches is still, separated from the choir by a screen and occupied by the officiating clergy. Usually it is only separated from the choir by a rail and contains the altar, or communion table. The chancel is sometimes rectangular and sometimes semi-circular, in which case it is known as the "apse," following the style of its prototype, the Roman basilica, and peculiar to Episcopal and Catholic churches. W.R.B.

CHANCELLOR, CHARLES WILLIAMS, physician and surgeon, was born in Virginia on February 19, 1833, and was educated at Georgetown College, D. C., the University of Virginia, and Jefferson Medical College, Philadelphia. In the Civil War he gave his services to the Confederate cause, and was attached to General Pickett's corps as medical director. After the war he became professor of surgery in Washington University, from 1868 to 1875, secretary of the board of health of the state of Maryland in 1875, president of the state insane asylum of Maryland in 1880, and United States consul at Havre during the second administration of President Cleveland, from 1893 to 1897. He has written a number of

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treatises on sanitary topics, and is a member of various learned societies. His home is in Washington, D. C. W. F. J.

CHANCELLOR. A chancellor is the officer who presides over a court of chancery, corresponding to the judge in a court of law. He is usually a judge who is selected by the other judges of the judicial district to sit as a chancellor, or by some other authority has the right to act in that capacity. A chancellor of a university is the chief officer of the institution, but is for the most part an honorary officer. See CHANCELLOR, Vol. V, pp. 336–338.

CHANCELLORSVILLE, Virginia, a house and plantation in the northeastern county of Spottsylvania, near Alrich on the Potomac, Fredericksburg, and Piedmont R. R., about 10 miles west of Fredericksburg, and nearly midway between the latter town and the Wilderness. It gives its name to the battle fought from the 2d to the 4th of May, 1863, which besides the engagement at Chancellorsville, May 1st to 3d, comprises also the actions at Marye's Heights on May 3d, and at Salem Church, May 3d and 4th, when the Union forces under General Hooker, were disastrously defeated by the Confederates under General Lee.

After Burnside's defeat at Fredericksburg in December, 1862, the command of the army of the Potomac was given to General Hooker, who devoted the rest of the winter to recruiting and reorganizing, and who, when he resumed offensive operations in April, for a march on Richmond, had raised his forces to a total of 120,000 men and 1,200 cavalry. Lee with but 60,000 men remained on the defensive in the position that he had gained by the victory at Fredericksburg. General Hooker's army comprised 7 corps, and his general plan of battle was to surround Fredericksburg, and to defeat General Lee's forces by attacks directed against the flanks which were to be rolled up while Hooker with a strong force was to crush the center. The movements to encompass the flanks and rear of the Confederate army were successfully executed by Reynolds, Sickles, Sedgwick, and Slocum, commanding respectively the first, third, sixth, and twelfth corps, and by Stoneman commanding the cavalry. The main attack was to be delivered against Lee's left wing, but Lee perceived the stratagem, and there massed his forces, whereupon Hooker gave orders for a retirement upon Chancellorsville, and reformed his troops. The second days' battle ended in "Stonewall" Jackson driving in the right under Howard, upon the Union center commanded by Hooker, while Lee prevented Meade commanding the left from going to their assistance. During a reconnaissance beyond his main line, Gen. Jackson and his staff mistaken by his own pickets for a troop of Union cavalry were fired upon by both Confederate and Union troops; Jackson had both arms shattered by three bullets and died of his wounds May 10; his staff also were nearly all killed or wounded.

On the third day Hooker, who had drawn in his lines and concentrated his troops with the exception of Sedgwick's corps, was attacked and defeated by the united forces of Lee which then turned upon Sedgwick who had defeated Early, carried the heights of Fredericksburg and was pushing on to Hooker's aid, and forced him to retire with the rest of the Union forces across the Rappahannock. The Union loss was 12,197 killed and wounded, and 5,000 missing,—total 17,197; that of the Confederates, 10,266 killed and wounded, 2,753 missing,—total 13,019. The censure which Hooker received for his failure compelled him to resign his command. The disaster has been attributed to various causes. Hooker was severely injured by a cannon-ball striking a pillar of the Chancellorsville House against which he was leaning; the shock caused concussion of the brain and incapacitated him from giving the orders essential at critical moments; this accident has been advanced to explain why the whole of the First, with parts of the Fifth and Eleventh Corps, numbering 37,000 men, were kept idle on the left flank of the enemy, when their advance would have turned the tide of battle; the consensus of opinon, however, lays failure to the retirement upon Chancellorsville, when a continued advance for a short time longer and co-operation with Sedgwick's corps would have insured success. C.L.S.

CHANCROID. See SURGERY, Vol. XXII, p. 721.

CHANDAUSI, a town of the northwest provinces of India, 27 miles S. of Muradabad, on the Burjeb and Delhi railroad. Population, 27,521.

CHANDELEUR ISLANDS, Louisiana, a crescent-shaped group of low-lying islands, separated from St. Bernard County, by Chandeleur Sound, which is 20 miles wide, and incloses several other islands. Chandeleur lighthouse, 55 ft. high, showing a fixed white light, is on the most northerly island. C.L.S.

CHANDERI OR CHANDHAIREE, a town of Gwalior, central India, 105 miles S. of the city of Gwalior, once a flourishing manufacturing center and an almost impregnable fort. It is now much decayed, on account of oppression and wars, but the beauty and extent of its ruins show its former importance and splendor. It is said to have contained at one time 14,000 stone houses, 384 markets, 360 caravansaries and 12,000 mosques. It is under British rule. Population, 1901, 5,600.

CHANDERNAGAR, a French settlement in Bengal. See CHANDARNAGAR, Vol. V, p. 339.

CHANDLER, CHARLES FREDERICK, chemist; was born at Lancaster, Massachusetts, on December 6, 1836, and was educated at Harvard, Berlin and Göttingen. After receiving the degree of doctor of philosophy from the University of Göttingen in 1856 he returned home and the next year became professor of chemistry at Union College, where he remained until 1864. In the latter year he was one of the organizers of the School of Mines of Columbia University in New York, and became its dean and professor of chemistry. In 1877 he was appointed also to the chair of chemistry in the College Department of Colum-

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bia. In addition to these duties he was professor of chemistry in the College of Physicians and Surgeons of Columbia and in the New York College of Pharmacy, a separate institution. His services to the city of New York have been many and valuable, including the duties of sanitary expert investigator, chemist of the board of health, president of the board of health, etc. He has also done much lecturing and editorial work, has written a number of treatises, is a member of many learned societies, and has received honorary degrees from the chief universities of the world. He was for eight years president of the American Chemical Society, and has also been president of the British Society of Chemical Industry and the Chemists' Club. W.F.J.

CHANDLER, FRANCIS WARD, architect, was born in Boston on September 30, 1844, served in the Civil War, and afterward studied architecture. He was connected with the architectural department of the Massachusetts Institute of Technology, Boston, in 1869, was assistant architect of the Treasury Department, Washington, in 1871, practiced the profession of an architect in Boston from 1874 to 1888, and since the last-named year has been professor of architecture in the Massachusetts Institute of Technology. He is a member of the board of art commissioners of the city of Boston, and advisory architect to the mayor of Boston. He has written several text-books on architecture. W.F.J.

CHANDLER, JOHN, an American legislator; born in Epping, N. H. He served in the Revolutionary War; settled in the Maine district of Massachusetts, which he represented in Congress, 1805–09; was elected United States Senator from Maine on the admission of that State, and served from Nov. 13, 1820, to March 3, 1829; and was collector of customs at Portland, Me., 1829–37. He died at Augusta, Me., Sept. 25, 1841. E.E.T.

CHANDLER, JOSEPH RIPLEY, educator, was born in Massachusetts on August 25, 1792, and became a teacher and editor in Philadelphia. In 1849–51 he was a representative in Congress, and in 1858 was United States minister to Naples. He was the author of an English grammar, and was much interested in prison reform and other philanthropic movements. He died in Philadelphia on July 10, 1880. W.F.J.

CHANDLER, RALPH, naval commander; was born in New York city on August 23, 1829, and became a midshipman in the navy in 1845. He served in the Mexican War and the Civil War upon the coast survey, and at the Brooklyn navy-yard. He became master and lieutenant in 1855, commander in 1866, captain in 1874, commodore in 1884, and rear-admiral in 1886. He died on February 11, 1889, at Hong Kong, while he was in command of the Asiatic squadron. W.F.J.

CHANDLER, SETH CARLO, astronomer; was born in Boston, Mass., on September 17, 1846, and was educated at the Boston English High School. He devoted himself to astronomical studies and work, and in them has attained great success. He received the Watson gold medal and the gold medal of the Royal Astronomical Society of England, in recognition of his services to science, and is a member of various learned bodies in Europe and America. Since 1896 he has been editor of the *Astronomical Journal* at Cambridge, Mass. W.F.J.

CHANDLER, WILLIAM EATON, lawyer and Senator, was born at Concord, New Hampshire, on December 28, 1835, and was educated at the Law School of Harvard University. In 1855 he was admitted to the bar, and became reporter to the supreme court of New Hampshire. He was a representative in the New Hampshire legislature in 1862, 1863 and 1864. In 1865 President Lincoln made him Judge-Advocate General of the Navy Department, and in the same year he became Assistant Secretary of the Treasury, which latter office he resigned in 1867. In 1881 he was again a member of the New Hampshire legislature. From 1882 to 1885 he was Secretary of the Navy. From 1887 to 1901 he was a U. S. Senator from New Hampshire, and since 1901 he has been president of the Claims Commission for the adjustment of claims for losses in Cuba and in the Spanish War. W.F.J.

WILLIAM E. CHANDLER.

CHANDLER, ZACHARIAH, statesman, was born at Bedford, New Hampshire, on December 10, 1813, and devoted the early part of his adult life to mercantile pursuits. He went west, settled in Michigan, and became in 1851 mayor of the city of Detroit. The next year he was an unsuccessful candidate for governor of the state, but in 1857 was elected to the United States Senate to succeed General Lewis Cass, who then became a member of the President's Cabinet. He remained in the Senate, through successive re-elections, until 1875, and for many years was one of the most influential members of that body. He was an uncompromising Republican, and advocated the most vigorous measures for the preservation of the Union in the Civil War and for the reconstruction of the southern states afterward. In 1875 he was appointed Secretary of the Interior by President Grant, and held that place until March, 1877. He exerted much influence during the contest over the Presidential election in the winter of 1876–77, and it was largely due to his efforts that the Republican candidate was finally seated. He was chairman of the National Republican Committee at that time. Upon the inauguration of President Hayes he retired to private life, but in 1879 was again elected to the United States Senate, to succeed I. P. Christiancy, who had resigned. He died suddenly in Chicago on November 1, 1879. W.F.J.

CHANDOS is one of the most illustrious family names in English history. It was brought to England by one of the followers of William

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the Conqueror. The most famous bearer of it was Sir John Chandos, a follower of the Black Prince. The male line died with another Sir John, in 1428, and the descent then passed through his sister, who married Giles Brydges. A descendant, Sir John Brydges, was made Baron Chandos in 1554. In 1719 the Dukedom of Chandos was created, and in 1796 the title passed by marriage to the Grenville family, the present dukes of Buckingham and Chandos. W.F.J.

CHANEY, HENRY JAMES, British physicist; born in Windsor, England, in 1842; superintendent of standards for the Board of Trade. He was active in bringing about the adoption of international standards of weights and measures, and in the enactment of the British laws regulating such standards. He published *Verification of Parliamentary Standards of Length and Weight; Mode of Testing Weighing Machines; Redetermination of the Scientific Unit of Volume*, and many other papers on kindred topics.

CHANG AND ENG. See SIAMESE TWINS, in these Supplements.

CHANGARNIER, NICOLAS ANNE THÉODULE, soldier; was born at Autun, France, on April 26, 1793, and was educated at the military college of St. Cyr. He served in the Spanish campaign of 1823, and in 1830 went to Algeria, where he was in active service for 18 years, and distinguished himself repeatedly. In 1848 he was in Paris, assumed charge of the garrisons and of the National Guard, and rendered invaluable services to the cause of order. At Louis Napoleon's *coup d'état* he was arrested and imprisoned, and then sent into exile, where he remained until 1870. Upon the outbreak of the war with Prussia he offered his services to the government, and served under Bazaine at Metz. After the war he aided Thiers in reorganizing the army. He died on February 14, 1877. W.F.J.

CHANG-CHAU, China, the capital of a department of the Province of Fukien, at the mouth of a small river at the head of Amoy harbor, 28 miles west of Amoy. A wall over four miles long girdles the city, and the river is crossed by a bridge 780 feet long. Two temples, one dating from the eighth century, attest the antiquity of the city which has important industrial works in connection with the iron mined in the neighboring mountains. Silk, paper, porcelain, and sugar are manufactured, and with tea supply a busy export trade. Pop. (est.), 900,000. C.L.S.

CHANGE OF VENUE is the change of the place of trial of a suit to another county or to another court of like jurisdiction in the same county. The rule is, that if the venue is changed the case must go to the nearest county, or if to another court in the same county, then to the nearest of such courts to that in which the suit is brought. The usual grounds for changing the venue are, that the judge of the court wherein the suit was brought is disqualified to try the case, through interest in the result or prejudice against the defendant, or that on account of the prejudice of the citizens of that county a jury cannot be procured who will give a fair and impartial verdict. The right to a change of venue is governed by statute in the various states.

CHANG-SHA, China, capital of the southern province of Hunan, on the Siang River, 350 miles by rail N. of Canton. In the neighborhood is Yo-lo College, a famous educational seat. The silk industries and commerce are important. Pop., 300,000. C.L.S.

CHANK-SHELL, a gasteropod mollusk of the genus *Turbinella*, occurring in Indo-Pacific waters. It is the sacred shell of the Hindus. Many are brought to America and Europe for ornamental purposes.

CHANLER, MRS. AMÉLIE. See RIVES, in these Supplements.

CHANNING, EDWARD TYRREL, scholar; born in Newport, R. I., Dec. 12, 1790; studied law but chiefly devoted himself to literature. He was one of the founders of *The North American Review* in 1815, and its editor in 1818. In 1819 he was appointed Boylston professor of rhetoric and oratory at Harvard University, which chair he resigned in 1851. He died in Cambridge, Mass., Feb. 8, 1856. G.J.H.

CHANNING, WALTER, physician and surgeon, was a brother of William Ellery Channing (q.v., Vol. V, pp. 341–343). He was born at Newport, Rhode Island, on April 15, 1786, and was educated at Harvard, but was not graduated. He studied medicine in Boston, Philadelphia, Edinburgh and London, and began the practice of it in Boston in 1812. Three years later he became professor of obstetrics and medical jurisprudence at Harvard, and there served until 1854. In 1821, also, he became a physician of the Massachusetts General Hospital in Boston, and was connected with it for twenty years. He won renown by the use of ether in childbirth and in other cases. He died on July 27, 1876. W.F.J.

CHANNING, WILLIAM ELLERY, JR., son of Dr. Walter Channing (q.v.); was born in Boston on June 10, 1818, and was educated at Harvard. He went west and lived in Illinois for a time. Then, entering newspaper work, he was connected successively with the Cincinnati *Gazette*, the New York *Tribune*, the Boston *Journal*, and some other papers. He was a friend of Emerson and Thoreau and belonged to the "Concord School" of philosophers. He wrote a number of volumes in prose and verse, including memoirs of Thoreau and John Brown, and a poetical tribute to Eliot. He died at Concord, Massachusetts, on December 23, 1901. W.F.J.

CHANNING, WILLIAM HENRY, clergyman, nephew of WILLIAM ELLERY CHANNING (Vol. V, p. 341); was born in Boston on May 25, 1810, and was graduated from Harvard College in 1829, and from the Cambridge Divinity School in 1833. He was pastor of various Unitarian churches and was recognized as one of the most eloquent pulpit orators of his age. He was also editor of several religious periodicals, and a contributor to *The Dial* and *The North American Review*. He was the author of a memoir of William Ellery

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Channing; a memoir of Margaret Fuller Ossoli, and various other works. He was an earnest laborer for social reforms, and at one time advocated the principles of Fourier. In Liverpool he was the pulpit successor of James Martineau. He died on December 23, 1884. W.F.J.

CHANT. See PLAIN SONG, Vol. XIX, pp. 179, 180.

CHANTILLY, Virginia, a village of Fairfax County (pop., 63), about five miles N.W. of Fairfax, the county-seat, and six miles N.E. of Bull Run. It was the scene on Sept. 1, 1862, of the last struggle in the second battle of Bull Run. See BULL RUN (Vol. XXV, p. 644). C.L.S.

CHANTRY. See ARCHITECTURE, Vol. II, p. 405.

CHANUTE, Kan., a city of Neosho County on the Neosho River, 14 miles N.W. of Erie. It is an important administrative center of the Atchison, Topeka, and Santa Fé railroad, on several branch lines exporting the products of the neighboring oil-fields and productive farming region. Pop. (1900), 4,208. C.L.S.

CHANUTE, OCTAVE, civil engineer; born in Paris, Oct. 18, 1832; was educated in New York; in 1853 went to Illinois, later becoming chief engineer of the Toledo, Peoria and Western railroad; in 1867 to Kansas City where he built the first bridge across the Missouri River. He became president of the American Society of Civil Engineers, and in 1893 presided over the opening and closing sessions of the international engineering congress, Columbian Exposition. He is the author of *Progress in Flying Machines*, having studied deeply the mechanical laws governing artificial flight. G.J.H.

CHANZY, ANTOINE EUGENE ALFRED, French general; born at Nouart, Ardennes, March 18, 1823; died at Châlons, Feb. 5, 1883. He entered the artillery as a private, received a commission in the Zouaves in 1841, and served almost uninterruptedly in Africa till 1870. He was elected to the National Assembly, and narrowly escaped being shot by the Communists in 1871. He was made governor-general of Algeria, 1873. In 1875 he became senator; and in 1879 was spoken of for the presidency. He was ambassador to Russia in 1879; but recalled, and placed in command of the 6th army corps. R.C.A.

CHAPALA, Mexico, a lake in the states of Jalisco and Michoacan, 6,000 feet above sea-level. It is about 50 miles long with a maximum width of 20 miles, and is fed by the Rio Grande de Santiago. The Mexican Central railway touches the shores at Ocotlan, and steamers navigate its waters. C.L.S.

CHAP-BOOKS are small books or pamphlets, unbound, sold by "chap-men" or traveling peddlers, of whom Shakespeare's *Autolycus* may be regarded as a prototype. In former generations such publications were innumerable in England, usually consisting of condensed versions of tales of fiction. Many famous legends were thus embodied, and the chap-books especially of the 17th century are highly prized. W.F.J.

CHAPEL. See ARCHITECTURE, Vol. II, p. 405.

CHAPEL HILL, a town of Orange County, central northern North Carolina, on a branch of the Southern railroad, 26 miles N.W. of Raleigh. The University of North Carolina is located here. Population 1890, 1,017; 1900, 1,099.

CHAPELLE, PLACIDE LOUIS, clergyman, was born in France in 1842, came to America in 1859, became a priest of the Roman Catholic Church in 1865, and was pastor of St. John's Church and St. Joseph's Church, Baltimore, and St. Matthew's Church, Washington, D. C., where he earned a high reputation as a theologian and as an ecclesiastical administrator. He was appointed coadjutor bishop to Archbishop Salpointe in 1891, and succeeded him as archbishop of Santa Fé in 1894. In 1897 he was made archbishop of New Orleans, 1898 apostolic delegate to Cuba and Porto Rico, and 1899 apostolic delegate to the Philippine Islands. Died Aug. 9, 1905. W.F.J.

CHAPIN, AARON LUCIUS, educator; was born in Hartford, Conn., on February 4, 1817, and was graduated from Yale College in the famous class of 1837. Later he taught school in Baltimore, taught in the New York Institution for the Deaf and Dumb, and became a Presbyterian clergyman. In 1850 he became the first president of Beloit College, until 1886. He was for some years editor of the *Congregational Review*, and he edited Wayland's *Political Economy*. He died on July 22, 1892. W.F.J.

CHAPIN, EDWIN HUBBELL, clergyman and lecturer, was born at Union Village, New York, on December 29, 1814, and studied both law and theology, finally turning his attention solely to the latter. He entered the ministry of the Unitarian Church, and was pastor of churches in Richmond, Va., Charlestown and Boston, Mass., and New York City. He was for many years one of the most prominent preachers in New York, and one of the foremost lecturers and platform orators in the United States. His attention was largely devoted to social reforms of many kinds. He became editor of the *Christian Leader*, a Universalist paper, in 1872. In 1867 the congregation of his New York church founded the "Chapin Home for the Aged and Infirm" in that city. He was the author of a number of books, some of them purely devotional and others devoted to depicting the need of philanthropic reforms in city life. His New York church was one of the most influential centres of good works in the metropolis. Dr. Chapin died on December 27, 1880. W.F.J.

CHAPLAIN, originally an ecclesiastic who accompanied an army and carried the relics of the patron saint. The word now signifies the spiritual adviser of any organization or person. Legislative bodies, military and naval organizations, public institutions in general, and noblemen and sovereigns have such an officer. In the United States most prisons have chaplains to look after the comfort and needs of the inmates. In the United States army the chaplain generally holds the rank of captain, and in the navy ranks from lieutenant up to captain, according to the num-

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ber of years of his service. For the British army chaplain, see ARMY, Vol. II, p. 511.

CHAPLEAU, JOSEPH ADOLPHE, was born in the province of Quebec, Canada, on November 9, 1840, and was called to the bar in 1861 and became queen's counsel in 1873. He entered the Quebec legislature in 1867, became Solicitor-General for the province in 1873, and Prime Minister of the province in 1879. In 1882 he became Secretary of State of the dominion, at Ottawa, and ten years later was appointed lieutenant-governor of Quebec. He was a member of the Legion of Honor, of France, and a K.C.M.G. He died on June 13, 1898. W.F.J.

CHAPLET, a garland or head-band of leaves and flowers. See also ROSARY, Vol. XX, p. 871.

CHAPLIN, CHARLES JOSHUA, portrait-painter; born in Les Andelys, France, June 6, 1825; died in Paris, Jan. 30, 1891. His father was English, his mother French. He studied at the École des Beaux-Arts and under Dröllling; became a chevalier of the Legion of Honor in 1877. His works include *Soap Bubbles; A Bather; Girls Kneeling at a Shrine* (in the Walters Gallery, Baltimore); and *Haidée*, in the Museum of Art, New York.

CHAPLIN, HENRY, an English statesman, the farmers' member of the British Parliament, was born in 1841 and educated at Harrow School and Christ Church, Oxford University. From November, 1868, to November, 1885, he represented Mid-Lincolnshire in the House of Commons, since which date he sat for the northern division of the Parts of Kesteven or Sleaford, in the same county. The tenant farmer of England was always the object of his legislative solicitude. He was prominent in the councils of the Conservative party, a frequent and incisive debater and an authority on all matters agricultural. His politics were of the old Tory stripe and his adherence to his party procured him several important offices. In June, 1885, he was appointed Chancellor of the Duchy of Lancaster, and in 1889, on the formation of the Board of Agriculture, Mr. Chaplin was appointed its first president, with a seat in the Cabinet. In 1885 he was sworn of the Privy Council. In 1876 Mr. Chaplin married Lady Florence Leveson-Gower, daughter of the third Duke of Sutherland. She died in 1881.

CHAPLIN, WINFIELD SCOTT, educator; born in Glenburn, Me., Aug. 22, 1847; was graduated at West Point in 1870, and was appointed 2d lieutenant of the 5th Artillery. In 1872 he resigned his commission and engaged in railroad engineering until 1873, when he became professor of civil engineering in the Maine State College. In 1877–82 he held the same chair in the Imperial College, Tokio, Japan; in 1883–86 in Union College, Schenectady, and in 1886–91 in the Lawrence Scientific School; then became chancellor of Washington University, St. Louis. G.J.H.

CHAPMAN, ALVAN WENTWORTH, botanist, was born in Massachusetts on September 28, 1809, and was educated at Amherst College He studied medicine and was for some years a practicing physician. He was employed in the internal revenue service of the United States, in Florida, in 1865–66, and in the customs service in 1866–69. He wrote a *Flora of the Southern States*. He died in 1899. W.F.J.

CHAPMAN, ELIZABETH RACHEL, MISS, a British novelist and poetess, was born in Woodford, Essex. Her writings treat chiefly of those social movements that have for their object the improvement of the condition of woman. Her published works include *The New Godiva, A Comtist Lover; A Little Child's Wreath;* and *A Sonnet Sequence.*

CHAPMAN, JOHN GADSBY, artist; was born at Alexandria, Virginia, on December 8, 1808, studied in Italy, and became an etcher and wood-engraver, working in New York with great success. He is best known by his painting of the *Baptism of Pocahontas*, in the rotunda of the Capitol at Washington, and by his *American Drawing Book*, which has run through many editions, though he was a versatile and prolific painter, engraver and etcher of nearly all kinds of pictures, from landscapes to miniature portraits. He died in New York on July 6, 1890. W.F.J.

CHAPPAQUA, New York, a village and summer resort of Westchester County, 30 miles by rail north of New York city on a branch of the New York Central & Hudson River railroad. Among its institutions is a boarding-school supported by the Quaker sect. C.L.S.

CHAPPELL, WILLIAM, musical historian; was born in London on November 20, 1809, and became a member of one of the chief music publishing houses of that city. In 1838–40 he brought out a notable *Collection of National English Airs, Consisting of Ancient Song, Ballad and Dance Tunes.* This work was afterward revised and enlarged and edited by MacFarren, and forms one of the most valuable historical collections of English music. Mr. Chappell was in 1840 one of the organizers of the Musical Antiquarian Society, and the Percy Society, and edited some of Dowland's songs for the former, and several rare collections for the latter. He published a few papers in the *Archæol ia*, and some valuable notes to a reprint of the *Percy Folio Manuscript.* He also annotated the first three volumes of the Ballad Society edition of the *Roxburghe Ballads.* He published in 1874 the first volume of a *History of Music.* He ranked among the foremost authorities of his day upon the history of English music and ballads, and did an inestimable work for the promotion of musical knowledge. He died in London on August 20, 1888. W.F.J

CHAPTER. See CATHEDRAL, Vol. V, p. 198; and CONGE D'ELIRE, Vol. VI, p. 235.

CHAPTER-HOUSE. See ARCHITECTURE, Vol. II, p. 405.

CHAPULTEPEC, Mexico, a castle-crowned rock, 150 feet high, two miles south of the City of Mexico, from which it is approached by a fine driveway. The castle was built in 1785 by the then Spanish viceroy on the foundations of the ancient palace and burial place of the Aztec Kings of Mexico, and is now used as a summer

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residence by the President of the Republic. Near it is the Mexican National Military School, and an aqueduct of 900 arches, part of the water-supply system of the metropolis. During the Mexican War with the United States the troops of the latter, directed by General Scott, successfully stormed the hill and castle on Sept. 13, 1847. The attack was preceded by a heavy bombardment of the Mexican metropolis during two days, and the assaulting party comprised two columns of picked soldiers. During the two days' operations the Americans lost in killed and wounded over 800 men. The capture of Chapultepec was followed by the occupation of the capital and the speedy termination of the war. C.L.S.

CHARACEÆ, a group of green Algæ of complex structure. They grow in dense masses at the bottom of fresh and brackish water, and being often incrusted with lime, and hence rough and brittle, are sometimes called "brittle-worts" or "stoneworts." The plants are from a few inches to more than a foot long, the stem having long internodes (each internode in *Nitella* being one cylindrical cell, in *Chara* being a similar cell surrounded by a layer of smaller ones), the leaves and branches appearing in whorls at the nodes, and the conspicuous sex-organs (antheridia and oögonia) borne on the leaves. The circulating movement of protoplasm is easily seen in the internodal cells.

CHARADRIIDÆ, a family of birds comprising the plovers and similar forms. The representatives of the family are cosmopolitan in distribution. See CURLEW, Vol. VI, p. 628.

CHARAES OR XARAYES, a district of inundations. See BRAZIL, Vol. IV, p. 200.

CHARCOT, JEAN MARTIN, French physician; born in Paris, Nov. 25, 1825; died in the Morvan, central France, Aug. 18, 1893. He obtained his diploma as M.D. in 1853; was called to a place on the staff of the Salpétrière in 1862, from which time he continually devoted his attention to the study of the nervous system, and came into international prominence through his experiments in hypnotism and mental suggestion. Besides his principal works on various forms of disease, his *Leçons Cliniques sur les Maladies du Système Nerveux*, and his *Leçons du Mardi à la Salpétrière*, he founded, in 1880, and edited the *Archives de Neurologie*, and took a leading part in the direction of the *Revue de Médecine*, *Archives de Pathologie Expérimentale*, and the *Nouvelle Iconographie de la Salpétrière*. He was a member of the Institute of France, of the Royal Irish Academy, of the Royal Medical and Chirurgical Society of London, and of a great number of other scientific societies in various countries.

CHARD AND CARDOON, vegetables. See HORTICULTURE, Vol. XII, pp. 289, 292.

CHARD, JOHN ROUSE MERRIOTT, an English soldier, famous for his heroic defense, with Lieutenant Bromhead, of the post of Rorke's Drift, in the Zulu war; was born in the county of Somerset, England, Dec. 21, 1847. He was educated at Plymouth and Woolwich, and was gazetted a lieutenant in the Royal Engineers, July 15, 1868. After service at home, in Bermuda and Malta, he was ordered to Zululand on the outbreak of the Zulu war. Here, on the disaster of Isandula, Jan. 22, 1879, he held the near-by commissariat post at Rorke's Drift with eighty men, against an *impi* of 3,000 of the flower of the Zulu military system. Six times the little band of English soldiers drove the savages out of the barricade around the hospital at the point of the bayonet, killing 351 and wounding over 1,000. The heroic defense saved the towns of Helpmakaar and Grey Town from the horrors of a Zulu raid, and its incidents formed the subject for noted pictures by De Neuville and Lady Butler. Lieutenants Chard and Bromhead were decorated with the Victoria Cross for their valor. The former was made captain in 1879, major in 1886, and lieutenant-colonel in 1893. He died at Taunton, Eng., Nov. 1, 1897.

CHARDON, a village and the capital of Geauga County, northeastern Ohio, 37 miles N.N.E. of Akron, on the Pittsburg and Western railroad. It has considerable trade in dairy and farm products. Population 1900, 1,360.

CHARES, an Athenian general. See TIMOTHEUS, Vol. XXIII, p. 425.

CHARES OF RHODES, sculptor. See COLOSSUS, Vol. VI, p. 149.

CHARGE. See HERALDRY, Vol. XI, pp. 622, 629.

CHARGÉ D'AFFAIRES, a diplomatic officer, ranking below ambassadors and ministers, who holds his credentials from and is accredited to the minister for foreign affairs. A secretary of legation is often chargé d'affaires in the absence of the minister. W.F.J.

CHARITABLE USES. See TRUST, Vol. XXIII, pp. 634, 635.

CHARITES, Greek myths. See GRACES, Vol. XI, p. 24.

CHARITON, a northern affluent of the Missouri River which it joins near Glasgow at the boundary of Chariton and Howard counties, Mo., after a southerly course of 250 miles from its source in Clarke County, southern Iowa, near Osceola, 30 miles above Chariton City; it is unnavigable except by boats. C.L.S.

CHARITON, Iowa, the seat of Lucas County, on the Chariton River, 55 miles S. of Des Moines, on the Chicago, Burlington & Quincy R. R., and entered by branch lines. Its industries are agricultural. Pop., 1900, 3,989. C.L.S.

*CHARITY ORGANIZATION, a term that has come into general use to denote a recent movement for bringing the relief agencies of large communities into administrative co-operation. Particular associations bear different names, as associated charities, united charities, bureau of charities, etc.; but the phrase *charity organization* is a popular abbreviation of the title of the parent society in London. This association was instituted in 1869 under the cumbrous style of the "London Society for Organizing Charitable Relief and Repressing Mendicity." It is a general characteristic of this movement that it

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did not proceed from various relief societies uniting to form boards or councils of their own delegates, but from an independent movement to provide a distinct agency to which these societies might adhere voluntarily, and through which they might act in concert. Hence arises a distinct character for those associations that adopt pure charity organization principles. They do not aim to create funds for distribution amongst the necessitous, but rather to promote an economic and salutary distribution of the funds provided by the entire benevolence of a community for the relief of want. In some instances charity organization societies have taken up the work of dispensing funds directly to applicants for aid. In this case, the proceeding has grown out of the neglect or failure of relief societies to co-operate; but it is a deviation from the original scheme and basal principles of charity organization.

For two generations before the London society was established, thoughtful men had come to deplore the mischiefs wrought by an indiscriminate almsgiving. They discovered that alms created the very conditions they were supposed to cure; that benefits to be obtained for nothing produced a crop of applicants greedy to obtain an unearned share of the provision made for the poor. As Chalmers stated the problem, to those who were in want the accumulation of the many gifts of the benevolent into a few treasuries intended for their succor seemed a munificent provision. The poor did not consider the numbers among whom the money was to be divided, but only the total, and this seemed to them inexhaustible. These sums were disbursed, not by the donors, but by officials who became professional in their dealings with the multitude, and who were only almoners of others to whom the beneficiaries of these funds owed neither gratitude nor respect. To the poor, each such almoner was a Cerberus guarding the gates of plenty. Under such an administration, the destitute, who were too often so rather from defects of character than from real misfortune, acquired arts of beggary with dissimulation, and that is the spirit of pauperism. They became shameless, mendacious, brazen. Not only this, but they told others of the relief to be had, and of the arts by which it was to be obtained. No system could well be devised for corrupting the weak and penniless, and for extending pauperism. It was immaterial whether the funds to be given away were raised by taxes and dispensed by the parish, or were consolidated into the foundations of hospitals and asylums, or were dispensed by voluntary societies, or came from the free hand of personal generosity. The material defects of the whole scheme were these: Gifts of money were treated by the community as a panacea for all the ills of poverty, whereas what the poor sorely needed was the help of brave, spirited, well-disposed and potent friendship; in other words, society substituted cash for sympathy, a stone for bread; again, the temptation of ample treasuries to be tapped by begging was spread in the face of misfortune, teaching them to rely upon artificial and irregular means of support, rather than upon the employment of their own faculties as a means of subsistence. Investigation showed that children abandoned aged parents, and husbands wives, and parents children, in proportion as hospitals and asylums were founded; that applications for relief grew as the tax rate increased; that want was always exceeding the provision made for it by the benevolent.

The humanity of men forbade the suppression of pecuniary relief, but it was clearly desirable that such relief should be administered in the most prudent and efficacious way, so that misfortune might be succored with the least corruption of the poor. The problem had been attacked many times and in many places with success. Chalmers had solved it in Glasgow, and Von der Heydt at Elberfeld, in Prussia. The operations of the Society of St. Vincent de Paul and the work of Octavia Hill in East London had shown that much could be done for the necessitous by other means than alms. Experience also had been gained in the especial relief of the Lancashire mill-operatives during the cotton famine in England caused by the American Civil War. An undoubted impulse to the organization of the London society was found in the mission of Edward Dennison to Stepney, East London, in 1868, where he resided eight months, visiting and studying the conditions of wretchedness there. He wrote: "I am beginning seriously to believe that all bodily aid to the poor is a mistake; whereas, by giving alms you keep them permanently crooked. Build schoolhouses, pay teachers, give prizes, frame workman's clubs, help them to help themselves, lend them your brains; but give them no money except what you sink in such undertakings." His high personal and social standing influenced his friends, and they joined together in 1869 to form the society named.

It was impossible to bring the vast number of various organizations of the metropolis, parish relief, asylums, workhouses, voluntary societies, to organize themselves into a unity. In many cases they did not see the need of better methods; in others they were unwilling to have their administration criticised; altogether they were too multitudinous, unwieldy and inert to construct for themselves measures of practical co-operation. To draw them into unity the London society proposed a bureau where each of these independent agencies might register every case of its own relief, where their thousands of reports could be consolidated, and whence each might learn the result of these collated records. By such a registration bureau the whole field of London misery might be disclosed and the various societies made auxiliary to each other. The London society further proposed to send out friendly visitors, who should not give relief, but should befriend with their brains and counsels those who applied for aid, and whose reports upon each case should be available to all sorts of relief officials and

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private benefactors for the direction of their almsgiving.

The society organized district committees, one for each poor-law union in London. These committees consisted of clergymen, guardians of the poor and representatives of local charities. The district committees by delegates constituted a council, of which there were some few *ex officio* members. The functions of the council were to give unity of principle and method to the district committees; to aid them in every way, as by suggestion, by repression of imposture, through the agency of the law when necessary, and by seeking systematic co-operation from London's municipal and voluntary agencies of relief. The district committees were to aim at the prevention of overlapping aid, were to investigate all cases of need made known to them; were to obtain, if possible, from existing provisions, suitable and adequate succor for the deserving; were to place their knowledge of particular needs at the service of charitable agencies and private persons; were to promote social and sanitary reforms and habits of thrift; and were to advise the public concerning matters they thought desirable to accomplish, and for which suitable provision was not made. In substance, this plan has been followed wherever charity organization principles have been adopted in the United States.

The first movement of this nature known in the United States is to be credited to Boston, where the city, in combination with private citizens, erected an edifice, known as the Charity Building, in Chardon Street, to be the official home of municipal and private relief organizations. Here a certain amount of co-operation was obtained, and the way prepared for the fuller development of a wise and efficient system. This building was erected in 1869 and was contemporary with the formation of the London society. The first conscious adoption of the methods of the English society took place in Germantown, a suburb of Philadelphia, in 1873. This was a rural suburb and a distinct ward, characterized by considerable unanimity of social sentiment and local pride, having wealth and intelligence as well as poverty. The success of the Germantown association attracted attention, and began to be widely quoted throughout the city and elsewhere. In 1878 an English clergyman, who had been an active official of the London society, came to Buffalo and established a charity organization society there, which, from the outset, obtained the co-operation of the executive government. Results were immediately seen in the improved administration of the civic charities, and the movement was warmly supported by a body of intelligent and patriotic citizens. In the same year, a new movement in Philadelphia, in which Germantown was merged, resulted in the establishment of a large and highly successful society there, with branches spread throughout the wards of the city. From these points the organizations spread year by year to the principal cities of the Union, until in 1895 there were 132 such associations, extending from Ottawa to New Orleans and from Maine to California. Some of them were old relief societies that adopted charity organization principles and came into accord with the general movement; the most of them were new foundations, offering their services to the communities in which they were located. These communities embrace a population of nearly fourteen million souls.

Charity organization societies are in correspondence with each other, as well in America as throughout the British Empire. By this means they are able to follow a case from Australia to Puget Sound, sometimes returning a destitute person to family friends, sometimes recovering a pension, and sometimes putting a stop to depredations upon benevolent society throughout the English-speaking world.

In theory, a charity organization society proposes to do everything requisite for the permanent relief of destitution and the reformation of character that ingenuity can devise, and to find the means therefor, if possible, in the provisions for succor that each community has already founded. It aims to establish everywhere a corps of visitors who shall attach themselves to families and to individuals, with a view to acquiring a complete understanding of the nature of their wants and of suitable proceedings to restore them to independence. This visitation work is largely, and most appropriately, the function of women. Where mendicity is encountered, it is resisted. Efforts are made to suppress corrupting relief by invoking labor-tests, such as woodyards and wayfarers' lodges. Labor-tests consist in the requirement of a certain amount of coarse but simple work in return for food and lodging. Those who endure the test are retained long enough for them to find employment; those who refuse it are treated as vagrants.

Various devices have been found, such as savings funds, small loans for the purchase of tools, workrooms for unskilled women, laundries, crèches for the care of children, while the mothers are at work, employment bureaus, etc., to place needy persons in conditions of temporary self-maintenance, etc., until a better way of self-support may be found. Provision is also made to secure suitable sanitary conditions in tenements, and to afford children and young mothers outdoor excursions, or a short sojourn in country homes.

It is also a principle of charity organizations to bring into concert of administration to the utmost extent, not only the large charitable and penal institutions of municipal departments of charity and correction, but churches, voluntary societies and beneficent individuals. Such co-operation is hard to obtain, on account of the vast extent of the field and the sluggishness arising from the established traditions and persistent habits of a community. Considering the inertia to be overcome, this branch of work has made reasonable progress, and the ground once covered is seldom wrested away.

Recently a new phase of the work has sprung up,

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full of promise, both for the working out of charity organization doctrines as a part of sociological science, and in disseminating higher intelligence in the work. It consists of an alliance made between universities and the larger of these societies, as in Boston, New York and Chicago, where the universities of Harvard, Columbia and Chicago, have established seminaries to which the organization societies are auxiliaries. The young students enter the service of these societies under the direction of their preceptors, to study the operations of economic laws in the pauper world. The effect is reciprocal, for the societies profit by the intelligent study and criticism of their university associates, while these associates test their judgments in the wide field of practice.

Charity organization forms a section of the National Conferences of Charities and Correction which meets yearly at some previously designated city, and here goes on a valuable exchange of views, founded upon actual records of work done and the disclosure of methods employed in various parts of the country.

The influence of this movement has been very wide—perhaps wider and more potent in its influence on the legislation of many states, on the administration of municipal charities, and in stimulating new enterprises, such as university settlements, kindergartens, trade schools, etc., than in the results of direct contact with the destitute. Still, these latter results are by no means small, and have introduced a new criterion of humane succor. It is more and more widely seen that the type of true benevolence is not in the magnitude of things given away, but in the recovery of souls from personal depression and degradation.

Charity organization is simply a distinct recognition of the facts that real misfortune, as a rule, is but temporary; that a sound society rests more upon character than circumstances; and that the only effectual method of eradicating social evils is moral—that is, that the strong and the healthful and the wise shall make their poorer brethren participators in these qualities.

Literature. The proceedings of the National Conference of Charities and Correction, published annually, contain an account of the Charity Organization Section sessions and the papers read there. The leading periodicals devoted to this work are monthlies, and, in the order of their founding, are *The Monthly Register* (Philadelphia) *Lend a Hand* (Boston) and *The Charities Review* (New York). The larger societies keep on hand a list of small treatises of practical character concerning various phases of charity organization, and their reports contain much general information. The two most compact histories of the movement in America are by S. H. Gurteen and Charles D. Kellogg. D. O. KELLOGG.

CHARITY, SISTERS OF, one of the sisterhoods of the Roman Catholic Church. The members of this order are sometimes called "Gray Sisters," "Daughters of Charity" and "Sisters of St. Vincent de Paul." The order or congregation was founded by St. Vincent de Paul at Paris in 1634. Its first object was to be the nursing of patients in hospitals. There have since been added to the duties of the members, the taking charge of orphanages, and in some places the management of poor-schools. They are under the direction of the Lazarists. Their vows are simple and are renewed each year. The order, at first confined to France, is now spread all over the world, and numbers between 30,000 and 40,000. There are also, in addition to the order just described, the Sisters of Charity in Ireland and the Sisters of Charity of St. Paul. The former was founded in Dublin, Ireland, in 1815, by Mary Frances Aikenhead. The order is similar in its objects to the main society. The vows, however, are perpetual. In 1891 this order had 22 convents in Ireland and one in England. The central power is in the mother superior, who has jurisdiction over the whole. The Sisters of Charity of St. Paul was founded by Chauvet, a French curé, in 1704. This order is devoted almost entirely to giving instruction to the children of the poor. It was introduced into England in 1847.

CHARIVARI, a serenade of discordant music, used originally to annoy widows who married the second time, but also, on other occasions, when the performers desired to annoy or insult any one. In some districts of the United States, this rough kind of serenade is common at any marriage, and is generally rather a token of good feeling than of any desire to insult either bride or groom.

CHARLEROI, an iron-manufacturing town in Washington County, Pennsylvania, on the Monongahela River and the P. R. R. Pop. 1900, 5,930.

CHARLES I (CHARLES EITEL FREDERICK ZEPHYREN LOUIS), king of Roumania; was born at Singmaringen, April 20, 1839; the second son of Prince Charles Antoine de Hohenzollern. He was educated at Dresden (1850–56), and Bonn; and entered the Prussian army. He was elected Prince of Roumania in 1866, and in 1869 married Elizabeth de Wied, who is known as "Carmen Sylva," the author of popular verse and fiction. She is much loved by the Roumanian people. See ELIZABETH OF ROUMANIA, in these Supplements. Prince Charles became king of Roumania in 1881. R.C.A.

CHARLES I.

CHARLES I, an eccentric king of Würtemberg; born March 6, 1823; succeeded his father, William I, on June 25, 1864. He married, July 13, 1846, the Grand Duchess Olga, daughter of Nicholas I, czar of Russia. Originally an opponent of the unification of Germany, at any rate to the extent of Prussian pre-eminence, he conceded to the inevitable, and supported his fellow-Germans with an army corps in the sharp and decisive struggle with France in 1870. Though trained to militarism, his bent was toward art and literature. Stuttgart benefited architecturally, musically and scientifically by his reign, the last ten years of which were rendered ludicrous by

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Charles I's credulous encouragement of a parcel of American adventurers, who evolved weird hypnotic experiences wherewith to control the weak-minded king. His last years were practically passed in confinement. He died in Stuttgart, Oct. 6, 1891, and was succeeded by his uncle's grandson as William II.

CHARLES III, PRINCE OF MONACO, born in 1818; he succeeded his father, Florestan I, on June 20, 1856. Early in his reign he sold the communes of Mentone and Rockabrunna to France for the sum of $800,000 to replenish the empty coffers of his petty principality. While with one hand he built a Benedictine monastery, so as to secure a bishopric at Monaco for his spiritual needs, with the other he fostered the principal gambling-den of Europe, which, after his abolition of all taxes, was his only source of revenue. With the co-operation of the pope in 1880, he divorced his son and heir from his wife, Lady Mary Douglas Hamilton, after a union of 11 years. He died Sept. 10, 1889, and was succeeded by his son, Albert Honoré Charles.

CHARLES, CAPE, Virginia, an islet on the north side of the entrance to Chesapeake Bay, forming the southernmost point of the eastern peninsular county of Northampton. It lies southwest of Smith Island and its lighthouse. C.L.S.

CHARLES, ELIZABETH (RUNDLE), an English writer of religious stories; the only child of Thomas Rundle, at one time member of Parliament for Tavistock, Devonshire; born in 1826, she married Andrew Paton Charles of London in 1851. In 1863 she published *The Chronicles of the Schönberg-Cotta Family*, a story of the days of Luther, and with a distinctively religious purpose. This work had considerable popularity, especially in America. It was followed by *The Diary of Mrs. Kitty Trevelyan* (1864), a novel dealing with the Wesleyan movement; *The Early Dawn* (1864); *Winifred Bertram, and the World She Lived in* (1866); *The Draytons and the Davenants* (1867); *The Martyrs of Spain and Liberators of Holland* (1870); *Against the Stream* (1873); *Joan, the Maid* (1879); *Lapsed, not Lost* (1881). She edited some works of Christian song, in addition to her other labors. She died in Hampstead, London, England, March 29, 1896.

CHARLES, JACQUES ALEXANDER CÉSAR (1746–1823), a French physicist. See AERONAUTICS, Vol. I, p. 170.

CHARLES CITY, Iowa, the seat of Floyd Co., on the Cedar River, and a junction for branch lines of the Chicago, Milwaukee & St. Paul R. R. It has a college and academy; good water-power promotes milling, the manufacture of furniture, and other industries. Pop., 4,227. C.L.S.

CHARLES FREDERICK WILLIAM, DUKE OF BRUNSWICK, son of the duke who fell at Quatre Bras; was born in 1804, and succeeded in 1823. He was a man of vast wealth but erratic mind, and was deposed by the German Diet in 1830. He spent the rest of his life in other lands, and died on August 18, 1873, leaving his fortune to the city of Geneva, Switzerland. W.F.J.

CHARLES RIVER, Massachusetts, about 76 miles long, rises in the east of Worcester County, and its outlet forms one of the upper reaches of Boston Harbor. Below Dedham it connects also with the Neponset. C.L.S.

CHARLES'S WAIN, the constellation Ursa Major, the Great Bear; also popularly known as the Plow and the Dipper. The term is a corruption of the old English *ceorles wæn* (the churl's wagon), and has been further corrupted into "King Charles's wain." Shakespeare refers to it in *Henry IV.*

CHARLESTON, a city and capital of Coles County, central eastern Illinois, on the Cleveland, Cincinnati, Chicago and St. Louis and on the Toledo, St. Louis and Kansas City railroads, 48 miles W. of Terre Haute. It has an infirmary and a medical college. Population 1900, 5,488.

CHARLESTON, Missouri, the seat of Mississippi County, and a junction on the St. Louis, Iron Mountain & Southern R. R., 15 miles southwest of Cairo, Ill. A wooded, farming, and grazing region furnishes lumber, cattle, grain and other agricultural produce. Pop., 1,893. C.L.S.

CHARLESTON, a city of South Carolina, and county seat of Charleston County. The trade of the city for the year 1889 amounted to $80,000,000, an increase of $4,000,000 over that of the

THE BATTERY, CHARLESTON.

previous year. The imports for 1889 were $683,232, and exports $13,807,673. Manufacturing industries numbered 364, with $12,473,187 capital, producing $9,562,387. The phosphate industry leads, the trade in phosphate fertilizers alone amounting (1900) to $3,697,090, as against $2,612,660 in 1887. In Dec., 1901, was opened at Charleston the South Carolina Interstate and West Indies Exposition, designed to show the development of the New South, and the extent of its commercial relations with the West Indian islands. Public schools and libraries have advanced with the population and wealth of the city. Population 1900, 55,807. See also CHARLESTON, Vol. V, p. 370.

CHARLESTON OR KANAWHA COURT-HOUSE, West Virginia, the capital of the state from 1869 to 1875, and again since 1885, and the county seat of Kanawha County, at the confluence of the Elk and Kanawha rivers, 60 miles south of Parkersburg. It is in an extensive coal region,

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and has a large trade in coal, and the products of foundry and machine works, boiler works, brick works, woolen mills, ship-building yards, etc., the exports of which are promoted by various railways and steamer communication with Ohio and Mississippi ports. Pop., 1890, 6,742; 1900, 11,099. C.L.S.

CHARLESTON, COLLEGE OF, the oldest college in South Carolina; was founded in 1770, and chartered in 1785, but not actually opened for work until 1791. Under the presidency of Dr. Adams, formerly of Brown University, in 1824–36, it was raised to real collegiate rank. It suffered much during the Civil War, and its buildings were damaged by the earthquake of 1886, but it is now in a prosperous condition. It is under the control of the city government of Charleston. It is for men only, and is non-sectarian. In 1904 it had eight professors and 75 students, and a library of 15,625 volumes. W.F.J.

CHARLESTOWN, a manufacturing town of Sullivan County, central western New Hampshire, on the Connecticut River, and on the Central Vermont and Boston and Maine railroads, 50 miles W. of Concord. It has manufactories of boots, shoes and lumber. Population, 1900, 1,473.

CHARLESTOWN, West Virginia, the seat of Jefferson County, an agricultural industrial center, 10 miles by rail S.W. of Harper's Ferry. It was the scene of John Brown's trial and execution, Dec. 2, 1859. Pop., 1900, 2,392. C.L.S.

CHARLEVOIX, Michigan, the seat of Charlevoix County, on Lake Michigan, at the entrance to Pine Lake, and on the Bay View to La Crosse branch of the Pere Marquette railroad, 200 miles north of Grand Rapids. It is a summer resort, in a lumber region, with allied industries, and lucrative lake fisheries. Pop., 1900, 2,079. C.L.S.

CHARLOIS, a village of south Holland, situated on the Maas, about two miles S.W. of Rotterdam. It is memorable on account of a terrible accident which occurred here in 1515. A religious procession crossing on the ice in defiance of magisterial prohibition, was precipitated into the Maas, and 8,000 lives were lost. Population, 1899, 2,253.

CHARLOTTE, a railroad city and the capital of Eaton County, central southern Michigan, on the Michigan Central and the Chicago and Grand Trunk railroads, 20 miles S.W. of Lansing. Lumber and flour are here manufactured. Population, 1890, 3,867; 1900, 4,092.

CHARLOTTE, a city and the capital of Mecklenburg County, North Carolina, situated on Sugar Creek, and on the Southern and the Seaboard Air Line railroads, 110 miles N. of Columbia, the capital of S. C. The court-house is a fine structure. The Biddle (Presbyterian) University was organized here in 1867. In 1838 a branch mint was established in Charlotte. The principal manufactories are of carriages, machinery, cotton goods, agricultural implements, tobacco and iron castings. Pop., 1890, 11,577; 1900, 18,091.

CHARLOTTE, ex-empress of Mexico. See CHARLOTTA, in these Supplements.

CHARLOTTE-AMALIE, Danish West Indies, a fortified seaport town on the south coast of the island of St. Thomas, surrounding a fine bay which forms one of the best harbors in the West Indies. It is a free port and carries on a considerable transit trade chiefly with the United States. Pop., 15,000. C.L.S.

CHARLOTTE AUGUSTA, princess of Great Britain, the only child of King George IV and Queen Caroline. She married, in 1816, Leopold of Saxe-Coburg, afterward King of the Belgians, and died Nov. 6, 1817. As to her treatment by her debauchee father, see BROUGHAM, Vol. IV, p. 338; GEORGE IV, Vol. X, pp. 384, 385.

CHARLOTTE HARBOR, Florida, a shallow inlet of the Gulf of Mexico forming the western boundary of De Soto County. Gasparilla Island at the main entrance gives it the alternative name of Gasparilla Sound. From a chain of islands separating it from the Gulf it extends inland 24 miles, with an average width of 10 miles, to the mouth of the Peace River. C.L.S.

CHARLOTTENBURG, Germany, a residential and industrial town suburban to Berlin, west of the Thiergarten. See Vol. V, p. 372. Pop., 150,000. C.L.S.

CHARLOTTETOWN, Canada, the capital of Prince Edward Island, on Hillsborough Bay, a landlocked inlet of Cumberland Strait. (See Vol. V, p. 372.) Pop., 1901, 12,080. C.L.S.

CHARNOCK, RICHARD STEPHEN, was born in London, England, on August 11, 1820, was educated at King's College, and became a barrister. He traveled widely through Europe, northern Africa and Asia Minor, studying anthropology, archæology, philology, and particularly the Celtic and Oriental languages. He is the author of a number of standard works, including guides to the Tyrol, to Spain and Portugal, and treatises on the dialects of various countries and districts; studies in etymology and nomenclature, and essays on manners and customs. He is a member of many learned societies. W.F.J.

CHARON OF LAMPSACUS, a noted historian of Lampsacus, who flourished about 464 B.C., and wrote works on Ethiopia, Persia, Greece and other countries, the fragments of which were collected and published by Max Müller in 1841.

CHARR, a fish of the *Salvelinus* genus. See SALMONIDÆ, Vol. XXI, pp. 234, 236.

CHART, a marine or hydrographical map exhibiting a portion of a sea or other water, with the islands, coast of contiguous land surroundings, currents, etc. See *Nautical Maps*, under MAP, Vol. XV, pp. 525–527; especially SURVEYING, Vol. XXII, pp. 745–748, 750–754.

CHARTA EMPLASTICA (Lat., *emplasticus*, is from Gr., *emplastikos*, fit to spread), in medicine, paper covered with some adhesive substance to be used for external application as a plaster. Some plasters owe their consistence to wax and resin, and others to the chemical union between the oxide of lead and oil. W.R.B.

CHARTE, a charter, or system of constitu-

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tional law, included within a single instrument. Two famous *chartes* are known in French history. The first, or *Grande Charte*, was that given by King John in 1355. The second and better known was that given by Louis XVIII on his restoration to the throne in 1814, in which he acknowledged the rights of the nation. It served, with some modifications by Louis Philippe, in 1830, as the fundamental law of the monarchy, until it was abolished by the Revolution of 1848. The term is obviously closely akin to *Magna Charta* in English history. W.F.J.

CHARTER, a term applied in the United States to the deed or instrument of conveyance by which land is granted by the government to an individual or a corporation. The certificate issued by the proper officers of a state or the act passed by the legislature creating a corporation is also called a charter. See also CHARTER, Vol. V, pp. 374, 375.

CHARTER HOUSE, a corruption of Chartreuse, or Carthusian, is the name of a famous English boys' school, now situated at Godalming, in Surrey. It takes its name from a Carthusian monastery, which was founded in London in 1371, and which was abolished by Henry VIII. In 1611 the property was purchased by Thomas Sutton, of Cambridgeshire, who richly endowed it and made it an asylum or home for "poor brethren," a school, and a religious institution — whence it was called by Francis Bacon a "triple good." The whole institution occupied the old site in London until 1872, when the school was removed to Surrey, the asylum, hospital, and chapel remaining on Charter House Square, London, and forming a picturesque landmark of that city. The "brethren" number eighty, and must be at least fifty years old when admitted. Thackeray immortalized an imaginary member of the company in his *Colonel Newcome*. The school, which ranks among the best in England, has about 500 scholars, of whom only sixty have scholarships under the endowment. Among eminent students in the Charter House School were Blackstone, Addison, Steele, John Wesley, Grote, Thackeray, and John Leech. Reminiscences and memorials of it are numerous in English history and literature. W.F.J.

CHARTERIS, ARCHIBALD HAMILTON, a clergyman; born at Wamphray, Dec. 13, 1835; studied at Edinburgh, Tübingen and Bonn; was a minister at different places, organized the Young Men's and Young Woman's Guild; revived the order of Deaconesses; was professor of Biblical criticism at Edinburgh from 1868–98. Among his works are *Early Testimonies to the Books of the New Testament; A Faithful Churchman*, and *The Christian Scriptures*. G.A.S.

CHARTER OAK, a huge, venerable and historic white oak tree which once stood in the city of Hartford, Conn. It gained its name and fame from having been the hiding place of the parchment Charter of the colony of Connecticut in 1687, when Sir Edmund Andros, under royal orders, sought to seize and revoke that instrument. The charter was placed in a hollow of the tree by Captain James Wadsworth, and was thus pre-

CHARTER OAK.

served. The tree was thereafter carefully cherished, but grew infirm and was destroyed by a storm in August, 1856. W.F.J.

CHARTRES, DUC DE (Robert Philippe Louis Eugène Ferdinand d'Orléans), grandson of King Louis Philippe of France; born at Paris, Nov. 9, 1840. He lost his father at the age of two years, and when six years old was driven into exile by revolution. He learned the military art in the Italian army, and served as a captain on McClellan's staff in 1862, during the early part of the American Civil War. He married, June 11, 1863, the eldest daughter of the Prince de Joinville. After Sedan he came to the aid of France, serving in General Chanzy's army corps under an assumed name. On the revocation of the edict of banishment in 1871, he served as major in Algiers, becoming lieutenant-colonel and ultimately colonel commanding the Twelfth Chasseurs. In 1883 he was dismissed from the French army by the Republican government, and in 1886 again banished from the country as a possible pretender to the throne.

CHARTULARY OR CARTULARY, a collection of charters. As soon as a body, ecclesiastical or secular, possessed a considerable number of charters, they were classified and copied into a book or roll, called a chartulary; the officer in the ancient Latin church who had charge of the records was called a cartulary. See also DIPLOMATICS, Vol. VII, p. 220.

CHARTERS TOWERS, a mining township of Davenport County, northeast Queensland, Australia, situated on the northern spurs of the Towers Mountain, 820 miles N.W. of Brisbane. It dates from the gold discovery here of 1871–72, and was incorporated in 1877. It has railway connection with Townsville, on the coast. Population 1901, 20,976.

CHASE, GEORGE, lawyer and educator, was born at Portland, Maine, on December 29, 1849, and was graduated from Yale in 1870 and from the Columbia College Law School in 1873. He

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was professor of law at Columbia College in 1873–91, and since 1891 has been dean of the New York Law School, which he has raised to a high standard. He has written and edited numerous legal works. W.F.J.

CHASE, IRAH, an American theologian; born in Stratton, Vt., Oct. 5, 1793. He graduated at Middlebury College in 1814, studied theology at Andover, and was ordained in 1817. In 1818 he was appointed professor in the Philadelphia Theological School. He spent a year in Europe, and in 1825 took a leading part in founding the Newton (Mass.) Theological Seminary, in which he was a professor until 1845. He published several doctrinal articles in reviews, etc. He died in Newton, Mass., Nov. 1, 1864. E.E.T.

CHASE, PHILANDER, clergyman, was born at Cornish, New Hampshire, on December 14, 1775, and was educated at Dartmouth College. He entered the ministry of the Protestant Episcopal Church in 1798, and served in western New York, New Orleans, Hartford, Conn., and Ohio. He was made bishop of Ohio in 1819, and a few years later founded Kenyon College and Gambier Theological Seminary. As the result of a dispute with his clergy he retired from his bishopric in 1831, for which he was censured by the general convention of his church, but in 1835 he was made bishop of Illinois, and in 1838 he founded Jubilee College in that state. He was the author of several books, two of them about Kenyon College, and for many years was one of the greatest forces in the advancement of the Protestant Episcopal Church in the middle west. He died on September 20, 1852. W.F.J.

CHASE, PLINY EARLE, educator, was born at Worcester, Massachusetts, on August 18, 1820, and was educated at Harvard. He wrote a number of works on mathematics and philology, and then devoted himself to physics, investigating magnetism, chemical affinity, heat, light, gravitation, meteorology, etc. He was the discoverer of numerical relations between gravity and magnetism, for which he received in 1864 the Magellanic medal of the American Philosophical Society. For many years he was professor of philosophy in Haverford College. He died on December 17, 1886. W.F.J.

CHASE, SAMUEL, an American jurist; born in Somerset County, Md., April 17, 1741. He was admitted to the bar in 1761. He entered into open conflict with the Crown, and strenuously opposed the Stamp Act. From 1774 to 1778 he was a member of the Continental Congress. In 1776 he brought the wavering Maryland convention over to the cause of independence, and himself signed the Declaration. In 1783 he went to England to recover Maryland funds which had been invested in the Bank of England previous to the war, a mission in which he was largely successful. In 1791 he was appointed chief justice of the General Court of Maryland. He sat in the convention that considered the Federal Constitution. In 1796 President Washington appointed him an associate justice of the Supreme Court of the United States. He was charged with arbitrary conduct in several important trials, and in 1804 he was impeached, but discharged. He died, June 19, 1811, leaving the reputation of a patriot, a learned and skilful lawyer, and an upright though sometimes overbearing judge. E.E.T.

CHASE, THOMAS, educator, brother of Pliny Earle Chase (q. v.), was born at Worcester, Massachusetts, on June 16, 1827, and was educated at Harvard. From 1855 to 1875 he was professor of Greek and Latin at Haverford College, and from 1875 to 1887 he was president of that institution. He was one of the American translators of the revised New Testament, and was the author of standard editions of many classics. He died on October 5, 1892. W.F.J.

CHASE, WILLIAM MERRITT, artist; born in Franklin, Ind., Nov. 1, 1849; studied with Wagner and Piloty, Munich. In 1878 he opened a studio in New York. He received a medal at Philadelphia, 1876; honorable mention, Paris, 1881; honors, Munich, 1883; silver medal, Paris, 1889; 1st prize, Cleveland Art Association, 1894; Shaw prize, Society of American Artists, 1895; gold medal of honor, Philadelphia Academy of Fine Arts, 1895, and gold medal, Paris Exposition, 1900. G.J.H.

CHASE, WILLIAM ST. LUCIAN, military officer; born in St. Lucia, West Indies; was educated by private teachers and in private schools. He entered the British army in 1876 as a member of the 15th regiment. Two years later he was assigned to the Indian Staff Corps. He participated in the Afghan war; was present at the defense of Kandahar, and aided in the sortie on Deb Kajah. During the Chin-Lushai expedition he won distinction in the attack on Fort Naba. In 1897 he served on the northeast frontier of India during the Mohmand expedition, and also during the Tirah campaign in 1897–98. Later he participated in the capture of Sampagha Pass. G.J.H.

CHASIDIM, a Jewish sect. See JEWS, Vol. XIII, p. 691.

CHASING. See ENCHASING, Vol. VIII, p. 173.

CHASKA, the county seat of Carver County, southeastern Minnesota, on the left bank of the Minnesota River, and on the Minneapolis and St. Louis, the Chicago, Milwaukee and St. Paul and the Chicago, St. Paul, Minneapolis and Omaha railroads, 32 miles S.W. of St. Paul. The manufacturing industries of the city are quite important. It has a grain-elevator and some fine business blocks. Population, 1900, 2,165.

CHASLES, MICHEL, mathematician; born in Épernon, France, Nov. 15, 1793; was professor at l'École Polytechnique and at the Sorbonne; and was one of the presidents of the Academy of Science. In 1867 he was duped into announcing the discovery of manuscripts by Pascal and others. He died in Paris, Dec. 18, 1880. G.J.H.

CHASLES, VICTOR EUPHÉMION PHILARÈTE, a French writer; born at Mainvilliers, near Chartres, Oct. 8, 1798. Early imbued with Rousseau's

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ideas by his father, he was apprenticed at 15 to a Jacobin bookseller, with whom he was sent to jail after the restoration. Released by Chateaubriand's influence, he went to England, where he found employment in a bookseller's shop, and during his seven years' residence laid the foundation of his large knowledge of English literature. After his return to France, he contributed reviews of English books to the *Revue Encyclopédique*. In 1824 he published *Discours sur Jacques Auguste de Thou*, and in 1828 *Tableau de la Langue et Littérature Française, 1500–1610*. In 1837 Chasles became librarian of the Bibliothèque Mazarin, and in 1841 professor of northern languages at the Collège de France, which chair he filled until his death at Venice, July 18, 1873.

CHASSÉ, David Hendrik, Baron, was born at Thiel, Gelderland, on March 18, 1765, and in early life went to France and entered the French army. In 1793 he went with Pichegru to Holland, and fought against the English. He greatly distinguished himself in the Dutch service at Waterloo. In the separation of Belgium from Holland he played a heroic part, defending the citadel of Antwerp against the insurgents in 1830, and defending Antwerp against the French in 1832 with great valor. Upon the fall of the fortress he was held as a hostage and sent to Dunkirk, but was released after the signing of the treaty of May, 1833. He died on May 2, 1849. W.F.J.

CHASSEPOT, Antoine Alphonse, inventor; was born in France on March 4, 1833, the son of a gunsmith. He entered the government arsenals, and rose to the rank of principal in the shop of St. Thomas, in Paris, in 1864. He devised the rifle which was called by his name, and which was most effective against the Garibaldians at Mentana, but proved to be inferior to the Prussian needle gun in the war of 1870. He secured patent rights upon his invention, and thus received from it a large fortune. He was decorated with the cross of the Legion of Honor in 1866, and was promoted to be an officer of the order in 1870. Later he became the proprietor of a hotel at Nice. The Chassepot rifle has long since been superseded by other weapons. Died Feb. 14, 1905. W.F.J.

CHASSEUR, a name given to certain light troops in several of the European armies. In 1815, battalions of chasseurs were enrolled in the French army. The name is now generally applied to special corps of light troops designed for rapid movements, whether cavalry or infantry.

CHASSEURS DE VINCENNES, a famous regiment of riflemen in the French army, which was formed in 1838. It was long reputed to be the best regiment in the French army for rapidity and precision of action. W.F.J.

CHASTELLUX, François Jean, Marquis de, a French soldier and man of letters; born in Paris in 1734. He distinguished himself in the Seven Years' War in Germany, and later in America, where he served as major-general under Rochambeau. In 1772 he published *De la Félicité Publique*. His *Voyages dans l'Amérique Septentrionales* gives his opinions of America and the Revolution. He died in Paris, Oct. 28, 1788. E.E.T.

CHASUBLE, an ecclesiastical service-robe. See Costume, Vol. VI, p. 408.

CHAT, the common name of birds of the thrush family, belonging to the genera *Pratincola* and *Saxicola*. They are principally African, but species are found in Europe and America. The chats are valuable insectivorous birds. See Wheat-ear, Vol. XXIV, p. 567.

CHATEAUGAY, lakes, a river and a town in Franklin County, northeastern New York. The Upper Chateaugay Lake, on the boundary between Franklin and Clinton counties, is the source of the Chateaugay River. The river runs north-northwest through the Lower Chateaugay Lake, into Canada, then northeast into the St. Lawrence, just below Lake St. Louis. It is about 90 miles in length. The upper lake is about eight miles long and five wide, the lower lake five miles long and three wide. The town of Chateaugay is on the Vermont Central railroad, a short distance east of the river, in the northwest corner of Franklin County. Its industries are the manufacture of dairy products. Population, 1890, 1,172; 1900, 973.

CHÂTEAUROUX, Marie, Duchess of, was one of the mistresses of Louis XV of France, noted for her intrigues. She died, probably of poison, in December, 1744. Her title was taken from the name of an important manufacturing city, now the capital of the Department of the Indre, the birthplace of General Bertrand. The population of the city is about 30,000. W.F.J.

CHÂTELDON, a village in the northeast of the department of Puy-de-Dôme, France, not far from the right bank of the Allier River, nine miles N. of Thiers. There are mineral springs here, the water of which is exported for table-use. Population, about 2,000.

CHATELET-LOMONT, Gabrielle Émile, Marchioness of, was born in Paris on December 17, 1706, daughter of Baron Breteuil. She became famous for her learning in many branches of science; married the Marquis of Chatelet-Lomont; was the mistress of Voltaire for fifteen years, and then transferred herself to Captain St. Lambert. She died on September 10, 1749. See Voltaire, Vol. XXIV, p. 308. W.F.J.

CHÂTELGUYON, France, a village in the department of Puy-de-Dôme, near Riom, celebrated for its mineral springs and baths, chief of which are the Gubler waters, containing chloride of magnesium. It is much frequented by health-seekers suffering from rheumatism, derangement of the digestive organs, and related disorders. Pop., 2,000. C.L.S.

CHATFIELD, a city of Fillmore County, southeastern Minnesota, on the Root River and on the Chicago and North-Western railroad, 50 miles E.S.E. of Winona. It is in a rich agricultural district, from which it derives a large trade. Population, 1890, 1,335; 1900, 1,426.

CHATHAM, Massachusetts, a fishing town and summer resort of Barnstable County, 88

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miles by rail S.E. of Boston, on an inlet of Nantucket Sound, at the southeastern corner of Cape Cod. Pop., 1900, 1,749. C.L.S.

CHATHAM, New Brunswick, a town of Northumberland County, on the Miramichi estuary, and on a branch of the Canada Eastern railroad. It is a port of entry with an excellent harbor, an active trade in lumber and salmon, and has numerous domestic industries. Pop., 1901, 4,868. C.L.S.

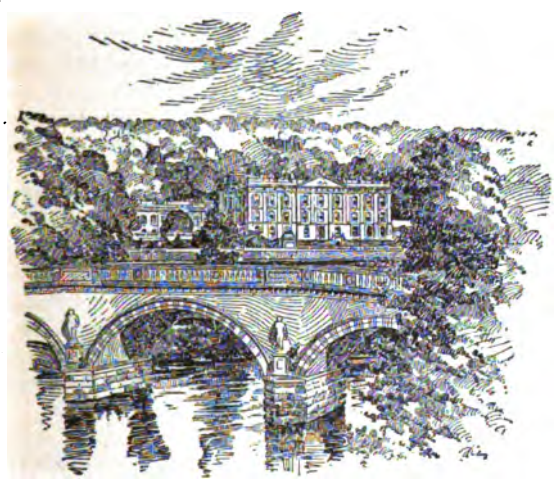
CHATHAM, Ontario, the seat of Kent County, on the Thames River, 46 miles east of Detroit, Mich. It is a manufacturing town and busy railway junction, exporting machinery, woolens, manufactured timber, potash, soap, and tobacco. Pop., 1901, 9,068. C.L.S.

CHATHAM VILLAGE AND CHATHAM FOUR CORNERS, a thriving village of Columbia County, southeastern New York, on the Boston and Albany and the Kinderhook and Hudson railroads. It has cotton and paper mills, blast-furnaces and machine-shops. It is a junction for the Boston and Albany, the New York and Harlem and the Harlem Extension railroads. Population, 1900, 2,018.

CHATOYANT, in mineralogy, the changeable light resembling that of a cat's eye, reflected by certain minerals. The reflections are sometimes colored, as in Labrador feldspar; or pearly, as in adularia, or silky, as in satin spar. W.R.B.

CHATRIAN, ALEXANDRE, a French novelist. See ERCKMANN-CHATRIAN, in these Supplements.

CHATSWORTH, England, a village in the parish of Edensor in the western division of



CHATSWORTH.

Derbyshire, 12 miles northwest of Matlock. Here is situated Chatsworth Hall, a country seat of the Duke of Devonshire, with its beautifully laid out gardens and extensive grounds, celebrated as the finest of typical English mansions and estates. Chatsworth is two miles northeast of Rowsley station, the terminus of a branch line of the Midland railway, and is also approached from Whaley Bridge on a branch of the London & Northwestern railway. The estate is about nine miles in circumference, and is watered by the Derwent River, across which the main driveway passes upon a bridge ornamented with groups of statuary. The grounds present fine prospects of hill and dale, where deer and other game animals roam unmolested. The mansion, called a palace from its magnificence, is in the Ionic style and consists of a superb quadrangular edifice surrounding a central open court ornamented with the splendid Orion fountain. It was built from 1687–1706 for the first Duke of Devonshire after designs by Wren and Talman, and parallel to its front extends the north wing erected since 1720. The length of the façade is 720 feet, or with the terraces 1,200 feet. The interior decorations, the furniture, curiosities, paintings and statuary, are all artistic productions of untold value, the pictures including works by Teniers, Holbein, Titian, Murillo, Reynolds, and the statuary gems by Canova, Chantrey, Thorwaldsen, Westmacott and others. The grounds and gardens platted by Loudon and Paxton, are ornamented with trees, shrubs, floral beds, rock-work, and fountains supplied by extensive water-works south and southwest of the mansion, which are unrivaled in Europe, except by those of Versailles. The grand conservatory, 300 feet long, 145 feet wide, and 65 feet high, is covered by over 70,000 square feet of glass, occupies an area of about an acre, and is traversed by a carriage road through the center. The great glass house of the *Victoria regia* lily designed by Sir Joseph Paxton gave him the idea for the Crystal Palace erected for the Hyde Park Exhibition of 1851, and since rebuilt at Sydenham. Chatsworth is annually visited by thousands of tourists, and with the surrounding region and the neighboring Haddon Hall is the scene of incidents depicted by Sir Walter Scott in *Peveril of the Peak*. Hobbes the philosopher was long a resident at Chatsworth as private tutor, and there wrote several of his works. Chatsworth was part of a gift of William I, Duke of Normandy, to his illegitimate son, William Peveril. The estate was purchased by Sir William Cavendish, and in the old mansion built after 1533 for him and his wife "Bess of Hardwick," subsequently the Countess of Shrewsbury, Mary Stuart, Queen of Scotland, was confined from 1570 to 1584. C.L.S.

CHATTAHOOCHEE, Georgia, a tributary of the Appalachicola, with its sources in the Appalachian Blue Ridge. It is over 500 miles long and is navigable by small river-steamers to Columbus, the seat of Muscogee County, 350 miles from the Gulf of Mexico. C.L.S.

CHATTANOOGA, Tennessee, the seat of Hamilton County, 120 miles southeast of Nashville, in a valley at the foot of the Cumberland Plateau, opening on the south bank of the Tennessee River, near the boundary with Georgia. A busy industrial city in the rich metalliferous and coal district at the southern entrance to the Great Appalachian Valley, it is a converging point for numerous railroad lines and branches. A semicircular water frontage of over ten miles, and the improved navigability of the Tennessee River, here spanned by a passenger and carriage

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steel bridge, facilitate the steamer transit trade with the principal ports of the Ohio and Mississippi valleys. On the west, Lookout Mountain, and on the east, Mission Ridge dominate the city; with Chickamauga they were scenes of some of the severest conflicts of the Civil War. Lookout Mountain with a Government signal station at an altitude of 783 feet, has become a favorite summer and winter resort and is connected by an electric railway line with the street railway system of the city. Chattanooga has a well-developed water supply. Among the excellent educational institutions are Grant (Methodist) University, Chattanooga College for Young Ladies, and the Chattanooga Normal College; other prominent features are the St. Vincent and Erlanger hospitals, the Chickamauga National Military Park and the Chattanooga National Cemetery. Commerce, which has an annual value of over $75,000,000, is in the agricultural and dairy products, the lumbering, and coal and iron mining, of the surrounding fertile and productive region of east Tennessee, northern Georgia and Alabama, and in the manufactures of the city's car and foundry works, agricultural implements and wagon works, clay and pipe works, roller mills, tanneries, spinning and hosiery mills, etc. See the following, and CHATTANOOGA, Vol. V, p. 385. Pop., 1900, 32,490. C.L.S.

CHATTANOOGA, SIEGE AND BATTLE OF. Victorious at Murfreesboro, the victim of a panic at Chickamauga, a battle he had contested only after a score of orders from Washington, Rosecrans had retired with the Union army behind the defenses of Chattanooga. Here he threw up intrenchments fit for a permanent fortress. The Confederate General Bragg, speedily ran a line of rifle-pits from the northern spur of Missionary Ridge over the heights, across the valley and over Lookout Mountain, whence his cavalry pickets patrolled nearly to Bridgeport. Rosecrans was practically "bottled up in Chattanooga," and was soon pressed for forage and rations. Ten thousand horses died, the survivors were too weak for transport or battery service, the troops were on half rations, and ammunition was scarce. Matters stood thus when, on September 29th, Grant, fresh from the capture of Vicksburg, was ordered to relieve Chattanooga. With Rosecrans superseded by Thomas, Grant arrived in the beleaguered city on Oct. 23, 1863. He was confronted by the knotty problem of supplies. To throw reinforcements into Chattanooga with insufficient rations for its present garrison, and with the enemy practically in possession of all the lines of communication, would hasten famine and insure surrender. Ordering Thomas and Burnside to strengthen their intrenchments and to hold them at all hazards, he waited meanwhile for Sherman, who was marching from the Mississippi. Hooker guarded the Nashville railroad below Bridgeport, ultimately moving in closer, when, by a clever stratagem, a good road for supplies but eight miles long was uncovered and seized for use. Supplies poured into Chattanooga, and the lean men in the trenches began to feel like fighting again. As Sherman plodded toward Chattanooga, Bragg made his worst error of judgment. He sent 15,000 of his oldest and steadiest infantry, covered by 5,000 Confederate cavalry, to attack Knoxville. By November 14th. Sherman was at Bridgeport and reporting to Grant, Then he threw his men across the Tennessee on pontoons, and formed a line on South Chickamauga Creek, overlapping Bragg's right flank. Hooker advanced and placed himself in the Confederate rear. When these movements were complete, Thomas was to charge out of Chattanooga and drive in the Confederate front. On November 23d, Thomas's men drove the Confederates a full mile, carried his advanced earthworks and rifle-pits, and at once occupied them and changed their fronts. This new line gave Orchard Knob to Grant, whence to watch "the Battle in the Clouds." Sherman got intrenched securely across Bragg's flank by the 24th, while Hooker had swept everything before him. The battle proper began on the 25th by Hooker storming the earthworks on the east face of Missionary Ridge. Sherman advanced, bore the brunt of the battle and ultimately held his ground. As Hooker got in action, Thomas's army rushed out of its earthworks and swept up the slopes in their front. Work after work was carried. The advance was irresistible. Bragg's center was broken, and the Confederate retreat soon became a rout. Night put an end to the pursuit. The Union troops engaged numbered about sixty thousand, the Confederates fifty thousand. The Union losses were 700 killed and 4,850 wounded and missing. Grant's soldiers captured six thousand prisoners. Chattanooga was the Worcester of the Confederacy. Its cause was thereafter hopeless, and Grant, commander-in-chief of the Union armies, moved forward to crush secession's forces in detail.

CHATTEL MORTGAGE. See PLEDGE, Vol. XIX, p. 231.

CHATTELS. See PERSONAL ESTATE, Vol. XVIII, pp. 677, 678.

CHATTERER. See WAXWING, Vol. XXIV, pp. 486, 487.

CHAUDET, ANTOINE DENIS, was born in Paris on March 31, 1763; became famous as a sculptor; and executed the statue of Napoleon which once surmounted the column in the Place Vendome. He died on April 19, 1810. W.F.J.

CHAUDIÈRE, LAKE, Canada, an expansion of the Ottawa River, about 15 miles long, in Quebec, 40 miles above Ottawa City. C.L.S.

CHAUDIÈRE RIVER, Canada, in Quebec, flows from Lake Megantic, near the Maine border, 120 miles N. to the St. Lawrence, 7 miles above Quebec. The CHAUDIÈRE FALLS, 2½ miles from the river's mouth are 100 feet high. C.L.S.

CHAUMONOT, PIERRE MARIE JOSEPH, was born in France in 1611, became a Jesuit missionary among the Indians of Canada, and did a great work, and wrote a grammar of the Huron tongue. He died on February 21, 1693. W.F.J.

CHAUNCEY, ISAAC, an American naval officer; born in Black Rock, Conn., Feb. 20.

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1772. He entered the navy as lieutenant in 1799, and in 1802 was appointed acting captain of the *Chesapeake*, in which ship and the *John Adams* he took a prominent part in active service, notably before Tripoli. In 1806 he was made captain. In 1812 he was given command on all the lakes except Champlain, and inaugurated an active course of naval construction at Sackett's Harbor. He fought an action off Kingston, Nov. 9, 1812; on April 25, 1813, captured York (now Toronto); on May 27 assisted in the capture of Fort George; and on Sept. 27 fought an action from York Bay to Burlington Bay. On Oct. 5 he captured five vessels and 264 prisoners; and blockaded the enemy at Kingston, August and September, 1814. He died in Washington, Jan. 27, 1840. E.E.T.

CHAUNCEY, JOHN S., son of Isaac Chauncey (supra); was born in New York in 1798 or 1799, and entered the navy as a midshipman in 1812. He became a commander in 1842, a captain in 1855, and a commodore on the retired list in 1869. He served in the Civil War. He died on April 10, 1871. W.F.J.

CHAUNCY, CHARLES, educator; was born in England in 1592, was educated at Cambridge, and was professor of Greek there. He became a Puritan minister, came to America in 1638 to avoid persecution, was pastor at Scituate, and from 1654 to 1672 was the second president of Harvard College. He died on February 19, 1672. He was the ancestor of all the Chauncy or Chauncey family in America. W.F.J.

CHAUNCY, CHARLES, clergyman, descendant of Charles Chauncy (supra); was born in Boston on January 1, 1705, was graduated from Harvard College in 1721, and became pastor of the First Church of Boston, filling that place for sixty years. He was a voluminous writer on theological topics. He died on February 10, 1787. W.F.J.

CHAUNCY, CHARLES, jurist; was born at Durham, Conn., on May 30, 1747, became attorney-general of that state in 1776, and judge of the superior court in 1789. He died on April 28, 1823. W.F.J.

CHAUTAUQUA, a unique summer resort in Chautauqua County, western New York, on Chautauqua Lake, and on the Chautauqua Lake railroad. It was formerly called Fair Point, and was a favorite place for Methodist camp-meetings, but in 1874 the grounds were purchased by the Chautauqua Sunday School Assembly. Many lots have been purchased, upon which neat cottages have been erected; there are also numerous boarding-houses and hotels, and large pavilions for religious services and instructions. Each year, during July and August, summer schools of language and art are held there, popular lecturers being secured to address the large classes. Crowds of people annually throng the Chautauqua grounds. Sunday school and temperance work, as well as Bible study, receive attention.

CHAUTAUQUA LAKE, New York, occupies the central part of Chautauqua County, at an altitude of 730 feet above, and about 10 miles east of Lake Erie; its height above the sea-level of the Atlantic is 1,290 feet. It is 18 miles long, from one to three miles wide, and drains through Connewango Creek into the Alleghany River. The name of Indian origin is supposed to signify either "foggy place," or "bag tied in the middle," an allusion to its shape. C.L.S.

CHAUTAUQUA LITERARY AND SCIENTIFIC CIRCLE, an incorporated institution for study and instruction, suggested and largely promoted by Hon. Lewis Miller of Akron, Ohio. It was organized in 1878 at Chautauqua, New York, with Lewis Miller as president of the association, and Rev. John H. Vincent, D.D., LL.D. (now a bishop of the Methodist Episcopal Church), as chancellor of the faculty. The purpose of the circle is to promote habits of reading, and study in nature, art, science, and in secular and sacred literature, in connection with the routine of daily life; to give college graduates a review of the college course; to secure for those whose educational advantages have been limited the college student's general outlook upon the world and life, and to develop the habit of close, connected, persistent thinking.

It endeavors to encourage individual study in lines and by text-books which shall be indicated; by local circles for mutual help and encouragement in such studies; by summer courses of lectures and "students' sessions" at Chautauqua, and by written reports of each year's work.

Any person may join the circle upon payment of the annual membership fee, which is 50 cents. No entrance examination is necessary. Persons may enter for one year, but the full course is four years, after which the graduate receives a diploma. The course of studies is directed from the center of the circle, and may be pursued at home and in the local circles. Attendance at the summer meetings at Chautauqua, New York, is urged, but is not imperative. The meeting extends usually from about July 5th to August 25th, each year. The headquarters of the department of instruction are at Plainfield, New Jersey, and *The Chautauquan*, the official organ, is published at Meadville, Pennsylvania.

There are over fifty Chautauqua assemblies in the United States, Canada, Great Britain, Japan, India, South America, Australasia and South Africa, with a membership of half a million persons. All are modeled in organization and methods upon the original Chautauqua assembly, but are independent in management. Catholics have recently initiated a similar movement, and under the name of the "Catholic Summer School" have held successful gatherings at Plattsburg, New York, and have organized reading-circles and study-classes on a large scale.

CHAUVEAU, PIERRE JOSEPH OLIVIER, statesman, was born at Quebec, Canada, on May 30, 1820, studied law, and became a writer for the newspaper press, in French He was prominent in the formation of the Dominion of Canada in 1867, and at that time was a member of the Quebec Assembly, and of the Dominion House of Commons, and also the first Prime Minister of Quebec under the Dominion. Later he was the presiding officer of the Quebec Senate, president

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of the commission in charge of the harbor of Quebec, and sheriff of Montreal. In addition to his contributions to newspapers and other periodicals, he wrote a number of volumes, of poetry and prose, which hold high rank in French Canadian literature, the best of them being *Charles Guerin*, a novel of French Canadian life. He died on April 4, 1890. W.F.J.

CHAUVENET, WILLIAM MARC, engineer and chemist, was born at Annapolis, Md., where his father was a teacher in the Naval Academy, on March 4, 1855, and was graduated from Washington University in 1879. He was a special agent in mining geology of the U. S. Census in 1879–83, chemist of the U. S. Geological Survey in 1881–82, and an assistant of the U. S. Geological Survey in the Lake Superior region in 1882–85. He has written *Notes on Minnesota Geology on the Northern Boundary*, and various geological reports on Missouri, California, Mexico, and Venezuela, besides reports on the iron ores of Missouri, Alabama, Kentucky, and Tennessee for the Tenth U. S. Census. W.F.J.

CHAUVINISM, a term that has come to mean an extravagant and absurd patriotism and pride in one's own country, with a corresponding enmity toward and contempt for foreign nations. It is the French equivalent for the "jingoism" of the London music-halls after Lord Beaconsfield's return from the Congress of Berlin in 1878. The origin of the word is due to Chauvin, the name of a veteran soldier of the first empire in Scribe's *Soldat Laboureur*, whose admiration of Napoleon was unbounded, and who honored even "the shadow of his shoe-tie."

CHAVANNES, PUVIS DE. See PUVIS, in these Supplements.

CHAY-ROOT. See MADDER, Vol. XV, p. 177.

CHAZARS, a people of the Finnish stock, known in the seventh century on the shores of the Caspian; in the ninth century their kingdom occupied the southeast of Russia, from the Caspian and the Volga to the Dnieper. They were singularly tolerant of all religions; a large part of the nation adopted the Jewish faith from Jews who fled from the persecutions of Emperor Leo, and Cyril converted many to Christianity in the ninth century. The power of the Chazars was ultimately broken in the twelfth century, by the Byzantine emperors and the Russians.

CHAZY EPOCH, the name given by American geologists to that division of Silurian time during which the chazy limestone of New York, Canada, etc., was formed.

CHEATHAM, BENJAMIN FRANKLIN, soldier; was born at Nashville, Tennessee, on October 20, 1820, the great-grandson of James Robertson, the "Father of Tennessee." He was an officer in the Mexican War, and distinguished himself at Molino del Rey, Cerro Gordo, and Monterey. In 1849 he went to California in quest of gold, but four years later returned to Tennessee, and became a farmer until 1861. Then he entered the Confederate service among the first volunteers, and was made a brigadier-general on May 9, 1861. On March 12, 1862, he was made a major-general. He was with the army of Tennessee from the beginning to the end of the war, and distinguished himself at Pittsburg Landing, Perryville, Stone River, Chickamauga, Missionary Ridge, Kenesaw Mountain, Dalton, and all through the Atlanta campaign. He was one of the ablest fighting commanders in the Confederate service, and was beloved by his men as scarcely any other was. The "Ney of the Confederacy" was his popular title, and he well deserved it. He surrendered in 1865, and then went back to Tennessee, and gave the rest of his life to promoting good feeling between north and south. He was made postmaster at Nashville in 1885, and died on September 4, 1886. W.F.J.

CHEAT RIVER, a river of West Virginia, which rises in Pocahontas County, among the Elk Mountains; flows north-northeast till it comes to Preston County, where it turns northwestward, enters Pennsylvania, and joins the Monongahela two miles north of the boundary. Its length is somewhat over 80 miles. Its name is derived from the apparent variableness of its volume.

CHEBOYGAN, a city and the capital of Cheboygan County, Michigan, at the northern extremity of the southern peninsula, on a river of the same name and on Lake Huron. It has saw, planing and grist mills; also a large grain trade. Population 1900, 6,489.

CHECK. See CHEQUE, Vol. V, pp. 506, 507.

CHECKERS. See DRAUGHTS, Vol. VII, pp. 384, 385.

CHEDDAR, a village in Somersetshire, south western England, two miles S.E. of Axbridge, celebrated for the production of the Cheddar cheeses Population about 2,400.

*CHEESE. The American process of making cheese differs in many features from that followed in other countries. While, in some localities in the United States and Canada, different kinds of fancy cheese are produced (brick, Swiss and some of the softer brands), the Cheddar is the favorite. The method of making the Cheddar cheese as practiced in the United States and Canada is given herewith.

The milk is collected from the farmers of the neighborhood. When the factory is owned by a private individual, the milk is purchased and the farmers paid for it. When the factory is co-operative—owned by the farmers themselves—they are paid for their milk by a proportionate share of the profits. The necessity of pure milk, sweet, and entirely free from taints of all kinds, is very strongly emphasized. The milk is brought to the factory in the morning, and is usually all in by ten o'clock.

The development and management of acid in the milk is the salient feature in the modern method of manufacturing Cheddar cheese. As is now generally known, the acid in milk is produced by minute organisms, which gain access to the milk from the air, the vessels in which the milk is kept, etc., and multiply with marvelous rapidity. These organisms, or germs as they are more commonly called, live upon the albuminous constituents of the milk and the sugar, breaking up a portion of the latter, and thus producing lactic acid. When the milk is

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brought to the factory it is placed in the cheese-vat and heated to a temperature of from 82° to 86°. It is then tested for acid. If, in the judgment of the maker, there is a sufficient amount of acid present, the rennet is added and the milk permitted to coagulate. If there is not a sufficient amount of acid present in the milk, it is held at the temperature before mentioned and "ripened." By the term *ripen* is meant, to develop a certain amount of acidity—to proceed a certain distance toward souring. By this means, time is saved for the maker, because less time is required to develop acid in the after process. Again, the acid aids in expelling the whey, and thus makes a firmer, stiffer curd. The main reason, however, why it is better to develop the acid before the introduction of the rennet will probably be ascertained when the relation between the rennet, on the one hand, and germs which produce acidity, on the other, has been discovered. At the present time this relation is not well understood. It is of the utmost importance that the maker know the condition of the milk as regards acidity, or ripeness. He ascertains this in a sufficiently accurate manner, for his purpose, by the application of what is known as the rennet-test. When the milk has been heated to a temperature of 84° F., 160 cubic centimeters of the milk are taken in a tin cup. Five cubic centimeters of the rennet are then taken, and placed in 45 cubic centimeters of lukewarm water. Five cubic centimeters of this mixture are then added to the milk, thoroughly stirred for an instant, and then permitted to remain quiet. With a small spatula or common case-knife the milk is gently agitated, in order that the exact instant when coagulation begins may be noted. If the milk is in the proper condition for the introduction of the rennet, coagulation will begin in two minutes after the rennet has been introduced. If a longer time elapses, the milk is not ripe enough to receive the rennet, and it must be held at a temperature of from 84° to 86° F. until it ripens. If coagulation begins in less than one minute, the milk is riper than it should be, and the rennet must be added immediately and the process hastened as much as possible. To make the best cheese, coagulation should begin, by the test, in from one minute and three quarters to two minutes.

The milk being at a proper degree of ripeness, and at a temperature of from 84° to 86°, the color may be introduced, if any be used, and then the rennet. In the commercial cheese factories of America very little rennet is prepared by the cheese-maker, who uses almost exclusively the commercial extract. The amount of rennet used depends upon the season of the year, the length of time in which it is desired to market the cheese, the strength of the rennet and the condition of the milk as regards ripeness. In general, it may be said that enough rennet should be used to coagulate the milk and render it fit for cutting in from 30 to 45 minutes. A floating thermometer is kept in the milk during the whole process, in order that the temperature may be observed conveniently and frequently. Immediately after the rennet is introduced, the milk should be gently but thoroughly stirred for about one minute, when it is quieted by passing the dipper gently over the surface, and from this time until the curd is in proper condition to be cut, the milk should be entirely undisturbed—even the vat should not be jarred. If the milk is agitated at this time, a loss of butter-fat results, as the latter exists in the milk in the form of minute globules, which are caught mechanically as the casein coagulates. The rennet has no action upon the fat.

The time at which the curd is in the best condition for cutting is determined by passing the first finger along about half an inch under the surface, having first split the curd with the thumb. If the curd breaks clean before the finger and leaves only moisture in its wake, it is in the proper condition to be cut. If cut too soon, the curd does not retain its form and body in the after-manipulation, and a great deal of butter-fat will be lost in the whey.

The curd is cut with knives made especially for the purpose. The object in cutting is to facilitate the separation of the curd from the whey, and when completed the curd is in the form of small cubes about one fourth of an inch in size. The knife should be held in warm water for a few moments before using, so that it will be of the same temperature as the curd. It should be introduced very carefully, placing it flat on the surface of the curd and cutting downward with the lower end until the latter rests on the bottom of the vat; then it should be moved carefully from one end of the vat to the other, turning at the ends in such a manner that the curd will be always cut and never broken. When the curd has been cut one way, it should be permitted to rest for a moment, when it is cut crosswise, and then once more as it was cut the first time. After being permitted to remain undisturbed for a few moments, the hands are very carefully placed in the vat, and whatever pieces of curd along the sides or in the corners of the vat have escaped cutting are gently raised to the surface and cut.

After the cutting is completed, the curd is stirred very gently, giving it a rotary motion, so that the pieces of curd will fall apart. When the curd has been stirred in this manner for five to ten minutes, heat is gradually applied to the water surrounding the vat, and the stirring is continued. This part of the process is commonly called "cooking" the curd, although the temperature is seldom raised above 98° F. From the time the curd is cut until it is put to press, it is handled with a view to accomplishing two things: First, to expel the moisture, retaining only what is necessary to make a palatable cheese and insure perfect curing; second, to develop a certain amount of acidity. In order to develop the acid evenly and continuously, the temperature is raised at the rate of about one degree in two and a half to three minutes. If raised more rapidly, a film forms over the curd, preventing the escape of whey and injuring the cheese.

While the temperature is being raised, the curd should be stirred continually, but as gently as possible. When small vats are used, the arms are bared and the stirring done by hand; when the vat is large, the curd is stirred with a wooden rake made especially for the purpose. The fat, which is the most valuable constituent of cheese, is held in the

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curd mechanically, and if the curd is bruised or agitated unnecessarily, a considerable amount of the fat will become disengaged from the curd and be lost in the whey. Heating is discontinued when a temperature of 98° F. has been reached, and the curd remains in the whey until the required amount of acidity has been developed. It would be possible to develop all the acidity in the curd, but it would be a slow process, requiring a great deal of time and careful attention, and there would be danger of retaining a surplus of moisture in the curd, making a soft cheese, easily soured. If an excess of acid is developed, the cheese will invariably be of poor quality, hard and slow in ripening, and the "buttery" consistency and "nutty" flavor of first-class cheese be lost.

The presence of acid in the curd is determined by what is known as the hot-iron test. A bar of iron (a piece of iron pipe is quite commonly used) is heated until almost at a red heat; a handful of the curd is then taken, firmly pressed to squeeze out the whey, and applied to the surface of the iron with a rubbing motion and slowly withdrawn; if acid is present, it will be manifested by numerous fine threads between the iron and the piece of curd, and the degree of acid is represented by the length and number of these threads. This test is in general use throughout the United States and Canada, and has been found entirely satisfactory for all practical purposes, but up to the present time it has not been scientifically explained. It is believed that the presence of certain kinds of germs in a marked degree increases the number and length of threads on the hot iron, almost without regard to the amount of acid present, but as germs of this kind are not present in milk of normal condition, they very seldom interfere with the application of the test.

The amount of acid developed before the curd is removed from the whey necessarily varies with the season and the locality. In making spring cheese the curd is usually taken from the whey when threads an eighth of an inch long appear on the hot iron; in summer, when the threads are about one fourth of an inch in length. In the fall, somewhat more acid is developed at this stage. When the proper amount of acid is present, the whey is drawn out of the vat by a siphon, the curd well stirred and piled on each side of the vat to drain and become matted; an open channel is left in the center of the vat, in order that the whey may flow out as the curd settles and expels it. When the curd is matted firmly it is cut in blocks six or eight inches across, so that it can be turned and piled. The blocks of curd should be turned at intervals of 10 to 15 minutes, to give the whey opportunity to flow off easily, and then piled, two deep at first, and afterward three and four deep. The whey should not be permitted to stand in pools on the curd at this point; if this is permitted, there is danger of sour flavors being developed in the cheese. It is important that the temperature of the curd be maintained at from 94° to 96° while in this matted condition. This is necessary, not only for the development of acid, but to secure the proper mechanical condition; if the makeroom be cold, the curd should be covered with heavy cloth. The curd is permitted to remain in this matted condition until it becomes of the proper mechanical condition and shows the presence of from ½ to 1½ inches of acid as measured by the hot-iron test. When in the best condition for grinding, the curd is flaky, and when torn apart splits instead of breaking, resembling the breast of a chicken when torn apart in a similar manner.

The curd is ground in mills made for the purpose, which leave it in small pieces; in some, irregular in shape; in others, in the form of small cubes. The curd should be at a temperature of 90° to 92° when ground. After grinding, the curd is stirred for 10 to 15 minutes, for the double purpose of giving the surplus whey an opportunity to pass off and to expose the curd to the air. During the stirring period the character of the curd changes somewhat; it becomes smooth and silky to the touch, and the odor of new-made butter develops. When this mechanical condition develops, and when squeezed firmly in the hand, a mixture of whey and butter-fat oozes out between the fingers, the curd is ready for salting. The amount of salt varies with the season, the condition of the curd as regards moisture, and the market for which the cheese is intended. When quick-curing cheese is desired, less salt is used than when it is intended to keep the cheese in the curing-room for several months. In the spring, when it is desired to place the cheese on the market within 30 to 40 days, 1⅓ to 1⅔ pounds of salt are used to the hundred pounds of curd, while in the latter part of the season, when the cheese is held for the winter market, as much as 2½ to 3 pounds of salt are used. The salt is weighed and scattered over the curd as evenly as possible. The curd is again stirred for ten to twenty minutes until the salt is dissolved and the harsh, rough feeling caused by the salt gives way to a smooth, soft feeling. If there is a disagreeable odór present, the stirring is continued ten to twenty minutes longer

When the curd has reached the proper mechanical condition after salting, it is placed in hoops for pressing. These hoops are made of galvanized iron, and are of different sizes. The usual size will hold enough curd to make a sixty-pound cheese; some hoops are less than half this size, and others hold enough curd to make but ten pounds of cheese; the latter are used for making the Young America cheese of our large markets. The hoops are placed in warm water until of the same temperature as the curd, after which they are lined with cheesecloth and a circular piece of muslin placed in the bottom. They are then filled with the curd and another piece of muslin placed on top, covered with a circular piece of wood called a "follower," which fits into the hoop closely. The hoops are then placed in a gang-press, in which pressure is applied by means of a screw moved with a lever. The pressure is applied with a view to securing a close knitting together of the curd, and is consequently put on very slowly and gradually. After the pressure has been applied for three quarters of an hour, the hoops are taken from the press, the cheese taken out, and the bandages neatly dressed, after which the cheese is replaced in the hoops and pressure again applied.

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They are left in this condition for 15 to 24 hours. The cheese is then removed from the hoops, the cloths removed from the ends, and placed on shelves in the curing-room. The end of the cheese exposed to the air is greased with cheese-grease prepared especially for the purpose. Butter may be used for greasing with excellent results, but the prepared grease is less expensive and answers the purpose very well. The grease is hot when applied, and is well rubbed in, the object being to make a tough rind on the end of the cheese. The next morning the cheese is turned and the other end greased. On the side of each cheese is marked the date on which it was made.

The curing-room is kept at a temperature of from 70° to 80° during the early stages of curing, and this temperature should be maintained as evenly as possible. Each day the cheese is turned, and the upper surface well rubbed with the hand. Properly made Cheddar cheese reaches its best condition in from three to six months, but the demand of the consumer for a mild, soft cheese has lead the cheese-makers to place them upon the market within three to six weeks. See also CHEESE, Vol. V, pp. 394, 395; also AGRICULTURE, in these Supplements.

HENRY C. WALLACE.

CHEESE–HOPPER OR CHEESE–MAGGOT, the larva of a fly (*Piophila casei*) which deposits its eggs in cheese. The larva has the power of leaping by suddenly bending its body.

CHEESE–MITE. See MITE, Vol. XVI, p. 552.

CHEEVER, EZEKIEL, an American educator; born in London, Eng., Jan. 25, 1615. He came to America in 1637; assisted in founding the colony of New Haven, where he was chosen deacon and occasionally preached, taught a public school from 1638 to 1650, and represented the town in the General Assembly in 1646. From 1650 to 1661 he took charge of the grammar school at Ipswich, Mass., whence he removed to Charlestown, where he taught for nine years. In 1670 he assumed charge of the Boston free school, now known as the Latin School. He remained head of this institution for 38 years. He published a Latin *Accidence*, and *Scripture Prophecies Explained*. He died in Boston, Aug. 21, 1708.

E.E.T.

CHEEVER, GEORGE BARRELL, clergyman and author, was born at Hallowell, Maine, in 1807, and was educated at Bowdoin College (1825) and Andover Theological Seminary; in 1832 he became pastor of a Congregational Church at Salem, Mass., and also became so vehement a temperance advocate as to incur a suit for libel, as a result of which he was sent to jail for a month. He resigned his pastorate, went abroad, and in 1839 returned and became pastor of the Allen Street Presbyterian Church in New York, where he distinguished himself by his criticism of Roman Catholicism. In 1845 he was editor of the *Evangelist*, and in 1846 he was made pastor of the Congregational Church of the Puritans in New York. He then devoted himself largely to conducting a propaganda against slavery, intemperance, Sabbath breaking, and other evils. He was a singularly forcible and earnest speaker, with an inclination to run to extremes. He wrote much for the *Independent*, and for *Bibliotheca Sacra*, in a most scholarly vein. He was the author of a number of books of travel and history, and was a popular lecturer. His energies were chiefly devoted to controversy and aggression, in which fields he was one of the most effective figures of his time. He died on October 1, 1890.

W.F.J.

CHEHALIS, a river of Washington, which rises in western Lewis County, flows north to Thurston, then west through Chehalis County into Gray's Harbor. It flows past the city of Chehalis and the Indian reservation of the same name. Its length is about 150 miles; its valley is very fertile, and from 15 to 50 miles wide. It is navigable for about 45 miles for small steamers at high tide.

CHEHALIS, Washington, the seat of Lewis County, 32 miles south of Olympia, on the Chehalis River and on the Northern Pacific railroad. It has coal mining, lumbering, and farming industries. Population, 1900, 1,775. C.L.S.

CHEIROLEPIS, a genus of ganoid fishes found as fossils in the Devonian formations.

CHEIROMANCY OR PALMISTRY, a form of divination that professes to read the destiny of an individual by the lineaments of the hand. See PALMISTRY, in these Supplements.

CHEIRON. See CHIRON, Vol. V, p. 586.

CHEIRONECTES OR CHIRONECTES. See OPOSSUM, Vol. XVII, p. 819.

CHEIROPTERA OR CHIROPTERA, bats. See MAMMALIA, Vol. XV, pp. 409–420.

CHE-KEANG, a maritime province of China. See CHINA, Vol. V, p. 552.

CHELIDON, a bird. See MARTIN, Vol. XV, p. 587.

CHELIFER, pseudoscorpions. See ARACHNIDA, Vol. II, pp. 247, 248.

CHELIUS, MAXIMILIAN, born at Mannheim, Germany, in 1794; died in 1876. He was a physician and surgeon of distinguished ability. His *Handbook of Surgery* is a standard work, and has been translated into many languages.

CHELMSFORD, FREDERIC THESIGER, BARON, was born in England in 1794, served in the British navy, then was called to the bar and became solicitor-general in 1844, attorney-general in 1845 and 1852, and Lord Chancellor in 1858 and 1866. He was raised to the peerage in 1858, and died on October 5, 1878. W.F.J.

CHELMSFORD, FREDERIC AUGUSTUS THESIGER, son of the first baron; born May 31, 1827. He was educated at Eton, and in 1844 entered the Rifle Brigade, and then transferred to the Grenadiers. He served through the Crimea and the Indian Mutiny. In 1879 he was appointed to the command of the forces and lieutenant-governor of Cape Colony, and pacified Kaffraria. He commanded the British in the Zulu war, during which Durnford's column, encamped at Isandhlwana, was almost annihilated; while, at Rorke's Drift, Chard (*q. v.*, in these Supplements), held the post against the Zulus. The

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main camp was attacked (April 2) by 11,000 Zulus, who were repulsed. At Ulundi, July 4, the Zulus were utterly routed. The first of these events caused the dispatch, to relieve Chelmsford, of Sir Garnet Wolseley, who arrived after the disasters had been retrieved. Chelmsford resigned, and was gazetted K. G. C. B. From 1884 to 1889 he was lieutenant of the Tower. He retired in 1893. Died April 9, 1905. R.C.A.

CHELONIA, an order of reptiles having a bony covering, including tortoises and turtles. See TORTOISE, Vol. XXIII, pp. 484–489. R.W.C.

CHELSEA, Massachusetts, a city suburban to Boston, north of the latter, in Suffolk County, and connected with Charlestown and East Boston by bridges and steam ferries. It shares in the railways, general commerce and industries of Boston and has some 250 establishments, several of great size, manufacturing all kinds of goods. For historic description see Vol. V, p. 396. Population, 1890, 27,909; 1900, 34,072. C.L.S.

CHELSEA, Michigan, a village of Washtenaw County, 50 miles west of Detroit, on the Michigan Central railroad. It exports the grain and wool of a considerable region and has some manufactures. Pop., 1900, 1,635. C.L.S.

CHELSEA, Vermont, the seat of Orange County, 24 miles southeast of Montpelier, at the confluence of a branch of the White River. It was incorporated in 1781 as Turnersburg. It has milling industries. Pop., 1900, 1,070. C.L.S.

CHELSEA HOSPITAL, an asylum for old and disabled soldiers of the British army. The foundation-stone was laid by Charles II in 1682, and the building, designed by Wren, and constructed at a cost of $750,000, was opened in 1692. It has accommodation for 600 non-commissioned officers and privates. Gardens, exercise-grounds and a small park are attached to the building, the whole covering about forty acres. The funds for its lands and buildings, and for many years the maintenance of its inmates, were derived chiefly by deductions from the pay of the troops themselves. The staff consists of a governor, lieutenant-governor, secretary, chaplain, physician and adjutant. The cost of the hospital for the year 1894–95 was $133,165, defrayed by a Parliamentary grant. When a soldier enters, his pension ceases, but he is allowed pocket-money (12 to 48 cents per day) according to his rank in the service. All the necessaries are supplied, except that in the case of married men no provision is made for the wife. The hospital is always full, and many are always waiting for admittance as soon as a vacancy occurs.

CHELTENHAM COLLEGE, founded in 1841, in Cheltenham, Gloucester County, England (incor. 1894). There are three departments—the classical, the military and civil, and the junior. In 1896 the number of pupils was 580. The government of the institution is in the hands of a president and twenty members of council.

CHELYABINSK, a town of Russia, situated at the east foot of the Urals on Mias River and the head of the Siberian railway. It is a trade center of corn and cattle. Pop. about 20,000.

CHELYUSKIN, CAPE, formerly Northeast Cape, and sometimes called Cape Severo, the most northerly point of Asia, on a peninsula of the same name. It is a low promontory, divided into two parts by a small bay; the latitude of the western part is 77° 36′ 37″ N., that of the eastern 77° 41′ N. It is named after a Russian officer who led an expedition thus far in 1742; it was not revisited until 1878, when Nordenskjöld, in the *Vega*, spent the 19th and 20th of August there.

CHEMICKING PROCESS. See BLEACHING, Vol. III, p. 709.

CHEMICAL ACTION. See CHEMISTRY.

CHEMICAL AFFINITY. See AFFINITY, CHEMICAL, Vol. I, p. 203; ELECTRICITY, Vol. VIII, p. 86.

CHEMICAL ANALYSIS. See ANALYSIS, Vol. I, p. 698; also *Chemical Action*, under CHEMISTRY, Vol. V, pp. 411, 412.

CHEMICAL FORMULÆ. See MOLECULE. Vol. XVI, pp. 643, 644.

CHEMICAL NOTATION. See CHEMISTRY, Vol. V, pp. 408–411.

CHEMIOTAXIS, a term applied in physiological botany to the attractive power exerted by certain chemical substances upon spermatozoids. Spermatozoids, discharged and swimming in the water, are attracted to the archegonium by these substances secreted by it, and thus fertilization is secured. Thus far this phenomenon has been observed only in certain mosses and ferns, the attractive substance in the former being cane-sugar, in the latter a salt of malic acid. It cannot be doubted that chemiotaxis plays a much larger part in the plant economy, especially in connection with the sexual reproductive processes, than has yet been discovered.

*CHEMISTRY. (For general article on CHEMISTRY, see Vol. V, pp. 397–503.) During the last quarter of a century, chemistry has advanced more rapidly perhaps than during any preceding period of similar length. The number of facts within its domain has increased, and is increasing, so rapidly as to defy the effort of any single man to follow its progress. Not all the facts will be found to be of equal importance, when viewed in proper historical perspective. But the revision of the atomic weights, the discovery of new elements, whether of the rarer sort, like germanium, or of the more plentiful kind, like argon (q.v.), the preparation of new compounds of the highest theoretical as well as of practical interest, and the invention of new ways of manufacturing well-known substances, have all greatly increased our knowledge of the subject-matter of the science. Of even greater value have been the advances in theoretical chemistry. Not many years ago the only general laws were those affecting the composition of chemical compounds, the law that the elements unite in definite proportions by weight to form compounds, and the laws closely connected with it. Now we know much about the laws governing chemical change. One of the most valuable additions to our knowledge in this direction has been the modern development of the theory of solution.

Atomic and Molecular Weights. The atomic weight is the most fundamental property of every chemical element. Every physical and chemical

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property of the element seems to be a function of this. In the practical point of view, its exact determination is of the greatest importance to the analyst, and so touches the commercial aspect of the subject.

The fixing of the proportions in which hydrogen and oxygen combine to form water, in order to ascertain the atomic weights of these elements, has formed the subject of a vast amount of painstaking work. As the result of ten years' investigation, Professor Morley of Cleveland finds the atomic weight of oxygen to be 15.879 where that of hydrogen is 1. This agrees with the average of the determinations of six out of seven recent experimenters, who gave almost equal care to the work, and may be regarded as expressing the closest approach to accuracy attainable by our present means. Since the atomic weights of all the other elements have been measured by comparison with oxygen, this change from the old value (15.96) has involved a recalculation of all other atomic weights. In view of the fact, however, that the measurement of the proportions in which oxygen and hydrogen combine presents great difficulties, and that the results obtained are therefore liable to err, oxygen (with arbitrary atomic weight = 16) has now been almost universally accepted as the basis of all tables of atomic weights; so that when the atomic weight of another element is determined by the use of compounds containing oxygen, the value is affected by errors of the particular determination only, and not by any change in the atomic weight of oxygen itself. Hydrogen has on this scale the atomic weight 1.0076.

The following table shows the most recent values of the atomic weights, on the basis O=16:

Aluminium	27.11	Molybdenum	95.98
Antimony	120.43	Neodymium	140.5
Argon	40.00	Neon	?
Arsenic	75.09	Nickel	58.69
Barium	137.43	Nitrogen	14.04
Bismuth	208.11	Osmium	190.99
Boron	10.95	Oxygen	16.00
Bromine	79.95	Palladium	106.36
Cadmium	111.93	Phosphorus	31.02
Cæsium	132.89	Platinum	194.89
Calcium	40.08	Polonium	?
Carbon	12.01	Potassium	39.11
Cerium	140.2	Praseodymium	143.5
Chlorine	35.45	Radium	?
Chromium	52.14	Rhodium	103.01
Cobalt	58.93	Rubidium	85.43
Columbium	94.00	Ruthenium	101.68
Copper	63.60	Samarium	150.00
Coronium	?	Scandium	44.00
Crypton	?	Selenion	79.00
Didymium	142.30	Silicon	28.40
Erbium	166.30	Silver	107.92
Etherion	?	Sodium	23.05
Fluorine	19.03	Strontium	87.61
Gadolinium	156.10	Sulphur	32.07
Gallium	69.00	Tantalum	182.60
Germanium	72.30	Tellurium	127.00?
Glucinum	9.08	Terbium	160.00
Gold	197.24	Thallium	204.15
Helium	4.00	Thorium	232.63
Hydrogen	1.008	Thulium	170.7
Indium	113.7	Tin	119.05
Iodine	126.85	Titanium	48.15
Iridium	193.12	Tungsten	184.84
Iron	56.02	Uranium	239.59
Lanthanum	138.6	Vanadium	51.38
Lead	206.92	Xenon	?
Lithium	7.03	Ytterbium	173.00
Magnesium	24.29	Yttrium	88.95
Manganese	54.99	Zinc	65.41
Mercury	200.00	Zirconium	90.6
Metargon	?		

The atomic weights of argon and helium at present accepted are 40 and 4 respectively, instead of 20 and 2, as formerly, recent researches tending to show that they are monatomic.

Of equal importance to the determination of atomic weights is the measuring of molecular weights. Until recently the only method available for the purpose consisted in the vaporizing of the substance and weighing a known volume of the vapor; this was only applicable to those substances which were not decomposed by heat and did not possess too high a boiling-point. Other methods have now been discovered which permit the measurement to be made in solution. It has long been known that a solution freezes at a lower temperature and boils at a higher temperature than the pure solvent. It is found that these changes depend on the number of molecules of the substance dissolved in a given quantity of the solvent. Equal volumes of a solvent which show equal depressions of the freezing-point, or equal elevations of the boiling-point, contain equal number of molecules of the dissolved substances, so that the weights of the latter are proportional to the molecular weights. Water, benzene, acetic acid, and other common substances are used as solvents. The only notable exceptions to this rule are acids, bases and salts which are ionized (See ELECTROLYSIS, in these Supplements) in water, and show a larger alteration in the freezing and boiling points, since the ions behave like separate molecules.

Chemical Action. The sharp distinction which was drawn between physics and chemistry long kept the study of these sciences separate. It is gradually being realized, however, that, while "chemistry deals with the relations of atoms to each other, and physics with the properties of molecules and aggregates of molecules," physical conditions have a great influence on chemical changes, and the fundamental laws of the sciences are closely related. One factor in bringing about this *rapprochement* has been the application of the laws of energy to all branches of physical science. All physical changes in matter are accompanied by transformations of energy in some form. Thus a falling body, when changed into a body at rest, becomes heated; its energy of motion is transformed into heat-energy. So when a chemical change takes place in a mixture of, e.g., copper and sulphur, the matter is changed into sulphide of copper, and simultaneously heat is developed. Since this cannot arise out of nothing, it must come by transformation from some other variety of energy.

As the energy resident in a mixture of copper and sulphur cannot be readily identified with any of the familiar kinds of energy, such as electrical or mechanical energy, it is at present regarded as distinct from these, and is named chemical energy.

In every chemical change, as in every physical change, therefore, the transformation of energy is as essential an element in the phenomenon as the change in the matter itself. And in any consideration of the conditions favoring chemical action a study of the energy-change involved will be a prominent feature. In most chemical actions, heat is the form

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of energy which arises from, or is transformed into, chemical energy. In special cases, however, the greater part of the energy appears as electricity, as in the battery; and it has recently been shown that mechanical energy, applied by rubbing in a mortar, decomposes certain compounds of silver, gold and other elements into their constituents by producing the necessary chemical energy.

The above reasoning might lead us to the conclusion that the amount of the heat-change involved in any action was a measure of the force which urged the matter concerned from one condition to another. This idea has given birth to the so-called law that every chemical change results in the formation of those substances whose production will evolve the most heat. While this rule is very widely applicable, there are important, and every day more numerous, exceptions to it. In all equilibrium reactions (see Vol. V, p. 475), for example, the chemical change is reversible, and may be driven in either direction, independently of the sign of the heat-change, by altering the concentrations of the interacting substances. Thus in a closed vessel the action,

$$2NaCl + H^2SO^4 = Na^2SO^4 + 2HCl,$$

is only partially accomplished; all four substances co-exist, and the system on the left-hand side is stable in presence of its reaction products, in spite of the fact that heat could be given out by its undergoing change. If the concentration of the HCl is allowed to diminish by allowing the gas to escape, the action will go on to completion from this cause alone. On the other hand, simply injecting more HCl will push the action in the reverse direction of that which the above law would prescribe. The same principle explains the action of carbon monoxide on ferric oxide in the blast-furnace: $Fe^2O^3 + 3CO = 2Fe + 3CO^2$. This action is likewise incomplete in a closed vessel; but if the CO^2 escapes, or increased concentration of the CO is provided for (as is actually done in practice), the action may be carried to completion and all the oxide reduced.

Solution. That chemical changes take place more easily in solution, particularly in water, than under other circumstances, has always been recognized. Till recently, little has been known of the condition of a substance in solution, and so this fact could only be explained by the dogmatic assertion that "substances could only interact when they were in fluid form." An accurate knowledge of the properties of solution, however, has led to a complete explanation of numberless mysterious chemical facts, and has done more for the rationalization of chemistry than any other of its recent advances. Solutions are no longer liquids in which gases, solids or other liquids have been dissolved. They include mixtures of any of these kinds of matter with any other. They have been defined as "homogeneous mixtures which cannot be separated into their constituent parts by mechanical means, the proportion between the parts being continuously variable between certain limits, with a corresponding continuous variation in properties."

The addition of solid solutions to the list has been particularly noteworthy. Thus isomorphous substances form mixed crystals which have many of the properties of solutions. In the ordinary test for iodine the strongly colored blue substance formed has been shown to be a solid solution of iodine in starch, and not a chemical compound. In dyeing, the process is very often, apparently, the passage of the coloring matter out of solution in water into a condition of solid solution in the material of the fabric on account of its greater solubility in the latter; so that the dyed material is not a compound, but a solution. The absorption of hydrogen by heated platinum is a phenomenon of the same order, and it follows the same law in regard to pressure as the solution of a gas in a liquid. Opinions are divided in regard to the similar absorption of hydrogen by palladium, which can take up 900 times its volume of the gas. It is maintained by some that up to 40 volumes the process obeys the laws of solution, and above that a compound is formed. Others consider the whole absorption a case of solution. At all events, the formation of a solid solution of the gas in the metal plays an important part in the operation.

The observation of diffusion (that is, the mechanical transferences of particles through the mass) in solids confirms this view. Thus the penetration of carbon into a bar of iron, in the preparation of steel by cementation, is akin to the diffusion of a salt in solution. It is found that there is a corresponding diffusion of part of the iron into the surrounding charcoal. Plated articles often show a similar interchange in the adjacent parts of the metals. By purposely pressing them together, chemical changes can be produced between dry substances which would otherwise (at the ordinary temperature) only interact in solution in water. Thus when barium sulphate and sodium carbonate were mixed and put under pressure, 20 per cent of the barium became barium carbonate and a corresponding quantity of sodium sulphate was formed:

$$BaSO^4 + Na^2CO^3 = BaCO^3 + Na^2SO^4.$$

On starting with the latter substances the change took place to the extent of 80 per cent in the other direction. This could only have happened in consequence of interdiffusion of the molecules of each substance.

A substance in solution (say, in water) is, in consequence of the presence of the water, compelled to occupy a much larger volume than that which ordinarily belongs to it at the same temperature in the absence of the solvent. The question as to whether the dissolved substance forms a loose combination with the water, and therefore penetrates to every part of it, or whether the phenomenon is a purely physical one, has long been the subject of much discussion. The fact that a substance in dilute solution shows many of the properties of a gas, and that the properties are often independent of the chemical nature of the dissolved body, and depend only on the number of molecules in a given volume of the solution, has led to the belief that no union of any kind with the water has taken place. All the observed facts can be explained on the assumption that the solvent power of the water merely destroys the coherence of the body to be dissolved, and scat-

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ters its particles over a much larger space, leaving them in an essentially gaseous condition.

This view explains satisfactorily the phenomena of diffusion. If we place a strong solution of a salt at the bottom of a jar and cover it with pure water, we find that the particles of the salt make their way upward against gravity as if driven by some force, just as the particles of a gas at the bottom of an empty jar would do. The process is slower, on account of the interference of the water, but the similarity between the phenomena is unmistakable. The particles of the gas diffuse by virtue of their energy of motion, and so do those of the salt as fast as the hindering water will permit. This view suggests to us at once the idea that in consequence of this motion the dissolved substance would exhibit a pressure similar to the pressure of a gas, if we could find proper means of measuring it. If a suitable partition (called a semipermeable membrane) is interposed, such that the molecules of the solvent can freely pass through, while those of the salt cannot, the impact of the latter on the membrane establishes a pressure inside the membrane in excess of the pressure on the outside, which is that of the water alone. Such a membrane can be made by filling a porous pot with a solution of potassium ferrocyanide and immersing it in a solution of cupric sulphate. The cupric ferrocyanide precipitated in the material of the pot can be traversed freely by water, but resists the passage of substances in solution. When such a pot, is then filled with a solution and placed in pure water, an excess of pressure shows itself inside, which represents the pressure of the dissolved substance, and is called the osmotic pressure. It can be measured by any convenient gauge.

This osmotic pressure is proportional to the concentration of the solution; that is, it follows a law corresponding to Boyle's law for gases. Furthermore, it is found that equal volumes of solution containing molecular quantities of different dissolved substances, at the same temperature, exhibit the same osmotic pressure. This corresponds to Avogadro's law for gases: that equal volumes of gases at the same temperature and pressure contain equal numbers of molecules.

Measurements show that acids, bases and salts in solution in water exhibit abnormally high pressures, and behave, therefore, in an exceptional manner. This fact, however, far from being a disturbing element, is one of the most striking proofs of the established theory that these substances undergo electrolytic dissociation in solution. (See ELECTROLYSIS, in these Supplements.) Thus sodium chloride, nitric acid, etc., are dissociated in dilute solution with the ions, Na & Cl and H & NO^3, etc., and these particles contribute to the pressure just as if they were independent molecules. The pressure is therefore greater on account of the greater number of molecules present.

The absolute amount of the osmotic pressure is often considerable. A six-per-cent solution of sugar, for example, exercises an osmotic pressure of four atmospheres. Calculations show that a substance exercises the same pressure in solution as it would if it could exist as a gas in the same volume at the same temperature.

These results have explained the phenomena of dialysis observed by Graham about the middle of this century. He found that some bodies, like tannin and gums, which he called colloids, could not pass through membranes of bladder or parchment paper by diffusion, while acids, salts, etc., which he called crytalloids, could do so. He was simply using imperfect semipermeable membranes which permitted the passage of some substances, as well as the solvent, and delayed or prevented the passage of others. The pores of the membrane were apparently large enough to permit the passage of some molecules, while hindering the passage of others. This process is still used in pharmacy, in making substances like dialyzed iron, which is a solution of ferric hydroxide in water which has been freed by dialysis from the salts used in preparing it. The ferric hydroxid is a colloid, and does not pass through the membrane.

Not only do equal numbers of molecules of a substance produce equal osmotic pressure, but also equal depressions in the freezing-point and equal elevations in the boiling-point of the solvent. The use of these facts for the determination of molecular weights has been referred to already. Other chemical properties of solutions are discussed under ELECTROLYSIS; q.v., in these Supplements.

The Atmosphere. Our knowledge of the atmosphere has been enlarged by the discovery of argon (see separate article), and by the recognition of the important *rôle* which dust plays in the air. The importance of this constituent escaped notice until Dr. Aitken showed that the condensation of moisture to fog and rain was due to its presence. By filtering air through cotton wool, or letting the dust settle for a day or two, he prepared samples of air in which excess of moisture produced no condensation, while the introduction of dust caused the instant formation of a fog. The particles of dust seemed to act as nuclei around which the moisture was deposited, and in their absence the air remained supersaturated with water vapor. Not only was smoke capable of producing fog in dust-free, moist air, but even the gases from Bunsen flames exhibited the power in an unusual degree.

Dr. Aitken's experiments show that, other things being equal, the larger the amount of dust in the air, the greater the tendency to form fog and rain. This suggested to him the idea of applying the method in meteorology by the use of a dust-counter. This instrument enabled the observer to count the number of drops of fog which had settled, out of a known volume of moist air, on a known fraction of the whole surface of the vessel. By this means it was possible to determine the number of particles of dust in a cubic inch of various samples of air. In one series of determinations he found the numbers for outside air (raining), 119,000; outside air (fair), 521,000; room, 30,318,000; room, near ceiling, 88,346,000; above a Bunsen flame, 489,000,000; at great altitudes the number was much smaller than at the sea-level. It appears that artificial rain can sometimes be produced in air containing sufficient mois-

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ture, by the introduction of large quantities of dust. Experiments in "rain-making" by means of explosives were frequently successful from this cause.

The nitrogen of the air used to be considered an entirely inert constituent, yet the question remained unsettled whether it was not absorbed in some way by plants. It had been a familiar fact that many parts of their structure, particularly the fruit, contained a considerable proportion of nitrogen in combination, but it was also an undoubted fact that they could obtain this constituent from soluble substances in the soil. It is now known, however, that, even when the food-supply to the plant is entirely non-nitrogenous, it can draw its necessary supply of nitrogen from the air. This is accomplished, not by the plant itself, but through the agency of certain organisms which grow at its roots.

Water. As we shall see (see ELECTROLYSIS, in these Supplements), water, far from being a neutral substance, takes an active part in assisting and controlling chemical changes through its dissociative power. In addition to electrolytic dissociation, water frequently produces decomposition by acting chemically on substances dissolved in it. This action is called hydrolysis (or hydrolytic dissociation). Thus when water is added to antimony trichloride, antimony oxychloride is precipitated:

$$SbCl^3 + H^2O = SbOCl + 2HCl.$$

The action is incomplete, and can be reversed by adding hydrochloric acid. It appears that actions of this kind are much more common than was supposed, very many salts being hydrolyzed to a small extent by water. Thus cupric sulphate (anhydrous) is white, but its solution in water is blue. This color was at first attributed to the color of the copper ions, the SO^4 ions being colorless. But if this were the case, dilution, by increasing the dissociation, and therefore the number of ions, should deepen the tint in proportion to the amount of the salt present. As a matter of fact, however, no such change occurs, even when the number of copper ions is doubled; so that probably the blue color is due to the formation of copper hydroxide,

$$CuSO^4 + 2H^2O = Cu(OH)^2 + H^2SO^4,$$

to a small extent. Similarly, the yellow color of a solution of ferric chloride is thought to be due to the presence of ferric hydroxide, since the solution always has an acid reaction:

$$FeCl^3 + 3H^2O = Fe(OH)^3 + 3HCl.$$

In the case of actions furthered by electrolytic dissociation, the fullest exhibition of this power of water is shown in dilute solutions. But it appears that the presence or absence of even traces of moisture may determine the occurrence of many chemical changes. It has been shown that phosphorus, potassium and sodium will not burn in oxygen which has been carefully dried with phosphorus pentoxide, and that the combustion of carbon is greatly retarded; that when dry hydrogen and chlorine are exposed to bright sunlight for two days, more than a quarter of the material remains uncombined, while with the moist gases complete union takes place instantly with explosive violence. Sulphur trioxide refuses to combine with calcium or copper oxides under the same circumstances. The same is true of dry ammonia and hydrochloric acid. Conversely, perfectly dry ammonium chloride gives normal values for vapor density, while the ordinary salt is completely dissociated into ammonia and hydrochloric acid. The most curious fact of the series is, that the same salt also fails to act on quicklime, although, under ordinary circumstances, ammonia, calcium chloride and water are formed:

$$CaO + 2NH^4Cl = CaCl^2 + H^2O + 2NH^3.$$

Here the slightest interaction would have produced the moisture apparently indispensable to the occurrence of the change. In all these cases, on the introduction of a little moisture the chemical actions took their usual course.

New Elements. The discovery of a new element, like that of a new member of the solar system, is always a matter of great interest, and recent years have seen at least eight such discoveries. Just as the finding of Neptune was an occurrence of unusual significance to the astronomer on account of the fact that its existence and position had been foretold, so the discovery of no less than three of these elements has been a matter of special significance to the chemist, inasmuch as their properties had been minutely described several years in advance by Mendelejeff. An examination of the table representing the periodic system (Vol. V, p. 470) will show that there were a number of vacant places which none of the known elements could fill. In 1872 Mendelejeff gave a description of the characteristics which three of the missing members of the series would exhibit if they should be discovered. In 1875 Boisbandran separated gallium from a variety of zinc blende, and found that its atomic weight and properties were those of the hypothetical element, eka-aluminium. In 1879 Nilson and Cleve found a new element in euxenite and gadolinite, which they named scandium. Its properties showed it to be Mendelejeff's ekaboron, and finally, in 1886, Winker analyzed a new mineral, argyrodite, and found in it the third of the series, germanium. None of these elements is sufficiently plentiful to be of commercial value.

It has been known for more than a century that the mineral cerite contained a number of different elements. The oxides of these elements, the so-called cerite earths, proved to be very difficult to separate, however. The elements cerium and lanthanum were the first to be obtained pure. The other constituent, didymium, at first regarded as a single element, has since (1885) been separated by V. Welsbach into two, neodymium and praseodymium. These elements are of practical interest, since their oxides are used in making the mantle of the Welsbach lamp. They give out a very pure, white light when raised to a high temperature.

The new elements, or perhaps mixtures of new elements, argon and helium, form the latest additions to the list. The first is found in the air, and forms one per cent of its volume; the second has been extracted from cleveite and other minerals. (See ARGON and HELIUM, in these Supplements.)

The isolation of fluorine has attracted more attention, perhaps, than any of the above discoveries. It occurs plentifully in nature, in various

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forms of combination, and especially as fluorspar (CaF^2). But although many of its compounds were familiar bodies, the element itself had never been obtained in the free state, in spite of innumerable efforts to prepare it. The cause of the difficulty was known to lie in its extreme chemical activity, by virtue of which the moment a trace of it was formed it interacted with the substance of the vessel in which its preparation had been attempted, or with the ever-present moisture, and so passed into a new form of chemical combination. By combining three ideas,—the use of a vessel of material very difficult of attack, a low temperature and consequent relatively small chemical activity of the element, and the absence of moisture,—Moissan (1876) succeeded in preparing considerable quantities with great ease.

When an electric current is passed through aqueous hydrochloric acid, the constituents, hydrogen and chlorine, are liberated at the negative and positive poles respectively. When ordinary hydrofluoric acid is treat similarly, hydrogen and oxygen are the only products. The latter is clearly formed on account of the action of fluorine on water:

$$2F^2 + 2H^2O = 2H^2F^2 + O^2,$$

whereby the hydrofluoric acid is re-formed. Even chlorine acts on water in the same way in sunlight. By taking perfectly anhydrous hydrofluoric acid containing 25 per cent of acid potassium fluoride (KHF^2), Moissan secured a liquid which was decomposed by the current, and yet contained no water. The potassium fluoride broke up into fluorine and potassium. The former was evolved at the positive pole, the latter acted on the hydrofluoric acid, producing potassium fluoride again, and hydrogen, which appeared at the negative pole.

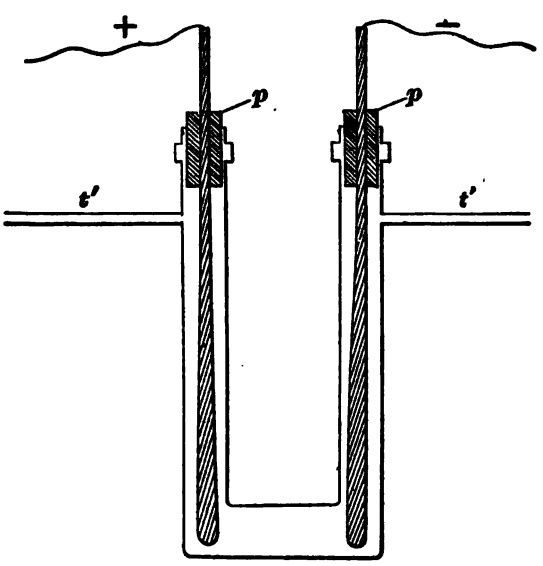

FIG. A.

The apparatus consisted of a U tube made of a platinum-iridium alloy. (See Fig. A.) This material was found to be much less attacked than platinum alone. To avoid the loss of hydrofluoric acid by evaporation, which is rapid at the ordinary temperature, as it boils below 20° C., and to diminish the activity of the fluorine, the tube was surrounded by a glass vessel in which methyl chloride boiled under reduced pressure. The boiling-point of this liquid is −23° C., and by drawing air through the apparatus by means of a pump, a temperature of −40° to −50° C. was maintained. The tube was provided with plugs (*p*) of fluorite, through which the platinum-iridium terminal passed, and with side-tubes (*t* and *t'*) for the exit of the fluorine and hydrogen respectively. Observation of the fluorine gas arising at the positive pole showed it to be similar in color to chlorine. It had an odor like chlorine monoxid. It displaced chlorine in sodium chloride just as chlorine displaces iodine in potassium iodide. It united directly with many elements. In contact with hydrogen, explosive union took place even in the dark. Iodine, sulphur, phosphorus, and even crystalline silicon and boron, took fire spontaneously in uniting with it. All metals were converted into fluorides more or less readily. All forms of carbon, excepting diamond, gave CF^4 on warming. Very startling was the action of a few drops of water on fluorine in a platinum tube. So much ozone was formed that the tube seemed to be filled with an indigo-blue gas:

$$3F^2 + 3H^2O = 6HF + O^3.$$

The blue colors disappeared after a few minutes, on account of the decomposition of the ozone. In connection with this new mode of obtaining ozone, it may be mentioned that traces of it have been proved to be formed during the heating of potassium chlorate with manganese dioxide for the purpose of making oxygen. This appears to be a particular case of the remarkable fact that it is formed when oxygen is passed over manganese dioxide, lead dioxide and other oxides at 400° C. These and other experiments have shown that it is not so readily decomposed by heat as had formerly been thought. The gas, supposed to be ozone, which is formed during the slow oxidation of phosphorus has been shown to possess some properties which do not bear out this supposition. It is now thought to be atomic oxygen.

New Compounds. Of the many new substances, or substances which have recently been rendered accessible in a pure condition, a few may be briefly mentioned.

Hydrogen peroxide (H^2O^2) was for a long time regarded as an oxidation product of water ($H^2O + O = H^2O^2$). It is now held to be a reduction product of free oxygen. It is never formed from nascent oxygen and water, while nascent hydrogen has been frequently found to act upon oxygen and produce it. Thus the presence of hydrogen peroxide, in dilute sulphuric acid undergoing electrolysis, has been found to be due to the action of the electrolytic hydrogen on dissolved oxygen. Renewed interest has been attracted to the subject by the fact that the compound can now be prepared perfectly pure and free from water, so that our study of it is not confined to more or less dilute solutions. It is a very unstable body, but if the solution is freed from all traces of alkaline matter, compounds of heavy metals and solid particles, it can be concentrated on the water-bath to a 65-per-cent solution without great loss. The loss which takes place is partly due to evaporation and partly to decomposition into water and

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oxygen: $2H^2O^2 = 2H^2O + O^2$. When the concentrated solution is distilled under diminished pressure, the water passes off first, and the last fraction contains 90 per cent of the compound. By repeating the process, perfectly pure hydrogen peroxide is obtained. It is a colorless liquid which can be kept safely in vessels whose surface has been covered with paraffin. Small particles of solid matter, rough surfaces, or the production of a scratch on the bottom of the vessel in which it is held, lead to rapid decomposition in the sense of the above equation. The assumed molecular weight (H^2O^2) has been shown to be correct.

Hydroxylamine (NH^2OH), a base-like ammonia, is obtained as hydrochloride by reducing nitric acid with tin and hydrochloric acid. Till recently, it was only known in the form of salts and in solution. By fractional distillation of the solution in methyl alcohol under diminished pressure, it has been obtained as a hygroscopic crystalline solid, which melts at 33° C., and decomposes explosively at about 100° C.

Hydrazine (N^2H^4) is an extremely interesting and very active body, related to ammonia. It is prepared from triazoacetic ether, and can be obtained by reduction of a compound nitric oxid and potassium sulphite according to the equations:

$KSO^3.NH.NO + 4H = KSO^3.NH.NH^2 + H^2O.$

$KSO^3.MH.MH^2 + KOH = K^2SO^4 + N^2H^4.$

It forms salts with acids, and when set free by bases, forms a hydrate with water ($N^2H^4.H^2O$), from which it is obtained by the action of barium oxide, and can be purified by fractionation *in vacuo*. It is a white solid, melting at −1° C.

Still another compound of nitrogen and hydrogen, hydrazoic acid (N^3H), has been prepared. It is formed by conducting nitrous oxide over Sodamid ($NaNH^2 + N^2O = N^3Na + H^2O$). The product is the sodium salt of the acid, which may be set free with sulphuric acid. The acid is a colorless mobile liquid, of frightfully explosive properties. Less than one grain exploded on being introduced into the vacuum of a barometer, and pulverized the apparatus so completely that only minute particles of it could be found, distributed in every part of the room.

The gas, nitrous anhydride (N^2O^3), has now been shown to be a mixture of NO^2 & NO in molecular proportions. The anhydrid exists only as an indigo-blue liquid at −21° C. Above this temperature it undergoes partial dissociation, even in the liquid state, and when completely vaporized it is entirely broken up into the above two constituents. The gaseous mixture of the composition N^2O^3 is a substance of great commercial importance, as on its power of combining with sulphur dioxide, water and oxygen depends the chemical reaction used in the manufacture of sulphuric acid; so that the above discovery involves a change in our view in regard to the reactions which take place in the lead chamber. The chief changes which take place are:

First, the union of NO and NO^2 with SO^2 and O^2 and H^2O to form nitrosyl-sulphuric acid (chamber crystals):

(1) $2SO^2 + NO + NO^2 + H^2O + O^2 = 2SO^2 \begin{cases} NO^2 \\ OH \end{cases}$

And second, the action of water on the product, producing sulphuric acid and NO and NO^2 again:

(2) $2SO^2 \begin{cases} NO^2 \\ OH \end{cases} + H^2O = 2H^2SO^4 + NO^2 + NO.$

The latter then repeat the first operation with fresh quantities of SO^2, H^2O and O^2.

Among the compounds with metals, the carbonyl derivatives have been the most interesting. It had long been known that potassium united with carbon monoxide to form a black explosive substance of the composition $(KCO)^x$, in which the x was probably = 6. It has recently been found that nickel in a finely divided condition unites directly with CO at 100° C. to form $Ni(CO)^4$. Nickel carbonyl is a colorless liquid which boils at 43° C., and freezes to a mass of needle-shaped crystals at −25° C. Cobalt, which resembles nickel very closely in most respects, does not give any corresponding compound, so that the removal of nickel by means of a stream of carbon monoxide makes a welcome addition to the few known means of separating the elements. The substance decomposes at 180° C. into nickel and carbon monoxide again. A large plant has been erected at Birmingham, England, with a capacity of one and a half tons per week, for preparing pure nickel from nickel matte. The process depends on the removal of the nickel as nickel carbonyl, the decomposition of the latter at a higher temperature, and the re-employment of the carbon monoxide for the extraction of a fresh quantity of the metal. Injected subcutaneously, it is a violent poison, and the breathing of air containing one-half per cent of the vapor is dangerous. The symptoms are the same as those of carbon monoxide poisoning and the spectroscope shows the presence of the same compound with the hæmoglobine in the blood.

Carbon monoxide also forms several compounds with iron of the formulæ $Fe(CO)^4$, $Fe(CO)^5$ and $Fe(CO)^7$, but they have not yet been fully investigated.

Chemistry at the Temperature of the Electric Furnace. Until recently, the highest temperature attainable for commercial or scientific chemical work has been about 2000° C. Isolated attempts have not been wanting to secure higher temperatures by means of the electric arc, but M. Moissan has been the first to devise apparatus for making higher temperatures easy of application. M. Moissan uses an electric furnace made of quicklime or pure limestone. The lower block is hollowed out for the reception of a small crucible, and is provided with grooves for the insertion of the carbon terminals. The upper block is not so thick, and serves simply to cover the hollow in the lower one. The whole apparatus is from 7 to 9 inches long by 6 inches wide and 5 to 6 inches high. The fundamental points are, that the substance of the furnace is so poor a conductor that the outside can be touched with the hand without discomfort, and the heat is thus concentrated as much as possible; that the current does not pass through the substance, but across its surface, so that the full action of the heat is obtained without any electrolytic effect; and that the carbon poles can be moved so as to regulate the length of the arc, with the object of maintaining the same current-strength even when vapors with con-

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siderable conductivity are formed, and so maintaining a constant temperature. To prevent chemical action between the lime of the furnace and the carbon of the crucible, a layer of pure magnesia is used to line the interior. For some purposes, hollow carbon poles were used to permit the introduction of various gases during the experiments. In examining the vapors present, a small copper vessel through which a stream of water flowed was lowered into the interior. A part of the vapor condensed on its surface. The currents ordinarily used varied from 35 to 40 amperes and 55 volts, to 450 amperes and 75 volts. The temperature was estimated to be at least 3500° C.

The physical effects of exposure to such temperatures were remarkable. With the less powerful current quicklime was transformed into shining white crystals of CaO; with a stronger current, fusion took place; with a current of 1,200 amperes and 110 volts, 100 grams (3½ ounces) of quicklime were melted and converted into vapor in five minutes. Pure sand (silica) melted and boiled with a current of 360 amperes and 70 volts. The condensing vapor took the form of small drops. Even carbon was converted into vapor. A tube made of carbon became filled with a network of fine crystals of graphite. The chemical effects were still more remarkable. They took the form chiefly of reduction of hitherto irreducible oxides, and the formation of compounds of the metal with carbon (carbides), while reductions which are difficult in a gas-furnace became mere child's play. Of the latter sort was the production of manganese from the oxides and carbon. The metal evaporated rapidly. Of the former class were the preparation, in large quantities, of the metals chromium, tungsten, molybdenum and titanium.

In nearly every case the first product was a carbide, or at least a specimen of the metal containing much carbon, and renewed heating with some of the oxide of the metal was necessary to effect the removal of the carbon. Metal carbides of definite composition were obtained in several cases (Cr^3C^2, Cr^4C, Mo^2C, Al^4C^3, TiC). The aluminium carbide could only be made by this interaction of alumina and carbon in the form of vapor. It consisted of transparent yellow crystals, which decomposed slowly in contact with water, giving marsh-gas and aluminium hydroxide:

$$Al^4C^3 + 12H^2O = 3CH^4 + 4Al(OH)^3.$$

In several cases a practical application has been found for the newly discovered substances. Thus calcium carbide (CaC^2) is now manufactured for the preparation of acetylene for illuminating purposes. The carbide is made by heating quicklime (120 parts) and coke (20 parts) in an electric furnace (350 amperes and 70 volts) for 15 to 20 minutes. It is a white homogeneous substance of crystalline structure. It reacts violently with water, giving torrents of acetylene gas:

$$CaC^2 + 2H^2O = Ca(OH)^2 + C^2H^2.$$

Carborundum is another result of these investigations. It is made by heating silica (sand) with carbon, and has the composition SiC. Its value is due to the fact that it is almost as hard as the diamond, and can be advantageously used for many purposes as a substitute for the latter, on account of its cheapness. When free from iron it forms colorless crystals which scratch the ruby; it is not affected by oxygen at 1000° C., or by potassium nitrate or chlorate at their melting-points, or by any acids.

Carbide of boron (B^6C) is prepared by heating amorphous boron with carbon and a large quantity of copper. The latter acts as a solvent for the carbide, which is obtained in shining black crystals when the copper is dissolved in nitric acid after the mass has cooled. It is of interest because it is harder than carborundum, and can be used for polishing diamonds, although slightly inferior to the latter in hardness.

The original experiments with the electric furnace were undertaken in connection with efforts to prepare artificial diamonds. These were partially successful. The best results were obtained by dissolving carbon in molten iron or silver at 2000° to 3000°, and then immersing the crucible in cold water. This produced a solidified coating around the still molten exterior, and the contraction accompanying the solidification subjected the solution in the interior to great pressure. By allowing the mass to continue cooling slowly in the air and then dissolving the metal away with acids, various forms of graphite and diamond were obtained. Without the preliminary sudden cooling and consequent pressure, only graphite was formed. The diamonds were of two kinds. Some were black, and resembled the natural "carbonados." Other fragments were transparent, and had all the properties of natural diamonds. They were very small, however.

The results of electric-furnace work are of great importance for several reasons. Besides those already mentioned, the carrying out of actions impossible at lower temperatures, and the production of new compounds, especially carbides, many of which will doubtless be of commercial value, they give us some grounds for speculation in regard to other chemical changes which may go on in the stars, and which may have taken place during the cooling of the earth from a nebulous condition. They recall Daubrée's suggestion that all the carbon of the present organic world may have originally been in combination with metals, and that possibly much of the interior matter of the earth may be carbide of iron and other similar compounds. It has been thought that some of our natural gas, consisting largely of methane, or marsh-gas, may come from the action of water on carbides (see ALUMINIUM CARBIDE, above.)

Chemistry at Low Temperatures. The liquefaction of the various gases has always been a problem of interest to chemists. Faraday succeeded, by applying cold or pressure, in obtaining such gases as chlorine, sulphur dioxide and ammonia in liquid form, but he failed to effect this change with hydrogen, oxygen, nitrogen, marsh-gas, nitric oxide, carbon monoxide, etc., and these were therefore known as the permanent gases. Later experimenters have succeeded in liquefying all of these, and have even obtained the last four in solid form.

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The earlier (1877) experiments of Cailletet and Pictet, in which the highly compressed permanent gases were cooled by boiling liquid carbon dioxide, showed that on releasing the pressure the temperature fell still farther, and a mist of liquid particles was visible for a few seconds in the inner tube of the apparatus. More recently, large quantities of these gases in the liquid condition have been prepared. By using the evaporation of liquid ethylene (−120°), and a pressure of about 50 atmospheres, liquid oxygen can be made. Liquid oxygen, in turn, evaporating *in vacuo*, gives a temperature of −211°, and can therefore be used as a cooling agent for other experiments. Thus when an open test-tube is surrounded by a jacket in which liquid oxygen is boiling under reduced pressure, the air in the tube liquefies, and a large quantity of the liquid air can be collected in a very short time. Oxygen boils at −180° and carbon monoxide at −190°, in an open vessel, at atmospheric pressure. Hydrogen, which was the most difficult of the series to liquefy, boils at −243.8°. This work was rendered much easier by the invention of vessels of glass with double walls in which the air had been withdrawn from between, so that a kind of "vacuum jacket" was formed. In such vessels a pint of liquid oxygen can be kept without external cooling for considerable time, the only loss being due to the gentle boiling of the liquid.

A few experiments on the effects of low temperatures on ordinary chemical changes have led to interesting results. Photographic action seems to be impeded, but not prevented. On the other hand, many substances which react violently at ordinary temperatures become entirely passive on cooling. Thus metallic sodium has no apparent action on aqueous alcohol at −80°. It may be added that it has been found that while moist chlorine attacks metals with extreme vigor, dry chlorine has no effect on them, so that liquid chlorine is now sold compressed in iron cylinders, and is much used in chemical industries.

Organic Chemistry. [The old distinction that organic chemistry was concerned only with compounds which were the result of vital forces has long been abandoned. The change of view began with Wöhler's artificial production of urea in 1828. For a general discussion of the matter, see CHEMISTRY, Vol. V, pp. 471 et seq. The progress of this branch of chemistry since that article was written is recounted below.] Organic chemistry, or more properly the chemistry of the compounds of carbon, for many of the products can be obtained quite independently of physiological processes, has accumulated more material than all the other departpartments of chemistry together. Yet much of this is of so technical a nature that we must here confine ourselves to a short account of a few only of the chief advances.

Many familiar organic bodies can now be prepared artificially. Indigo, for example, has attracted much attention on account of the large quantities of the natural products which are used in dyeing. No satisfactory substitute has been found for it, and hence a method of preparing it from cheap materials would be very welcome. Its constitution is now known, and several methods of synthesizing it have been discovered, but the artificial product still costs as much as, or more than, the natural one. Alizarin, another valuable dye, has been known for ages, and was obtained from the madder-root. In this case the efforts to prepare it cheaply have been more successful, and it is made in large quantities from anthracene, a constituent of coal-tar.

The investigation of the vegetable alkaloids, such as conine, nicotine, atropine, cocaine, quinine, morphine, narcotine, strychnine and brucine, has been followed strenuously. In a few cases their artificial preparation has been achieved. Conin, the poisonous principal of hemlock, was the first of the class (1886), and piperin, which occurs in pepper, and trigonelin, which is found in fenugreek, followed closely. In other cases their decomposition into known substances has paved the way for synthetic work. On the other hand, some artificial substances which have similar physiological action have been adopted in medicine, and have taken the place of the alkaloids to some extent. Thus we have as antipyretics, acetanilide (antifebrine), phenyl dimethyl pyrozolone (antipyrine) and phenacetine, which are manufactured in enormous quantities, and produce a greater lowering of temperature than quinin.

In no direction has chemistry made greater progress than in the study of the sugars. Not only have many new members of the group been discovered, but several sugars which occur in nature have even been prepared artificially. Formerly the simplest substances known as sugar had the formula $C^6H^{12}O^6$ (grape sugar and levulose), and the others, such as cane sugar ($C^{12}H^{22}O^{11}$), contained simple multiples of this number of carbon atoms. Our view has now been widened, so that all bodies having the atomic groupings—CHOH.CO—are found to share the properties of the sugars, and members of the series containing from 2 to 9 carbon atoms have been prepared. Bodies, like cane sugar, derived by doubling up the simpler formulæ are classified as saccharids and polysaccharids (e.g., starch $(C^6H^{10}O^5)^x$). The first sugar to be synthesized was *a*-acrose. It was a constituent of a mixture of sweet substances formed by boiling an aqueous solution of formaldehyde with milk of lime $6CH^2O = C^6H^{12}O^6$. A better yield of it was obtained by oxidizing glycerin ($C^3H^8O^3$) with bromin. The product from the first step was called glycerose, and contained two bodies having the formula $C^3H^6O^3$. When it was boiled with lime, *a*-acrose was formed:

$$C^3H^6O^3 + C^3H^6O^3 = C^6H^{12}O^6.$$

From *a*-acrose, grape sugar (dextrose) $(CH^2OH.(CHOH)^4.COH)$, levulose (fruit sugar) $CH^2OH.(CHOH)^3.CO.CH^2OH$, were prepared.

In this connection reference may be made to saccharin. This substance is a coal-tar derivative, and is chemically entirely unrelated to the sugars. It resembles them solely in its quality of sweetness. It is orthobenzoylphonimide ($C^6H^4\begin{smallmatrix}/SO^2\\\backslash CO/\end{smallmatrix}NH$). It is 500 times as sweet as cane sugar, and is manufactured in considerable quantities.

Among the long-known substances whose constitution is now determined are several derivatives of

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carbon monoxide in which the carbon atom is bivalent. Hydrocyanic acid (prussic acid) is H—N=C. Fulminic acid has the formula H—O—N=C. Its mercury salt ($Hg(ONC)^2$) is known as fulminating-mercury, and is largely used in making percussion-caps. ALEX. SMITH.

See PHYSIOLOGICAL CHEMISTRY, in these Supplements.

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CHEMMIS, an ancient Egyptian town. See EKHMIN, Vol. VII, p, 688.

CHEMNITZ, a town of Saxony, Germany, which as a commercial center and in industry, art and public improvements has made substantial progress. Pop. 1900, 206,813. See CHEMNITZ, Vol. V, p. 503.

CHEMOSH, a Moabite god. (MOAB, XVI, 557.)

CHEMULPO OR IN-CHÖN, a town on the west coast of Corea, at the mouth of the Han River, 25 miles by road S.W. of the capital, Seoul. It is one of the three treaty ports opened in 1883 to foreign commerce, the volume of which has since steadily advanced in spite of the drawbacks resulting from the great difference between high and low water here (33 feet) and the want of wharves. Since 1885 it has had telegraph connections with China. A line connects with the Russian telegraph system in Siberia. A cable connects Chemulpo with Japan. The Japanese army landed its troops here for the invasion of China in the war of 1894.

CHEMUNG GROUP. See GEOLOGY, X, 306.

CHEMUNG RIVER, New York, 40 miles long, is formed by the union of the Canisteo and Conhocton at Knoxville, Steuben County. It flows S.E. through Chemung County, and enters the Susquehanna at Athens, Pa. C.L.S.

CHENANGO RIVER, New York, 75 miles long, rises in Madison and Oneida Counties, and joins the Susquehanna at Binghamton. C.L.S.

CHENEY, a town of Spokane County, central eastern Washington, on the Northern Pacific railroad, 15 miles S.W. of Spokane. It is situated in a lumbering district, and in the handling of this the town is mostly occupied. Population 1900, 781.

CHENEY, CHARLES EDWARD, Reformed Episcopal bishop; born in Canandaigua, N. Y., Feb. 12, 1836, was graduated at Hobart in 1857 and subsequently studied theology. After being ordained he was made rector of Christ Church, Chicago, which office he retained when consecrated missionary bishop of the Northwest, Dec. 14, 1872. In 1878 he became bishop of the Chicago synod, being succeeded by Bishop Fallows as missionary bishop. Bishop Cheney took a leading part in organizing the Reformed Episcopal Church. He is the author of *Twenty-eight Sermons* (1880); *What Do Reformed Episcopalians Believe?* (1888), and *A King of France Unnamed by History* (1902). G.J.H.

CHENEY, JONH VANCE, an American librarian and poet; born at Groveland, New York, Dec. 29, 1848; educated at Temple Hill Academy, Geneseo, New York, and at Burr and Burton Seminary, Manchester, Vermont; studied law, and was admitted to the bar in Massachusetts; began practice in New York City, but ill health compelled him to give up his profession, and he removed to California. In 1887 he was made chief librarian of the San Francisco Free Public Library, where his eight years of service gave him such repute that he was chosen, in 1894, to fill the place made vacant by the death of Dr. William F. Poole, as chief librarian of the Newberry Library in Chicago. He wrote verse and literary essays from boyhood. Among his published writings are *Thistledrift* (1887); *Woodblooms* (1888); *Queen Helen* (1895); all poems, besides two volumes of essays — *The Golden Guess* (1892), and *That Dome in Air* (1895). He edited *Wood Notes Wild* (1892), a series of unique papers on bird-music, written by his father, Simeon Pease Cheney.

CHENOA, Illinois, a town of McLean County, 24 miles N. E. of Bloomington, on the Toledo, Peoria & Western, and the Chicago & Alton railroads. It is in a farming, grazing, and mining district, and exports live cattle and coal, canned goods, brick and tiles. Pop., 1900, 1,512. C.L.S.

CHENOPODIACEÆ, the spinach family of which *Spinacia oleracea* is a typical species. The native country of the garden spinach is supposed to be western Asia, but has long been cultivated in this country and in Europe *Chenopodium auricomum* is the Australian spinach that has lately come into use as a substitute for the garden variety. *Basella rubra*, or East Indian, is a succulent climber cultivated for shade as arbor plants. *Tetragonia expansa* is the New Zealand spinach of the *Ficoideæ*, a trailing branch-stemmed annual discovered by Captain Cook and much prized as a food vegetable among the crews, being anti-scorbutic. W.R.B.

CHER, a small river of the department of Loire-Inférieure, western France, a tributary of the Vilaine, about 25 miles in length.

CHERAW, South Carolina, a town of Chesterfield County, 80 miles N.E. of Columbia, on the Great Pedee River, and a junction for branches of the Atlantic Coast Line and the Sea-

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board Air Line. Hides, cotton and other agricultural produce are exported. As a Confederate commissariat depot it was captured by Gen. Sherman, Mar. 3, 1865. Pop., 1900, 1,151. C.L.S.

CHERBULIEZ, ANTOINE ÉLISÉE, a Swiss economist; born in Geneva, July 29, 1797; died at Zurich, March 7, 1869. He came of a family noted for literary talents; was professor of law and political economy at Geneva; later at Paris, where he opposed Proudhon and the socialists; was afterwards professor of political economy at Zurich. He wrote numerous works on political science; among them, *L'Utilitaire* (1830); *De la Démocratie en Suisse* (1843); *Études sur les Causes de la Misère* (1853); and *Précis de la Science Économique* (1862), pronounced by Cossa to be the best treatise on the science in the French language.

CHERBULIEZ, VICTOR, an eminent French novelist; born at Geneva, July 19, 1829; studied at Paris and in the universities of Bonn and Berlin. He died July 1, 1899. In Dec. 8, 1881, he was elected a member of the French Academy; received the decoration of the Legion of Honor in 1872, and was made an officer of the same in 1892. Besides numerous popular works of fiction, he has published many volumes on literary and art criticism and on politics; among them, *Le Roman d'une Honnête Femme* (1866); *L'Aventure de Ladislas Bolski* (1869); *L'Allemagne Politique* (1870); *L'Espagne Politique* (1874); and *L'Art et la Nature* (1892).

CHERIMOYER, a native name applied to the fruit of *Anona cherimolia*, one of the much-prized "custard apples" of tropical America, but cultivated in all tropical regions. Like the rest of the group, the large, roundish fruit has an abundant soft pulp (in this case white), in which are imbedded the seeds, as in the "papaw," the northern representative of the group. Also written "chirimoya."

CHERNIGOFF, a Russian city and government. See TCHERNIGOFF, Vol. XXIII, p. 103.

CHEROKEE, a town and the capital of Cherokee County, northwestern Iowa, situated on the Illinois Central railroad and the Little Sioux River. It is furnished with electric lights and good water-works, and has the Cherokee Magnetic Mineral Springs, which produce a solution of sulpho-carbonated chalybeate. Population 1890, 3,441; 1900, 3,865.

CHEROKEE, a town of Crawford County, southeastern Kansas, on the Kansas City, Fort Scott and Memphis, the Kansas City, Pittsburg and Gulf and the Missouri Pacific railroads, 136 miles S. of Kansas City. It has several factories, mills, machine-shops and coal-shafts. Population 1900, 1,326.

CHERRY-LAUREL, a shrub. See LAUREL, Vol. XIV, p. 349.

CHERRYVALE, city of Montgomery County, southeastern Kansas, on the Kansas City, Fort Scott and Memphis, the Atchison, Topeka and Santa Fé and the St. Louis and San Francisco railroads, 156 miles S.S.W. of Kansas City. The city is lighted and heated by natural gas. Population 1900, 3,472.

CHERRY VALLEY, New York, a village of Otsego County, 68 miles N. W. of Albany on a branch of the Delaware and Hudson railroad. Its industries are agricultural. The village was burned and the inhabitants killed by Tories and Indians on October 11, 1778. Pop., 1900, 772. C.L.S.

CHERSON, a Russian city and government. See KHERSON, Vol. XIV, p. 64.

CHERT, a variety of flint. See FLINT, Vol. IX, p. 285; GEOLOGY, Vol. X, p. 309.

CHERVIL, a name applied to several sweet aromatic species of *Umbelliferæ*, especially of the genus *Anthriscus*, several of which are cultivated as pot-herbs.

CHESANING, Mich., a village of Saginaw County, 30 miles S. W. of Bay City, on the Shiawassee River, and on the Jackson to Bay City branch of the Michigan Central railroad. It is a farming market town and has lumber, flour, and other mills. Pop., 1900, 1,244. C.L.S.

CHESAPEAKE BAY, in Maryland and Virginia, and dividing the former state into two parts. It is the largest inlet on the Atlantic coast; separated from the ocean by the peninsula on which are Delaware and ports of the above-named states. It extends northward from Cape Charles for 170 miles, and receives the waters of the Susquehanna, Potomac, Rappahannock, York, James and numerous smaller rivers.

CHESBROUGH, ELLIS SYLVESTER, engineer, was born in Baltimore on July 6, 1813, and in early boyhood went to work with an engineering party which was surveying for the Baltimore and Ohio railroad. Later he became a civil engineer, engaged in railroad work in 1831, upon the Boston water-works in 1846, and finally upon the work of the Board of Sewerage Commissioners in Chicago in 1855. He planned and built the sewer system and the tunnels under the river in Chicago, his work there remaining in use until transformed by the sewage canal. He was for a time president of the American Society of Civil Engineers. He died on August 18, 1886. W.F.J.

CHESNELONG, PIERRE CHARLES, a French statesman; born at Orthez, France, April 14, 1820; acquired a large fortune in the rearing of hogs; was elected a member of the Corps Législatif (1865) as an ultra-Imperialist; re-elected in 1869; elected to the National Assembly (1872); helped the fall from power of President Thiers; was one of the founders of the Catholic workingmen's societies; visited the Count de Chambord (the Bourbon pretender) in 1875, in Austria, with the committee of nine appointed to offer him the crown of France; the Count refused to accept the conditions, and the plan of restoration failed. He was elected permanent Senator (1876); sustained the De Broglie cabinet of 1877 that ended by President MacMahon's resignation, and after that remained in the small antirepublican senatorial minority.

CHESNEY, FRANCIS RAWDON, an English soldier and explorer; born in 1789 at Ballyrea, Ireland; died Jan. 30, 1872. He traveled in Asia Minor, Greece and Egypt, explored from 1831–32, and from 1835–37 the entire course of the Euphrates, and published his results in *Expedition for the Survey of the Rivers Euphrates and Tigris* (3 vols., 1850–68). Returning to active

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service he commanded the artillery in China. After his return he published *The Russo-Turkish Campaigns of 1828–29*; *Telegraphic Communication with India*, and *Observations on the Past and Present State of Fire Arms*. G.A.S.

CHESNEY, Sir George Tomkyns, soldier and author, nephew of Francis Rawdon Chesney (q. v., supra); was born in England in 1830, became a member of the Council of the Viceroy of India in 1886, was a general in the British army, wrote the very clever *Battle of Dorking* (1871); *The Private Secretary* (1881), etc., and died on March 31, 1895. W.F.J.

CHESS—Change of Style in Modern Play. Since the close of the meteoric career of Morphy in the chess world, it has been a subject of remark that no other player has shown so much superiority over his competitors and routed his adversaries so completely as did the young American champion. Within a few years it has come to be conceded that the reason for less pyrotechnic displays of chess-play lay rather in the fact that players of the first grade are now better equipped in matters of analysis than was the case in Morphy's time. It was claimed for Morphy that he could give odds to any living player. This may not have been true, but it certainly appeared that few of his opponents were worthy of meeting him on even terms. To-day no player is accounted as of the first power if he could not win from the most experienced at the smallest odds. The claim was even made by Steinitz that the time had arrived when no accurate player could afford to sacrifice a gambit-pawn in the opening. This claim was disputed by Tschigorin, and disproved by a subsequent match between the players, as well as by the results of numerous tournament games since that time. Nevertheless, coming from a player who is conceded to be inferior to none in analysis, and who held the world's championship for a longer period than any other champion, it affords a most valuable criterion of the result of modern analysis. The results of tournaments and match games also show a largely increased number of drawn games, indicating that strategy in chess is approaching its limit, and that the science is not the matter of exhaustless computation that it is reputed to be.

Certain openings and lines of play are proverbially regarded among chess-players as likely to produce draws, because their peculiarities have been largely exhausted by the analysts. At the St. Petersburg tournament in the winter of 1895–96, it is thought that the four players participating were the strongest ever brought together, and the result did not indicate the ability of any one of them to dispatch any of the others in the style of Morphy. Lasker, who took first prize, and who has never been beaten in a set match, is remarked upon as following no school of play, but relying upon the trading off of the more powerful pieces on the board, and the securing of a pawn position which will win in the ending. He appears to make the closest calculations as to end-game positions, and is unsurpassed in that part of chess strategy.

Steinitz, the recognized world's champion until he lost a match to Lasker, stood second in the St. Petersburg tournament. His style of play consists in the endeavor to force his opponent to take up an unsound position in the middle game, and he has often taken questionable positions himself in the endeavor to induce his opponent to leave some safe and sound arrangement of pieces.

Pillsbury, third-prize winner at St. Petersburg, and winner of the international tournament at Hastings, England, in 1895, is regarded by many as presenting a nearer approach to Morphy in his play than any other of the great living players. He wins by far-sighted combinations in the middle game, outgeneraling his opponents by superior combinations of force at the strategic points.

Tschigorin, fourth-prize winner at St. Petersburg, is pre-eminently a gambit-player. He never shows to such good advantage as when he has the opening move and chooses to sacrifice a pawn for the attack. He has downed all the theoretical defenses that have been presented within recent years to the famous Evans's gambit.

Notwithstanding these differences of style between the chess-masters, it is apparent in the play of all that the surprises which characterized play in Morphy's time are to be found but seldom in the play of modern experts, and that the game is better known now than then, and that if Morphy were to play to-day he would have to master the results of recent analyses before he could conquer the later exponents of the complications of chess. C. H. Cochrane.

CHESS or CHEAT, the popular name of *Bromus secalinus*, a grass common in wheat-fields, bearing some resemblance to oats. Its close association with wheat has given rise to the erroneous belief that it is degraded wheat.

CHEST or THORAX, in anatomy. (See Respiration, Vol. XX, p. 490.) The contents of the chest are the heart, the great arteries and veins, the lungs, the trachea or windpipe, the bronchi or branches of the trachea leading to the lungs, the œsophagus or gullet, and the thoracic duct or general terminus of the lymphatic system of vessels by which the chyle and lymph are discharged into the blood.

CHESTER, a coal-shipping city and the capital of Randolph County, southern Illinois, situated on the Mississippi River, and on the Wabash, Chester and Western railroad, 55 miles S. S. E. of St. Louis. It has a grain-elevator and flour and rolling mills. Population 1890, 2,708; 1900, 2,832.

CHESTER, a port of entry of Lunenburg County, southern Nova Scotia, on a point of land in the Mahone Bay, 34 miles W. of Halifax. It has large fishing-interests. Population about 3,000.

CHESTER, an important industrial city of Delaware County, Pennsylvania, in the southeastern corner of that state, on the Delaware River, a few miles below Philadelphia. It is reached by the Baltimore and Ohio, Philadelphia and Reading, and Pennsylvania railroads. It is the seat of a great ship-building industry. Its population was 33,988 in 1900. W.F.J.

CHESTER, capital of Chester County, northern central South Carolina, on the Seaboard Air Line,

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the Southern, the Cheraw and Chester and the Chester and Lenoir railroads, 65 miles N.N.W. of Columbia. It is chiefly a cotton-shipping station. Population, 1890, 2,703; 1900, 4,075.

CHESTER, a manufacturing town of Windsor County, southeastern Vermont, on the Central Vermont railroad, 39 miles S.E. of Rutland. It has an academy, and produces leather, furniture, lumber, boots and shoes. Pop., 1890, 1,787; 1900, 1,775.

CHESTER, JOSEPH LEMUEL, genealogist and antiquarian; was born at Norwich, Conn., on April 30, 1821, edited a newspaper in Philadelphia, and went to England in 1858, where he edited *Registers of Westminster; London Marriage Licenses*, and other similar works, and collected and edited an invaluable mass of historical and genealogical data. The University of Oxford gave him the degree of D. C. L. He died in London on May 26, 1882. W.F.J.

CHESTERFIELD INLET, a gulf penetrating to the westward from the northwest of Hudson Bay, at lat. 63° 30′ N., and long. 90° 40′ W., its extreme dimensions being 250 and 25 miles. Its western end expands into Baker Lake.

CHESTERTOWN, a town and county seat of Kent County, Maryland, in the northern part of the "Eastern Shore." It is on the north shore of the Chester River, and is reached by the Baltimore and Delaware Bay railroad. Its population was 2,632 in 1890, and 3,008 in 1900. W.F.J.

CHETIMASHES, a lagoon of Louisiana. See GRAND LAKE, in these Supplements.

CHETOPA, a city of Labette County, southeastern Kansas, on the Missouri, Kansas and Texas and the Missouri Pacific railroads, near the line of Indian Territory, situated on the Neosho River. The city has many mills, where flour and castor-oil are made. There are schools, stockyards, and also a foundry. Population, 1900, 2,019.

CHEVALIER, MICHEL, a French political economist; born Jan. 13, 1806, at Limoges. He advocated the teachings of Saint Simon's School, as editor of the *Globe*, and was imprisoned for one year, in 1832, but pardoned, and sent by Thiers to study the canal and railroad systems of the United States. He described the results in *Letters about North America*. In 1836 he became a knight of the Legion of Honor, in 1840 professor of political economy at the Collège de France, in 1841 chief engineer of mining, was in 1845 elected to the Chamber of Deputies where he opposed the socialistic theories of Louis Blanc, advocating at the same time, the most advanced economic ideas. In 1851 he was made a Councilor of State, and in 1860 a Senator. He was an advocate of free-trade and was instrumental in the negotiation of a commercial treaty between France and England, 1860. He died Nov. 28, 1879, at Montpellier. G.A.S.

CHEVAUX-DE-FRISE. See FORTIFICATION, Vol. IX, p. 372.

CHEVERUS, JEAN LOUIS ANNE MADELEINE LEFEBVRE DE, a French ecclesiastic; born January 28, 1768, in Mayenne, France, where he was a curate. In 1795 he went to Boston and founded a church, and in 1808 he was appointed first Roman Catholic bishop of that city. In 1823 he was called to the see of Montauban, France, which he later exchanged for that of Bordeaux, being also made a peer of France. He exerted himself greatly during the cholera outbreak. In 1836 he was appointed cardinal, but he died of apoplexy in Bordeaux, July 19 of that year. E.E.T.

CHEVES, LANGDON, an American statesman; born at Rocky River, S.C., Sept. 17, 1776. He was a leader of the national House of Representatives, and was an earnest advocate of the War of 1812. In 1814–15 he was Speaker and voted against the renewal of the charter of the United States Bank, but in 1819 he was elected its president. He opposed nullification and separate state secession, although he advocated a Southern confederacy. He died in Columbia, S. C., June 25, 1857. E.E.T.

CHEVREUL, MICHEL EUGÈNE, a French chemist; born at Angers, Aug. 31, 1786. He lectured at the Collège Charlemagne, and in 1824 was made director of the dyeing department of the government tapestry manufactory of the Gobelins. In 1826 he took his seat in the Academy of Sciences, and in 1830 became director of the Museum of Natural History. One of his earliest discoveries was that of margarin, olein and stearin in oils and fats. His studies in fatty bodies and his theory of saponification have opened up vast industries. Between the years 1828 and 1864 Chevreul studied colors, publishing important memoirs from time to time. His original and striking investigation of colors, their production and optical effects, has become the standard text-books for artists and designers. He died in Paris, April 9, 1889, nearly 103 years of age. R.W.C.

CHEVRON, in architecture, a zigzag moulding characteristic of Norman architecture. In military uniforms, chevrons are bands of cloth worn as distinguishing marks by non-commissioned officers and privates of merit. The chevrons are usually cloth of the same color as the facings of the uniform coat, and divided into bars half an inch wide by black silk stitching. There are special designs for musicians, and for ordnance, commissary, hospital signal corps, and pioneer non-commissioned officers, and privates of the first and second class. W.R.B.

CHEVY CHASE, an early example of English ballad poetry supposed to have been written in the time of Henry VI, or between 1422 and 1461. It purports to describe the battle of Otterbourne, fought August, 1388, but the ballad conflicts with Froissart's circumstantial account, and probably incorporates the chase of the Earl of Douglas among the Cheviot Hills after Earl Percy of Northumberland. The oldest MS. of the ballad is preserved among the Ashmolean MSS., in the Bodleian Library at Oxford, having attached to it the name of Richard Sheale, a ballad singer or reciter of the reigns of Mary and Elizabeth. The ballad, preserved in Percy's *Reliques of Ancient English Poetry* and Scott's *Minstrelsy of the Scottish Border* has always been a favorite. Sir Philip Sidney said it stirred him like the sound of a

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trumpet, while the classic Addison devoted two papers in *The Spectator* to a critique on a more modern version of the same artless but heroic metrical story.

CHEWINK, a bird of the family *Fringillidæ*, native of the United States and Canada, allied to the finches. Its color is black and brown, with white and red on wing and tail coverts. It is about seven to nine inches in length. It lives principally in thickets, feeding on worms and insects; spends the winter in the south, returning north in the early spring. It is found in all parts of the United States east of the Missouri River and also on the Pacific Coast.

CHEYENNE, a city and the capital of the state of Wyoming and county seat of Laramie County, located in the southeastern part of the state, on Crow Creek, and on the eastern slope of Laramie Mountain, at an altitude of 6,041 feet above sea-level. It was founded in 1867, and because of its rapid growth has been called the "Magic City of the Plains." It is an important railroad center, being on the Union Pacific, the Denver Pacific, the Cheyenne and Burlington and the Cheyenne and Northern railroads. The railroad-shops of the Union Pacific railroad, which are located here, are built of brick and stone, and cost between four million and five million dollars. The state capitol, which covers nearly three acres of ground, is built of native sandstone, and cost three hundred thousand dollars. Public, private and denominational schools and a public library provide ample educational facilities. Cheyenne owed its first settlement to the discovery of gold in the Black Hills, but its present prosperity is largely due to the growth and profits of the cattle trade. Population 1880, 3,456; 1890, 11,690; 1900, 14,087.

CHEYENNE INDIANS, a branch of Algonquin stock, prior to the nineteenth century inhabiting the basin of the Winnipeg River and Lake. With the advance of Caucasian civilization they emigrated southward, a part of the tribe settling among the Black Hills in South Dakota, where their descendants known as the Northern Cheyennes numbering (1900) 2,357, now live on the Cheyenne River Indian reservation northeast of the hills. The other portion of the tribe known as the Southern Cheyennes went to Colorado, where they came into frequent conflict with the Federal authorities owing to their disregard of treaty obligations. With the other Indian tribes of the region they were in almost constant warfare with the Federal troops from 1861 to 1867, the Southern Cheyennes finally, being almost totally exterminated by General Custer. C.L.S.

CHEYNE, GEORGE, was born in Seotland in 1671, studied medicine in Edinburgh, and settled in London, where he became eminent in his profession. He became enormously fleshy, weighing 448 pounds, but reduced his weight again upon a milk and vegetable diet, of which he was thereafter an advocate. He was the author of books, on medical, and religious topics, and died at Bath, England, on April 13, 1743. W.F.J.

CHEYNE, THOMAS KELLY, English clergyman and Biblical critic; born in London, Sept. 18, 1841, and educated at Merchant Taylors' School and Worcester College, Oxford. He was rector of Tendring, in Essex, from 1881 to 1885, when he was appointed Oriel professor of the interpretation of Holy Scripture at Oxford, and canon of Rochester. He was a member of the Old Testament Revision Company, and has contributed many articles on Biblical questions to the magazines and reviews. A critic of ripe scholarship and remarkable clearness in exposition, he has done much to advance Biblical science. His chief books are *The Prophecies of Isaiah* (1880; 3d ed. 1885); *Exposition of Jeremiah and Lamentations* (1883); and *The Book of Psalms, or Praises of Israel* (1888). No less than 13 articles on books of the Old Testament, etc., in this ENCYCLOPÆDIA are from his pen.

CHIANA, Italy, two small rivers of Tuscany; the first, an affluent of the Arno which it joins 5 miles N.W. of Arezzo after a course of 35 miles; the second joins the Tiber below Orvieto. The Chiana canal 37 miles long uniting the two and constructed between 1551 and 1823 converted the malarious Valle di Chiana into a fertile and habitable district. C.L.S.

CHIANTI MONTI, Italy, a vine-clad ridge of the Apennines between the provinces of Siena and Arezzo, the grapes of which yield the celebrated red wine of Chianti. C.L.S.

CHIAPAS, the most southern state of Mexico. The highlands have an agreeable climate, but the lowlands are hot and sickly. Its area is 27,222 square miles; capital, San Cristobal. Population 1900, 363,607.

CHIAROSCURO, the art of distributing light and shade in a picture, and especially of enveloping the figures or other parts of the scene represented in transparent half-tints or shadows very fine in tone. REMBRANDT (q.v., Vol. XX, p. 385–390) excelled all others in the rendering of the effects of chiaroscuro. In former times a drawing or picture in chiaroscuro meant a drawing executed in monochrome, and depending for its effect entirely on the contrast of light and dark tints. See also DRAWING, Vol. VII, p. 388.

CHIBCHAS. See COLOMBIA, Vol. VI, p. 140.

CHICA, a red dye made use of by the South American Indians to stain their skins. It is extracted from a plant, *Bignonia chica*, mixed with the fat of the alligator, and then rubbed on the skin. It is used to produce orange and red shades on textile fabrics. W.R.B.

CHICACOLE, a town in the Madras province, India. See CICACOLE, Vol. V, p. 673.

CHICAGO, the largest interior city of the United States, and the second in size on the Western Continent, is situated on the southwest shore of Lake Michigan, in Cook County, Illinois. It covers an area of 122,240 acres and stands at an elevation of about 580 feet above the level of the sea. It is about 27 miles long and 12 miles wide. The federal census of 1900 gave the population as 1,698,575, an increase of 54.4 per cent on the returns of 1890, when the number of inhabitants

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was 1,099,850. The increase for the ten years previous had been 118.6 per cent, the number of residents in 1880 being 503,185. The Chicago city directory for 1904 declared the population to be 2,241,000. This number is made up of representatives of almost every nation on earth, the Germans, numbering over 500,000, being the most numerous of the foreign nationalities, which also include Irish, English, Scotch, Bohemians, Poles, Swedes, Norwegians, Italians, Jews, Dutch, Russians, Danes, Swiss, Austrians, about 1,500 Chinese, and small contingents of Armenians, Turks, Arabs, and Japanese. The negro population in 1900 was 30,150.

In the year 1871 the city was visited by the most destructive fire that has ever occurred in the history of the United States. The population at that time did not exceed 325,000, and out of this number over 70,000 persons were rendered homeless. The number of buildings destroyed aggregated nearly 17,500 and the value of property $191,000,000. So quickly did relief pour in from all quarters, however, that in the course of little more than a year, much of the city had been rebuilt.

Chicago is situated in a healthy district and has a lower death-rate than any large city in the United States, the reports for 1900 giving 16.2 deaths per thousand inhabitants.

The city has an entirely level site, which has made the problem of drainage and the disposition of sewage an important and difficult one. According to the reports for the year ending December 31, 1903, there were 1,563 miles of sewers and 57,510 catch-basins. Construction and repair has brought the cost of the sewer system up to the sum of $22,000,000. In 1890 the state legislature provided for the formation of a drainage district, to be administered by commissioners elected by the people. The plan as adopted provided for the construction of a drainage canal, extending from Chicago to Lockport, there connecting with the Illinois River, thence on to the Mississippi, the main object being to reverse the flow of the Chicago River so as to prevent the sewage from reaching Lake Michigan, the source of the city's water supply. The main channel of the canal is 28.5 miles long. The work which was begun in September, 1892, was completed in January, 1900, at a cost of over 40 million dollars. See CANAL, in these Supplements.

The Chicago River and its north and south branches separate the city into three divisions, known as the north, south, and west sides. At the beginning of 1904, Chicago had 1,371 miles of improved streets and alleys, and 2,816.71 miles of unpaved streets, the improved thoroughfares, including renewals, having cost more than $60,000,000. The numerous docks along the Chicago River within the city, afford, with the drainage canal, facilities for shipping unexcelled by those of any city in the world. During the year 1903, 14,803 vessels, with a tonnage of 15,026,000, arrived at and departed from the port of Chicago.

It being necessary to keep the river open for navigation by large vessels, the bridges are chiefly of the swing pattern. There are 32 swing-bridges, 8 rolling bascule bridges, 5 trunnion bascule bridges, 1 page bridge, 1 lift-bridge, and about 25 fixed spans over streams. Three tunnels under the river connect the north and west sides of the city with the south side, and are used by the cable and electric railways. There are about 40 viaducts built over the railway tracks, within the city limits. Many of the tracks have been elevated above the grade crossings by reason of the enormous traffic on the streets.

The main business portion of the city is bounded on the north and west by the Chicago River; on the east by the lake, and on the south by Harrison Street. Within this limited district are located some of the principal railway depots, the banks, the leading hotels, Board of Trade, Art Institute, theaters, leading stores, both wholesale and retail, the government building and offices of the different branches of the customs, revenue, pension, and other services, and the lofty structures which have given Chicago a distinctive and colloquial name in this regard.

The park system is one of the most extensive in the world, the park acreage in 1903 being 3,174, exclusive of boulevards. It is estimated that there is one acre of park to every 590.4 inhabitants. The principal parks on the south side are Jackson and Washington, the former covering 524, and the latter 371 acres. Jackson Park has a system of lakes connecting with Lake Michigan, and was the beautiful site occupied by the buildings of the World's Columbian Exposition in 1893. Washington Park, from June to November, is rendered doubly attractive by magnificent displays of the landscape gardener's art. The parks of the west side are Humboldt Park, 206 acres; Garfield Park, 188 acres; and Douglas Park, 182 acres, all of which are elaborately ornamented and kept in first-class condition. On the north side is Lincoln Park, containing 300 acres. It has a zoölogical garden and many fine statues. Extension of the park system has been partly undertaken and partly planned on a very elaborate scale. Besides the creation of fourteen new small parks in the city, and the mapping out of a system of forest parks in the suburbs by the South Park commissioners, it is proposed to make great improvements in the parks that at present exist, and to construct in each of the fourteen small parks, that will vary in area from 5 to 325 acres, club-houses for the public. The Lincoln Park commissioners have planned great extensions to Lincoln Park, and the west side commissioners have proposed to establish a system of small parks. Grant Park, extending along the lake front from Randolph Street to Twelfth Street, and covering 211 acres, will be greatly improved. In it are situated the Art Institute and the present temporary Post-Office. The Field Columbian Museum will be erected to the south of the Art Institute and the John Crerar Library to the north. The former institution has been endowed with $10,000,000, and the latter with $1,000,000. There are in the

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city some 50 miles of boulevards along which automobiles spin without interruption from team traffic, etc.

The city government of Chicago is vested in a mayor and common council. Each of the 35 wards has two aldermen, elected by popular vote, one-half of the body retiring each year. The mayor, city treasurer, and city clerk, are each elected for two years. The mayor appoints all heads of departments, such as the comptroller, commissioner of public works, chief of police and fire departments, and others, subject to confirmation by the council. The council possesses all legislative power as to taxes, appropriations and the granting of franchises, subject to a veto on the part of the mayor, which may be overruled by a two-thirds vote. Under the constitution of the state of Illinois, the bonded debt of the municipality is limited to five per cent of the taxable valuation. The total bonded debt of the city on August 31, 1904, amounted to $19,618,000, of which $4,293,000 was the amount of the World's Fair bonds. The performance of public works chargeable to special assessment is in the hands of a board of four officers appointed by

CITY HALL, CHICAGO.

the mayor, known as the Board of Local Improvements. The superintendent of the special assessment bureau is, by force of the enactment, secretary of this board.

The police force consisted in 1903, of 2,773 officers and men, giving 14.5 policemen to each square mile of the city. The total number of arrests for the year was 77,763, of which 67,194 were males and 10,569 females, an increase of 7,449 over that of 1902. The number of persons fined in the police courts was 20,412, the amount of fines aggregating $330,026. During the year the patrol wagons responded to 69,918 calls. The amount expended in maintaining the department was $3,569,477.77.

In 1903, the fire department consisted of 1,199 firemen, of whom 1,152 were uniformed members. There were 94 engine companies; 5 fireboat crews; 27 hook and ladder companies; and 4 hose companies. The number of alarms sent in was 8,251. There were two firemen killed in discharge of duty and 62 injured. The total number of fires was 6,054. The value of the buildings with contents, which suffered fire losses, amounted to $111,743,441. Of this property $3,062,922 worth was destroyed. The insurance was $68,748,203, the insurance over loss, $65,970,423, and the loss over insurance, $285,142. The cost of the maintenance of the department for 1903 was $1,659,281.42.

Chicago is supplied with water from Lake Michigan, taken from five different water intakes located at various points in the lake from two to four miles from shore. The water is conveyed through 37.7 miles of underground tunnels and is distributed by eight pumping-stations capable of supplying 528,650,000 gallons per twenty-four hours. It is carried through the city by 1,939 miles of water-pipe. The quantity actually furnished during the year 1903, was 137,500,000,000 gallons, or about 180 gallons per capita per day, estimating the population at two million inhabitants.

There are in the city over 60 hospitals, about as many asylums, and many charitable institutions, some being maintained by the county, some by the city, and many by denominational and private organizations. All are open to those in sickness and distress, without distinction of nationality or religion. The Cook County Hospital, one of the largest in the United States, affords relief to several hundred resident patients. Next in importance come the Presbyterian, the Chicago Homeopathic, the United States Marine, the Woman's, the Alexian Brothers', the Wesley, St. Luke's, St. Joseph's, the Augustana, and the Michæl Reese. There are 35 free dispensaries in the city where the sick poor are furnished with free medicine. There are many institutions devoted to the training of skilled nurses, some of whom devote their time and services to the poor. The citizens of Chicago voluntarily contribute more than $5,000,000 annually to the support of public charities. The organizations having in charge charitable and benevolent work include aid associations, manual training-schools, missions, industrial schools, refuges, homes, kindergartens, crèches, sanatoriums, and a great number of other similar institutions. A county agent looks after the outdoor poor, distributing county funds annually donated for that purpose. The county also maintains a poorhouse and infirmary, where nearly two thousand aged and indigent persons are taken care of. The County Insane Asylum is sustained from public funds, as is the Washingtonian Home, an institution for the care, cure, and reclamation of inebriates. The Bureau of Charities is an organization designed to combine the different philanthropic organizations of the city, and thus prevent duplication in administering relief, and in other ways harmonize the societies and expedite the work. See CHARITY ORGANIZATIONS in these Supplements.

The school system is controlled by a board of education, appointed by the mayor. The school fund is a large one, being derived from property set apart for this purpose, in addition to an annual levy made by the city council. For the month of December, 1903, there were 259,214 pupils enrolled in all schools in the city. The average daily membership was 235,400, and the average daily attend-

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ance 218,282. The total number of teachers was 5,563, and the total number of schoolrooms, 4,932. The average daily attendance for the school year 1902–03, was 210,508. The leading institutions of advanced education are the Northwestern University, University of Chicago, Armour Institute, Lewis Institute, and the Chicago Athenæum. There are many theological colleges, as well as colleges devoted to the study of medicine, law, and art. Every branch of education is represented in the technical and scientific institutions located in various parts of the city, and including dental, pharmaceutical and veterinary schools, as well as schools of business training, telegraphy, agriculture, manual training, brewing, etc.

All of the colleges and institutions of learning have excellent libraries, as have the prominent clubs. The public libraries of the city are many, and have prominent positions among the best in the country. The Chicago Public Library, Michigan Avenue, Washington and Randolph Streets, had, at the end of December, 1903, 288,682 volumes. The total number of books issued for home use for the year, was 1,120,539, the number of books issued for a similar purpose from delivery stations being 487,716. The cost of erecting the

CHICAGO PUBLIC LIBRARY BUILDING.

building which is a massive and very substantial one, exceeded $2,000,000. The Chicago Historical Library, 142 Dearborn Avenue, is the oldest public library in the city, and is rich in original documents, records, and manuscripts. It contains over 110,000 books and pamphlets. The Newberry Library, North Clark Street and Walton Place, is largely patronized by the general public, the total number of volumes in it at the end of December, 1903, being 265,185. The Chicago Law Institute has a fine law library, located in the County Building. The Library of the Western Society of Engineers in the Monadnock Building contains over 5,000 volumes chiefly on engineering and technical subjects. The John Crerar Library, temporarily located in the Marshall Field Building, 87 Wabash Avenue, had 103,291 volumes at the end of December, 1903. The Field Columbian Museum Library, temporarily located in the World's Fair Building, Jackson Park, at the close of the year 1903, contained 30,000 books and pamphlets of a scientific character. The University of Chicago Library has about 375,000 volumes and 170,000 pamphlets. The Lewis Institute Library, West Madison and Robey Streets, boasts of more than 10,000 volumes. In the Ryerson Library, Art Institute, Michigan Avenue and Adams Street, are over 3,000 works on fine art. The Academy of Science Library in Lincoln Park has about 12,000 volumes. In many of the beautiful suburbs surrounding the city proper, there are excellent libraries, the one at Pullman containing over 9,000 volumes, situated in the Arcade Building. Others are located at Evanston and South Chicago.

Chicago contains hundreds of churches many of which are largely attended by the various denominations. The city has a large number and variety of public buildings and halls of which the Auditorium, Michigan Avenue and Congress Street, is probably the most important. There are many splendid office buildings ranging in height from 12 to 20 stories, of which the following are especially worthy of mention: Masonic Temple, Columbus Memorial, First National Bank, Monadnock, Fisher, Venetian, Rookery, New York Life, National Life, Stock Exchange, Security, Title and Trust, Ashland, Railway Exchange, Old Colony, Fine Arts, Hartford, Tribune, Home Insurance, Chamber of Commerce, Unity, Reliance, Manhattan, Marquette, and Woman's Temple. Every year marks the addition of a number of "sky-scrapers" to the scores situated in the downtown district.

The most fashionable residential thoroughfares in the city are, Michigan, Grand, Drexel, Washington, and Jackson Boulevards, Prairie and Calumet Avenues, La Salle Avenue, Lake Shore Drive, Ashland Boulevard, Rush Street, and Lincoln Park Boulevard.

The government maintains many branches of service in the city, among which, in addition to the Post-Office, are the United States Subtreasury, United States Appraiser's Office, Internal Revenue Department, Custom-House, Lighthouse Department, United States Army Headquarters, United States Courts, United States Pension Agency, Signal Office, Secret Service, Treasury Special Agents, etc. The total expenditure by the city for government, public works, public safety, etc., in 1903, was $15,545,741.92. The building in use as a Post-Office for some years, located on the square bounded by Dearborn, Adams, Clark, and Jackson Streets, although costing more than four million dollars, was so faulty in construction as to be condemned, in 1895, as unsafe and unfit for use. It was demolished during 1896, and has since been superseded by a structure built in the Chicago style of architecture, and large enough to accommodate, when completed, the entire government force of officials and employees.

Chicago stands as the greatest railway center in the world, no less than 21 great railroad systems running into six very large and handsome depots. The magnificent depot at Van Buren and La Salle Streets, erected in 1903, is occupied by the Lake Shore and Michigan Southern, Chicago, Rock Island and Pacific, and the New York, Chicago and St. Louis railroads.

Chicago has acquired a world-wide reputation of being a city of progressiveness and enterprise, and in it many extraordinary feats of engineering skill have been accomplished during its comparatively

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short existence. Probably one of the most noteworthy is that of the Illinois Tunnel Company, which proposes to use the telephone-cable tunnels of the Illinois Telephone and Telegraph Company in the busiest section of the city, for the transmission of freight, thereby reducing to a very large extent the enormously congested street traffic which question for years had been occupying the attention of the municipality. In 1899, the City Council granted to the Illinois Telephone Company an ordinance by which they were permitted to excavate tunnels beneath the streets for the purpose of carrying wire cables to supply 100,000 telephones. The tunnels made were considerably larger than were necessary to carry the telephone wires, and in July, 1903, the Council granted the company another ordinance by which they could adapt the tunnels to freight transportation. Early in 1904, the Illinois Telephone and Telegraph Company was absorbed by the Illinois Tunnel Company, a new corporation, capitalized at $30,000,000, and having an authorized bond issue of $30,000,000. In September, 1901, the work of excavating by the pneumatic system was actively undertaken.

The annual cost of teaming materials in the business district of Chicago is estimated to be $50,000,000. At present all the large business houses are obliged to handle their freight by teams. Most of the freight in course of time will probably be transferred through the tunnels of the Illinois Tunnel Company, the floor of which will be at a depth of over 45 feet below the street level. The company proposes to sink shafts at all points where large quantities of freight are shipped and received. At the bottom of the shafts, switching tracks will be laid. Freight will be conveyed along the tracks of the tunnels by cars running at the rate of possibly 20 miles an hour, the motive power being furnished by a third rail running midway between the tracks, and covered with a slotted plank as a safeguard to persons working in the tunnels. Up to August, 1904, three miles of track had been laid and more than twenty miles of tunnel completed. The main line tunnels having 18-inch cement walls and 21-inch cement floors, are 14½ feet from apex to floors and 12¾ feet wide at the base, the smaller tunnels being 7½ feet high, 6 feet wide, and having 10-inch walls and 13-inch floors. It was proposed to have a regular freight schedule in operation by November 15, 1904.

Many statues adorn different portions of the city. In Lincoln Park are located the following: Hans Christian Andersen, President Lincoln, Linnæus, General Grant, Schiller, Benjamin Franklin, Beethoven, Shakespeare, Goethe, La Salle, Garibaldi, the Alarm, and the Signal of Peace. The statues of Humboldt, Reuter, and Ericson, are found in Humboldt Park. In Washington Park is an equestrian statue of Washington. The Haymarket statue is located in Union Park. In Grant Park an equestrian statue is raised to General Logan. The Victoria Monument is found in Garfield Park. The Douglas Monument stands at the foot of 35th Street, and the Fort Dearborn Massacre group, at Calumet Avenue and 18th Street. The Drake fountain is situated on Washington Street, between La Salle and Clark Streets; the Drexel fountain at Drexel Boulevard and 35th; and the Rosenberg fountain at the south end of Grant Park. Many other minor monuments and fountains are found in various parts of the city.

The banks of Chicago which number about 60, exchange United States coin or bills for the money of all countries, and 26 foreign governments maintain consuls in the city.

The street-railway business of Chicago is conducted by over fifteen corporations having over 1,100 miles of track, the Union Traction Company and the Chicago City Railway Company operating over 700 miles. The elevated railroads are operated by the South Side, Metropolitan, the Chicago and Oak Park, and the Northwestern Elevated Railroad Companies.

Chicago has many social clubs, prominent among which are the Chicago Athletic, Union League, Chicago, Union, Washington Park, Ashland, Calumet, Hamilton, Illinois, Marquette, Press, Winter, Saddle and Cycle, Standard, and the University. The Chicago Athletic Club has a membership of over 2,500, the Union League, of over 1,500, and the Chicago, of about 1,000. There are over 30 golf clubs and four prominent yacht and automobile clubs. The leading newspapers of the city are: the *Tribune*, *Record-Herald*, *Daily News*, *Examiner* and *American*, *Chronicle*, *Journal*, *Inter Ocean*, and the *Evening Post*. As a publishing center Chicago stands unrivaled.

The total receipts of the Chicago post-office for the year 1903, were $10,056,237.58, and the expenditures, $3,598,772.48. The postal district covered an area of 190 square miles, with free delivery in 187 square miles. There were 205 sub-stations, 45 carriers' stations, and 5 substations without carriers. The total number of clerks in the main post-office and stations, was 2,238; there were 1,745 carriers and collectors, and 194 special delivery messengers. In the mailing division 520,538,710 pieces of first-class mail matter were handled during the year, and 223,545,000 pieces of other mail matter, making a total of 744,083,710 pieces. The registration division handled 7,399,848 pieces, the number of special delivery letters handled being 623,013. In the money order department there were 7,832,290 transactions amounting to $135,039,420.97.

Chicago has an abundance of first-class hotels. The principal ones in the business district are, the Auditorium and its annex, the Victoria, Grand Pacific, Wellington, Great Northern, Palmer, Stratford, Majestic, Sherman, and farther from the heart of the city, the Virginia, Metropole, Del Prado, Chicago Beach, Lexington, Hyde Park and Windermere. There are hundreds of European and family hotels and many thousands of boarding-houses. The theaters are many and well patronized, the principal ones being the Auditorium, Studebaker, Power's, Illinois, Garrick, McVicker's, Grand Opera House, Great Northern, La Salle, Bush Temple, and Hyde and Behman's Music Hall (formerly the Iroquois). Several others are located outside the central section of the city. The Iroquois theater was the scene of the most terrible calamity that ever visited Chicago when on the afternoon of December 30, 1903, nearly 600 lives were lost in a fire that destroyed the interior of the building at Randolph Street between Dearborn and State Streets. A spectacular production, "Mr. Bluebeard, Jr.," held the stage on the day of the fatal matinee. The scenery took fire in the flies shortly after the curtain had ascended on the second act, and in a very few minutes the entire stage was ablaze, which instantly resulted in a wild panic among the audience composed mostly of women and children many of whom were trampled to death in the mad rush for the doors. The greatest number of lives were lost in the gallery where the bodies of those who were suffocated by the hot air and smoke were piled eight and ten feet

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high. Comparatively few persons perished on the main floor. The dead were removed to undertaking establishments and before midnight more than 400 bodies were identified. The work of the fire and police departments on the occasion was of a character that well deserved the praise the community at large bestowed upon it.

As a trade and manufacturing center Chicago has very few rivals. The packing houses at the Union Stock Yards give employment to many thousands of people, and there are many business concerns in the city which have thousands of names on the pay-roll. No city in the world has made such advancements in such a short time as has Chicago. Its progress is looked on with admiration and wonderment by all the civilized nations on earth.

WILLIAM K. PRATT,
Sept., 1904 Associate Editor Webster's Imperial Dictionary.

CHICAGO HEIGHTS, a town in Cook County, Illinois, 8 miles south of Chicago city limits. It has railroads, numerous manufacturing industries, 10 churches and good schools. Pop. 1900, 5,100.

CHICAGO SANITARY AND SHIP CANAL. See CANAL, in these Supplements.

CHICAGO, UNIVERSITY OF. See UNIVERSITY OF CHICAGO, in these Supplements.

CHICKADEE, a small North American bird (*Parus atricapillus*) sometimes known as the black-cap titmouse. The back, top of the head, and throat are black or brown, and the breast and sides of the head, white. R.W.C.

CHICKAHOMINY RIVER, a small stream in the east central part of Virginia, which rises in the center of the state and flows southeastward to the James River, into which it empties itself a short distance above Jamestown. It passes some miles to the north of Richmond. The river is too small for important commerce, and for much of its course it passes through a swampy region of comparatively little value. Its chief interest is historical, its banks and the adjacent country having been the scene of a number of the most notable battles of the Civil War, including Cold Harbor and Fair Oaks, and others of the "battles around Richmond." W.F.J.

CHICKAMAUGA CREEK, a small stream in northwestern Georgia, flowing into the Tennessee River through Walker and Catoosa counties, Georgia. W.F.J.

CHICKAMAUGA, BATTLE OF. The city of Chattanooga, Tennessee was, in 1863, the bone of contention between the Northern and Southern armies. The town was the key to the fertile country to the south, and its railroad connections made it invaluable to either side. After the battle of Stone River—won by Thomas and Miller—Rosecrans had remained for months inactive, until at last, in response to pressure from Washington, he began his preparations for a southern movement. His army was divided into three corps—those of Thomas, Crittenden and McCook. At the outset the heavy rains and consequent rise in the rivers intersecting the country over which the Federal army moved, necessarily rendered Rosecrans's movements somewhat slow. The army under his immediate command numbered about sixty thousand, while Burnside, who was supporting the army of the Cumberland by concurrent movements, was in command of twenty thousand more. To oppose these two bodies of men, Bragg had fifty thousand men at Shelbyville and WarTrace, while Buckner, at Knoxville, had ten thousand more. Rosecrans's first scheme was to turn the Confederate right. Bragg fell back and destroyed all the lines of communication behind him as he retreated toward Chattanooga. Rosecrans's movements were greatly impeded by the necessity of repairing the damage thus done, meantime suffering sharp criticism from the government at Washington. Bragg, too, came in for his share of dictation from his government, and when he had been reinforced by Generals Polk and Longstreet, he was peremptorily ordered to make a stand and fight. In obedience to these directions, he posted Polk in and around Chattanooga, while Hardee held the Knoxville railroad. This disposition of the Confederate forces rendering Chattanooga too strong for direct attack, Rosecrans moved down the river and crossed on pontoons and a bridge which had been repaired, hoping thus to turn the Confederate left and gain the rear. Meantime the Federal left, under Crittenden, was ordered to make a direct attack on Chattanooga, while Thomas was to march upon Lafayette, and McCook was to threaten the Confederate communications with the south. On the 21st of August, Crittenden was before Chattanooga and began a bombardment, and by the 1st of September the entire Union army was in the positions designated by Rosecrans. Bragg was not slow to take advantage of the fact that in the execution of these movements Rosecrans had separated his army and interposed between them difficult mountain country. In order to take advantage of this fact, Bragg ordered Hill to march upon Lafayette, at the same time evacuating Chattanooga—intending to crush Rosecrans's left center before he could concentrate his forces. Rosecrans seemed wholly unaware of the intention of Bragg, believing him to be in retreat, instead of contemplating an attack on the weakened Union center and left. Bragg made all the preparation possible for the success of his plans, and there is no doubt that had he received the co-operation of his subordinates, he would have succeeded. As it was, his success was too near fruition to give the Union army anything but a disputed tactical victory. The delay caused by lack of co-operation gave Thomas and McCook opportunity to effect a junction of their forces—not a moment too soon. Crittenden had encountered the Confederates at Ringgold, and had retreated across the Chickamauga; and on the 18th of September the entire Union army was placed in position on the right bank of the Chickamauga. On the night of the same day the army moved north by the flank, Thomas being in front and McCook to his right, the two commands overlapping. Crittenden was in the rear of the center, Gordon Granger's command being held in reserve at Rossville, while the other reserves were scattered about in positions near Chattanooga. The Confederate forces lay on the other bank of the Chickamauga River that night. It had now become clear that the intention of Bragg was to attack the Union center, turn its left, and cut Rosecrans off from Chattanooga. Polk, with two divisions, held the Confederate right, while Hood occupied the left. The battle was begun by Bragg

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throwing thirty thousand men across the Chickamauga and projecting and concentrating division after division on Thomas's front. At first Thomas's advance wavered and retreated, but on the reserve coming up, the Confederates were in turn driven back. The attack was renewed by the Confederates, and Thomas was again forced back. At this juncture General Hazen, by a well-directed artillery fire, forced the Confederates to retire. Another attack of less strength than the preceding was made, when night put an end to the conflict. During the darkness a new disposition was made of both forces, and on the next morning (20th) at ten o'clock the entire Confederate right was thrown against Thomas, who now occupied the extreme left of the Union army. Reinforcements were hurried up to him, and in closing up from the right center a gap was left in the Federal front. Into this gap Longstreet poured his men, sending the right and center flying in the utmost confusion from the field, leaving Thomas on the left to his fate; which then seemed to be certain defeat. Rosecrans and his staff were swept from the field by the uncontrollable rout, and Thomas was left in command. Far to the rear, at the intersection of two roads, one leading to Chattanooga and the other to Thomas's position, Rosecrans halted long enough to send back his chief of staff, Gen. J. A. Garfield, to ascertain the import of the heavy firing still heard from Thomas's command, and then continued his flight to Chattanooga, to prepare for the holding of that town at all events. Meantime, Thomas, termed thenceforth "the Rock of Chickamauga," was receiving a terrific hammering, Polk assaulting his right and Longstreet his left. He was slowly forced back, and at one time having a gap left in his line, Longstreet rushed in, and for a time disaster and defeat seemed to be the inevitable result for the Union army, but Granger hurried up his reserves and strengthened the weak place, thus averting the impending danger. Nightfall put an end to the second day's fight, and Thomas fell back slowly and in good order, capturing five hundred prisoners as he retired. It is yet an unexplained circumstance why Bragg did not continue the fight during the night of the 20th, when Thomas was exhausted and had resisted to the last extreme of his tenacity, and had not one more effort in reserve. The night was one on which the full moon shone unobscured by a cloud, and the battle could have been continued to the irreparable damage of the Union army. This was not done, and the next morning found Thomas in a new position, from which he offered battle to Bragg, the offer being declined. On the evening of this day Thomas rejoined the army at Chattanooga.

The battle of Chickamauga was undoubtedly a tactical victory for the Confederates, but this victory had been dearly bought. Bragg stated his losses as two fifths of his entire force. But of far greater importance to the Confederacy was the loss of Chattanooga, to which the Federal army had retired, and which they now proceeded to fortify. The Federal losses were in the neighborhood of seventeen thousand men, and arms in proportion, but Chattanooga was worth the price, and this seemingly disproportionate loss of life was undoubtedly compensated by the fact that the possession of this stronghold practically decided the war in the far south. On the 16th of the following month General Rosecrans was relieved of his command. For the subsequent battle of Chattanooga, see CHATTANOOGA, in these Supplements. In 1896 the Federal government opened a handsome national park on the site of the battlefields. See PARKS, NATIONAL MILITARY, in these Supplements.

CHICKAMAUGA CAMP or CAMP THOMAS, a camp of concentration, established by the War Department, in the national park alluded to in the preceding article, as a rendezvous for troops mobilized in anticipation of the war with Spain. The camp was opened on the 15th of April, 1898, and thereafter a stream of regulars and volunteers poured in. On the 23d of May the First Division of the First Army Corps, 9,000 strong, was reviewed by Gen. James H. Wilson. By the 30th of May additional land had to be taken for camp purposes. The sanitary arrangements of the camp were very faulty, and typhoid fever, and other diseases incidental to the massing of large bodies of men, developed. These matters were made the subject of investigation.

CHICKAREE, a popular name of the red or Hudson Bay squirrel (*Sciurus hudsonius*), inhabiting British America and the northern United States.

CHICKEN-POX, a comparatively mild, but contagious, febrile disease of children, distinguished by an eruption of vesicles scattered over the body which are transparent and about the size of peas. They rarely become pustular, or yellow, and burst about the third or fourth day from their appearance, leaving only a slight incrustation, which falls off in a few days leaving no scar, or pit, like small-pox (q. v.). Chicken-pox is a different disease to small-pox. W.R.B.

CHICKERING, CHARLES FRANCIS, pianoforte maker, son of Jonas Chickering (q. v.); was born in Boston, Mass., on January 27, 1827. He made numerous valuable inventions for the improvement of pianofortes, traveled extensively, organized the first musical festival in America, and was himself both a skilled musician and a generous patron of the musical art. He died in New York city on March 23, 1891. W.F.J.

CHICKERING, JONAS, pianoforte maker; was born at New Ipswich, N. H., on April 5, 1798; was apprenticed to a cabinet maker, but showed great musical talent, and in 1818 began work in a Boston pianoforte manufactory. Five years later he founded a factory of his own, which became one of the largest and best known in America, employing more than 500 operatives, and producing more than 1,500 instruments yearly. In the latter part of his life his two sons were associated with him in the business. He was highly esteemed, both for his enterprise and success in business, and for his fine personal culture and benevolence of disposition. He died in Boston on December 8, 1853. W.F.J.

CHICKWEED (*Stellaria media*), one of the most common weeds of gardens and cultivated fields. It is a native of most parts of Europe and of Asia, appear-

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ing during the colder months even on the plains of India; an annual, with a weak procumbent stem and ovate leaves, very variable; some of the smaller varieties in dry, sunny situations, sometimes puzzling young botanists from having no petals or only five or three instead of ten stamens, but always characterized by having the stem curiously marked with a line of hairs, which at each pair of leaves changes from one side to another, and in four changes completes the circuit of the stem. The leaves of chickweed afford a fine instance of the sleep of plants, closing up on the young shoots at night. Chickweed is a good substitute for spinach or greens, although generally little regarded except as a troublesome weed, or gathered only by the poor to make poultices, for which it is very useful, or for feeding cage-birds, which are very fond of its leaves and seeds. A number of species of a nearly allied genus, *Cerastium*, also bear the name of chickweed, or mouse-ear chickweed, and the name is occasionally given to other plants, either botanically allied, or of somewhat similar appearance.

CHICLAYO, a town of northwestern Peru, 12 miles S.E. of Lambayeque; it is the center of a valuable sugar district. Population, 11,325.

CHICO, a town and the former capital of Butte County, central northern California, situated on Chico Creek, 95 miles N. of Sacramento, on the Southern Pacific railroads. It is the trade-center of a fertile district, and an important shipping-point for lumber. It is the seat of an academy, and contains a variety of manufactories. Population 1890, 2,894; 1900, 2,640.

CHICOPEE, a city of Hampden County, southwestern Massachusetts, on the Boston and Albany and the Boston and Maine railroads, four miles N. of Springfield. Among the principal industries are the cotton-mills of the Dwight Company, with a capital of $2,000,000. The Chicopee River affords ample water-power for the numerous mills and manufactories. A convent a high school and several churches are located here, and national and savings banks. Population 1890, 14,007; 1900, 19,167. See also CHICOPEE, Vol. V, p. 534.

CHICOUTIMI, a large county of northeastern Quebec, Canada, containing Lake St. John and most of the Saguenay River. Its northern parts are sub-arctic and unsettled. The town of Chicoutimi is in the southern part of the county, on the Saguenay River, and has a population (1898) of more than 3,000. W.F.J.

CHIEF JUSTICE, the title of the presiding justices of various courts, including the supreme courts of states, courts of errors and appeals, and others. In England the full title of the official is Lord Chief Justice. Particularly the title is applied to the Chief Justice of the Supreme Court of the United States, who ranks next after the President of the United States in official dignity and precedence. He is appointed directly to his place, and is the presiding judge of the court. He also, under the Constitution, presides over the Senate when the latter body is resolved into a high court of impeachment. He customarily, though not necessarily, administers the oath of office to the President at his inauguration. See JUSTICE, Vol. XIII, p. 798. W.F.J.

CHIEM–SEE, a lake of southeastern Bavaria, the largest in the country. It lies about 42 miles S.E. of Munich. It is 12 miles in length and 9 miles in breadth, and is situated at an elevation of more than fifteen hundred feet above the sea.

CHIFF–CHAFF. See WREN, Vol. XXIV, p. 724.

CHIGNECTO BAY, an inlet at the head of the Bay of Fundy, in British North America. It separates Nova Scotia from New Brunswick, is thirty miles long and eight broad, and has an isthmus only fourteen miles in width between it and Northumberland Strait, in the Gulf of St. Lawrence. An extraordinary ship-railway, designed to transport laden vessels, has been partially completed across this isthmus. It is quite straight, laid with two pairs of 110-pound steel rails, 16 feet apart, and designed for vessels up to 2,000 tons. About $4,000,000 had been spent in its construction up to 1890 when a financial depression in London suspended the work up to 1901.

CHIGOE OR JIGGER. See FLEA, Vol. IX, p. 263.

CHIH–LI OR PECHIHLI, PROVINCE OF. See CHINA, Vol. V, p. 550.

CHIHUAHUA, the largest state of Mexico, bounded on the north and northeast by New Mexico and Texas; has an area of 87,802 square miles, and a population (1900) of 327,004. In the east is the Bolson de Mapima, a vast desert of sand and alkali plains; in the south and west the surface is mountainous, and there are numerous rivers. The state is better adapted for stock-raising than for agriculture; the fertile districts are mainly confined to the valleys and river-courses. Cotton is grown in the south. The silver-mines were for centuries among the richest in Mexico, and though many are now abandoned, mining is still the chief industry. The state is traversed by the Mexican Central railway. The capital, Chihuahua, 225 miles south of El Paso by rail, rises like an oasis in the desert, among roses and orange-groves. It is well built, and is the center of considerable trade with Texas. It was founded in 1691.

CHI HWANG TI OR CHE HWANG–TE. See CHINA, Vol. V, p. 559.

CHILBLAINS. See MORTIFICATION, Vol. XVI, p. 876.

CHILD, FRANCIS JAMES, author and educator, was born in Boston on February 1, 1825, and was educated at Harvard, where he was graduated in 1846. He became professor of rhetoric and oratory at Harvard, from 1851 to 1876, and after the latter date was professor of English literature. His work on *English and Scotch Popular Ballads*, first published in 1856, ranks among the best upon that subject. He also wrote *Four Old Plays*, *Poems of Comfort and Sorrow*, *Early English Pronunciation*, and *Observations on the Language of Chaucer and Gower*. He died in Boston on September 11, 1896. W.F.J.

CHILD, FRANK SAMUEL, clergyman and author, was born at Exeter, New York, on March 20, 1854, and was educated at Hamilton College and

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Union Theological Seminary. In addition to clerical work he has lectured much, and is the author of a number of historical novels and descriptive works. He is settled at Fairfield, Connecticut. W.F.J.

CHILD, Sir Josiah (1630–99), a London merchant. See Political Economy, Vol. XIX, p. 370.

CHILD, Lydia Maria, author, was born at Medford, Massachusetts, on February 11, 1802, the daughter of David Francis. She was educated by her brother, the Rev. Convers Francis, and on reaching womanhood began writing stories of early New England life. Her first, *Hobomok*, was completed in six weeks, and was highly successful. The next, in 1825, was *The Rebels*, a historical novel of the American Revolution, into which she introduced the chief statesmen and generals of the Revolution, and attributed to them speeches which are often quoted as if genuine. In 1826 she began the publication of a magazine of juvenile fiction and miscellany, which she conducted for eight years. She was married in 1828 to David L. Child, a lawyer and social reformer of Boston, with whom in 1841 she removed to New York, where they became the editors of *The National Anti-slavery Standard*. Thereafter she devoted much of her attention to anti-slavery work and writings, though she continued in general authorship. Her *Appeal in Behalf of That Class of Americans Called Africans* attracted wide attention, and Dr. William Ellery Channing visited her to thank her in person for having written it. Her *Life of Isaac Tatum Hopper*, the anti-slavery philanthropist, ranks among the best biographies ever written in America. Among her other works were *The American Frugal Housewife*, *The Mother's Book*, *The Girl's Own Book*, *History of the Condition of Women in All Ages and Nations*, *Philothea*, a romance of the age of Pericles, which has been highly esteemed by critics, *Progress of Religious Ideas*, *Looking Toward the Sunset*, *The Romance of the Republic*, and numerous biographies of famous women. She wrote a letter of sympathy to John Brown after his capture at Harper's Ferry, and offered to go thither to be his nurse, and after his death she interested herself in his family. She died at Wayland, Mass., on October 20, 1880. W.F.J.

CHILD, Theodore, British author and traveler; born at Liverpool in 1855. He was educated at Oxford, and proceeded to Paris as correspondent of the London *Telegraph*, and wrote for *The World* and *Illustrated London News*, and the *Tribune* and *Sun*, of New York. In 1882 he became Paris agent for the Harpers, of New York; and in 1892 undertook a trip to India, to secure material for illustrated articles for their *Weekly*. Reaching Ispahan, Persia, he died of cholera, Nov. 2, 1892. His works are *The Spanish-American Republics; Art and Art Criticism; Summer Holidays; The Tsar and His People; The Praise of Paris; The Desire of Beauty*, and *Delicate Feasting*. R.C.A.

CHILDERMAS or HOLY INNOCENTS' DAY, observed in the Roman Catholic and Anglican churches on the 28th of December, to commemorate the slaughter of the children in Bethlehem by order of Herod. It is one of the anniversaries which were retained in the Anglican Church at the Reformation.

CHILDERS, Hugh Culling Eardley, statesman; was born in London, England, on June 25, 1827, and was educated at Cambridge. In early life he settled in Victoria, Australia, and was a member of the colonial legislature. Returning to England as general agent of Victoria, he was elected to the British Parliament in 1859. He served in the admiralty, was chancellor of the Duchy of Lancaster in 1872, secretary for war in 1880, chancellor of the Exchequer in 1882, and home secretary in 1886. He died on January 29, 1896. W.F.J.

CHILDREN'S AID SOCIETY. See Reformatories, in these Supplements.

CHILDREN, Societies for the Prevention of Cruelty to, had their origin in the resolve of Henry Bergh, who, in 1874, established, in his New York Society for the Prevention of Cruelty to Children, the first society of the kind in the world. For a while he had tried to help the children by the officers of his Society for the Prevention of Cruelty to Animals (q.v., in these Supplements), but he speedily found the scope of work ample enough for a separate organization. It was incorporated as the New York Society for the Prevention of Cruelty to Children in 1875, with John D. Wright as president until his death in 1879. Then Elbridge T. Gerry gave the society his service, and with G. Fellows Jenkins as secretary, it has proved potent enough to secure much beneficial legislation, including a revision of the penal code of the Empire State in the interests of its wards, and has been prolific enough to be the parent of 154 American and 32 foreign societies, scattered through the principal cities of the world.

As regards the parent society, the annual report shows that during an existence of 21 years, up to 1895, 95,481 complaints were received and investigated, involving the care and custody of 286,443 children; 38,318 cases were prosecuted; 35,270 convictions secured; 62,535 children rescued and relieved.

In the year 1895, 8,523 complaints were received and investigated, 3,301 prosecuted, 3,249 convicted, and 5,350 children rescued and relieved from destitution and vicious surroundings. The reception-rooms sheltered, fed and clothed 3,994 children, and 2,058 cases were investigated at the request of the city magistrates and courts. These cases involved applications for the commitment of 3,455 children; 1,645 of these were committed and 1,810 found to be improper cases—thus saving to the city and county of New York, at the *per capita* allowance of $104 per year for each year the children remained therein, the total sum of $188,240. With the co-operation of the city magistrates, the society was able to collect from the parents of children committed to the institutions $5,416.10, and that amount was paid to the comptroller of the city and county of New York, to be credited to it.

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Of kindred societies outside the United States, one of the oldest, and perhaps the best known, is the English National Society for the Prevention of Cruelty to Children, to which the Rev. Benjamin Waugh has given his life-work as director. His fame would be secure did it rest alone upon the passage of the Children's Charter Act of Aug. 26, 1889. This, his conception of what the law of England should be as regards children, swept away at one stroke, to use the language of a famous statesman, "the relics of a shameful past."

CHILDS, GEORGE WILLIAM, publisher, journalist and philanthropist; was born in Baltimore, Md., on May 12, 1829, studied in private schools, and was employed in a book shop. In 1842 he entered the navy, and in 1844 secured another place in a book shop in Philadelphia. At the age of eighteen he opened a shop of his own, and at twenty-one was partner in a publishing house, which greatly prospered. In 1864, having accumulated a fortune, he purchased the *Public Ledger* newspaper, of Philadelphia, with which he was thereafter identified and which he made one of the best known papers in America. He was noted for his generous treatment of his employees. He was one of the founders of Fairmount Park, the Zoölogical Gardens, the Pennsylvania Museum, the School of Industrial Arts, and other institutions in Philadelphia. He erected a Shakespeare Memorial Fountain at Stratford-on-Avon, and memorials to Herbert and Cowper in Westminster Abbey and to Milton in St. Margaret's Church, Westminster. He also erected monuments to Poe, and to Leigh Hunt. He published in 1890 a volume of his personal *Recollections*. He enjoyed his great wealth unostentatiously and used it for the good of his fellows. He died on February 2, 1894. W.F.J.

GEORGE W. CHILDS.

CHILE OR CHILI. For the purposes of local government the republic is now divided into provinces, and the provinces into departments. According to the rearrangement of 1887, there are 23 provinces, subdivided into 74 departments and 1 territory. The Senate is elected by the provinces for 6 years; the Chamber by the departments for 3 years, by electors possessing a small property qualification. The census of Nov. 28, 1895, gave the area of the republic as 279,901 square miles, and the population as 2,712,145. The estimated population in 1901 was 3,128,095, including about 50,000 American Indians and Auracanians. The capital is Santiago, with a population of 291,725. The constitution of the Chilian republic is on the United States model, but the President holds his office for five years and is not re-eligible until after an equal lapse of time. Several of these rulers, however, had virtually arranged for their own successors, and it was in attempting this, together with other high-handed proceedings, that President Balmaceda (q.v.) aroused during 1890, the bitter opposition of Congress. The culmination was in January, 1891, when the navy, under Admiral Montt, revolted in favor of the legislative or Congressionalist party. The country became at once divided into two hostile camps, while Balmaceda, as commander-in-chief, took active control of the army, and Congress set about raising an army to oppose him.

A fierce and vindictive war ensued, in which great cruelty, as well as bravery, was displayed on both sides. This continued throughout the summer of 1891, and was only brought to an end by the rout of Balmaceda's forces in the month of August, the President himself becoming a fugitive and shortly afterward a suicide. The Junta, as the Congressional government was called, at once took possession of the cities and entered the capital in triumph. It was during this period of transition that some of its followers committed an outrage, at Valparaiso, on the crew of the United States cruiser *Baltimore*, leading to a demand for reparation from our own government. This was acceded to after some parley, and meanwhile the new *régime* in Chile was acknowledged by the various powers, and honestly entered on the task of reconstruction left for it by civil war. Don Jorge Montt, the patriotic admiral of the fleet, was installed as President of Chile in January, 1892, and filled the office until the end of 1896, being succeeded by Señor Errazuriz, the candidate of the coalition or Liberal-Conservative party, on Jan. 1, 1897.

The difficulty with the United States arising out of the Valparaiso incident was atoned for by a salute to our flag, and an indemnity paid to the victims or their families. See also CHILI, Vol. V, pp. 535–543.

CHILIASM. See MILLENNIUM, Vol. XVI, pp. 327–330.

CHILLICOTHE, a city of Peoria County, northern central Illinois, on the Illinois River and the Chicago, Rock Island and Pacific railroad, 16 miles N.N.W. of Peoria. It is important as a grain-shipping center, and is frequented as a summer resort. Population 1890, 1,632; 1900, 1,699.

CHILLICOTHE, a city, the capital of Livingston County, northwestern Missouri, at the junction of the Chicago, Milwaukee and St. Paul, the Hannibal and St. Joseph (C. B. & Q.), and the Wabash railroads, 75 miles E. of St. Joseph. It is the chief town of the Grand River valley; has factories of machinery, lumber, and flour; and is the seat of an academy. Pop. 1890, 5,717; 1900, 6,905.

CHILLICOTHE, a city and the capital of Ross County, southern central Ohio (see Vol. V, p. 543). The Ohio canal and the Marietta and Cincinnati and Scioto Valley railroads pass through the city. The courthouse is a fine stone edifice. There are also a high school, public library, and numerous factories of carriages, paper, machinery, and farming implements. Population 1890, 11,288; 1900, 12,976.

CHILLINGHAM CATTLE. See CATTLE Vol. V, p. 213.

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CHILLON, a famous castle in the Canton of Vaud, Switzerland, on the Lake of Geneva, a few miles from Vevay. Originally it was a powerful stronghold, and for many years was the principal state prison of the Dukes of Savoy. More recently it has been used as an arsenal, and it is yearly visited by many tourists on account of its historical and legendary associations. It is most famed as the prison of the Genevese François de Bonnivard (q. v., Vol. IV, p. 33), the hero of Byron's well known poem, "The Prisoner of Chillon." W.F.J.

CHILLS. See *Malarial Fever* and *Pneumonia*, under PATHOLOGY, Vol. XVIII, pp. 403, 406.

CHILOGNATHA AND CHILOPODA. See CENTIPEDES, Vol. V, pp. 295, 296.

CHILTERN HUNDREDS. See CHILTERN HILLS, Vol. V, p. 544.

CHILTON, a city and the capital of Calumet County, central eastern Wisconsin, 95 miles N.W. of Madison, on the Manitowoc River, and on the Chicago, Milwaukee and St. Paul railroad. It is chiefly an agricultural station. Population 1890, 1,424; 1900, 1,460.

CHIMÆRIDÆ, a family of fishes. See ICHTHYOLOGY, Vol. XII, p. 724.

CHIMALTENANGO, a city and the capital of the department of Chimaltenango, southern Guatemala, 25 miles W. of the city of Guatemala. The inhabitants are mostly engaged in handling the products of the district. Population, 4,100. The department has an area of 800 square miles and a population of 61,013, engaged in agriculture and the manufacture of cotton cloths, tissues, woolen goods, hats, baskets, ropes and pottery. Some gold is found by washing the sand of the river-beds.

CHIMBORAZO, a conical peak of the Andes, in Ecuador, 20,517 feet above the sea. The first successful attempt to reach the summit was in 1880, when Whymper twice made the ascent. See ECUADOR, Vol. VII, p. 559.

CHIMERE, also known as "simar"; a woman's long gown, or robe. Also the outer robe of a Protestant bishop made of black satin with lawn sleeves. W.R.B.

CHIMMESYANS OR TSIMSIANS, Indians. A tribe of Indians in British Columbia, estimated to number 5,000. They resemble the natives of southern Alaska in many particulars, are expert fishermen, but indifferent hunters, and reside in wooden houses, similar to the Alaskan Indians. "Potlatch," or the giving of great feasts, is one of their customs.

CHIMNEY. See BUILDING, Vol. IV, p. 416; STEAM-ENGINE, Vol. XXII, pp. 517–522.

CHIMPANZEE. See APE, Vol. II. pp. 131, 132.

CHIMU OR GRAN CHIMU, was an important town of northwestern Peru in ancient days, of which only the ruins now remain. These, including the encircling walls and the remains of temples and palaces, are of a most imposing magnitude, covering an area of seven miles by ten. The place was destroyed at the time of the Spanish conquest, and the new city of Trujillo was built, three miles to the south, by Pizarro in 1535. W.F.J.

CHINA, the great empire of eastern Asia. (See Vol. V, pp. [illegible]) A statement of its area and population, per "Statesman's Year Book," 1902, is:

Subdivision.	Area, English square miles.	Population.
China Proper	1,353,350	383,000,009
Dependencies—		
Manchuria	362,310	7,500,000
Mongolia	1,288,000	2,000,000
Tibet	651,500	6,000,000
Jungaria	147,950	600,000
East Turkestan	431,800	580,000
Total	4,234,910	399,680,000

China proper (Chung Kwoh, "the Middle Kingdom") consists, apart from her dependencies, of eighteen provinces, occupying an area nearly 1,337,000 English square miles in extent, with a population close upon 300 to the square mile. The common estimate of four hundred millions for the population of the Empire is probably not in excess of the truth. The provinces (see description, Vol. V, pp. 550–557) may be grouped into four divisions or belts, two tiers (an outer and an inner) lying to the north and two to the south of the Yang-tsze-Kiang river. The trade of these provinces, besides agriculture, includes tea, sugar, indigo, cotton, and opium. Cereals are raised in the north, rice in the south, tea in the south and west, and the mulberry tree grows in all portions of the country. All of these provinces contain coal in great abundance, both anthracite and bituminous, besides iron, copper, tin, lead, and silver. The exports consist mainly of tea and silk, raw and manufactured.

Of her dependencies, China has of recent years lost the island of Formosa, which in the war with Japan, of 1894–95, became with a money indemnity the spoil of the victorious Japs. The Empire has also recently suffered from the aggression of foreign European Powers, who have, somewhat unscrupulously, been delimiting from her area "spheres of influence," besides wresting from her concessions and leases of naval ports on the coast, with slices of contiguous territory. Russia, of all the Western Powers, has been the most active aggressor, since she has not only been aggrandizing in Asiatic regions, operating actively along the Amur valley and threatening the integrity of Manchuria, but in 1897 she wrung from China the lease of Port Arthur and Talienwan and the adjacent district on the peninsula of Liaotung. In the following year (1898), Germany, as reparation for the murder of two of her missionaries, occupied part of Kiau-Chau, on the coast of Shantung, and subsequently secured a lease of the district for ninety-nine years. France, about the same time, obtained the lease of the Bay of Kwang-Chau-Wan, on the coast of the Lien-Chau peninsula, opposite the island of Hainan. For such period as Russia may hold Port Arthur, Great Britain, by agreement with China in 1898, secured the port of Wei-Hai-Wei, in the province of Shantung, and for defensive purposes she at the same time obtained a ninety-nine years' lease of Chinese territory on the mainland opposite Hong Kong.

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Of Chinese ports open to foreigners there are now twenty-eight, the chief of which are Canton, with 2,500,000 inhabitants; Tien-tsin (950,000); Hankau (800,000); Hangchau (700,000); Fuchau (650,000); Suchau (500,000), and Shanghai (586,000), where most of the foreigners reside. The number of foreigners resident in the ports of China (one-half of whom reside at Shanghai), was at the close of the year 1900 estimated to be 16,811, of which 5,471 were British, 1,908 were Americans, 2,900 were Japanese, 1,054 French, 1,343 Germans, 1,941 Russians, 1,175 Portuguese, 221 Spaniards, etc.

The country is traversed in all directions by numberless roads, usually in such bad state of repair, however, that internal trade has to rely almost entirely on the numerous canals and navigable rivers for the means of transportation. Railways have only of late begun to be constructed, chiefly as yet in the north, and were the country in a safe and settled condition they would speedily be opened for traffic and be largely extended. Telegraphs, under imperial control, have also of late been constructed, and in some parts have begun to be operated.

The late viceroy, Li Hung Chang, who was called the Gladstone and the Bismarck of China, showed a liberal and progressive spirit in adopting for his country, during recent years, many of the improved methods and enlarged ideas of Western civilization. The court intrigues at Pekin, the capital, and the growing manifestations of hostility to foreigners throughout the Empire, made it uncertain, while he lived, how far Li Hung Chang (known to be the mouthpiece of the reactionary Empress-Dowager Tsu-Hsi—the practical ruler of China) could be trusted by the Western Powers in any matter of grave international import.

The present sovereign is TSAI'TIEN KUANG-SÜ, son of Prince Ch'un, born in 1872, who succeeded to the throne by proclamation on the death of his predecessor, T'UNG-CHI, Jan. 22, 1875. Like his predecessor, he is a grandson of the Emperor TAOU-KWANG. After he became of age, the young Emperor nominally assumed government in March, 1887, but did not take full control until the withdrawal, in February, 1889, of the Empress-Dowager, known as the "Western" Empress, widow of T'UNG-CHI.

In 1898, the Empress-Regent, Tsu-Hsi, however, reappeared on the scene, actuated, it is believed, by hostility to the Emperor's innovations and reforms in governing. In September of that year she caused an imperial edict to be issued, announcing that the Emperor had resigned power to the Empress-Dowager, who has since retained the direction of affairs. The highest governing body is the Grand Council, while the imperial administration is under the direction of the Nei-ko or Cabinet, which consists of four members, two of Manchu and two of Chinese origin. Subordinate to the Cabinet are the boards of administration; there is also a board of censors, which reports directly to the Emperor delinquencies and shortcomings in any branch of the public service. The Tsung-li-Yamên, or Foreign office, created in 1861, has control of the relations with the Western nations and of the business of the maritime customs, which is under the able direction of Sir Robert Hart, a British subject. The Yamên consists of the members of the great Council of State and six other officials of the highest rank. The chief religions professed in China are Confucianism, Buddhism, and Taoism.

In 1900, the foreign imports amounted to $350,000,000, and the foreign exports to $116,000,000. The imports from Great Britain were $75,000,000, against $26,500,000 from the United States; while the exports to Great Britain were only about $15,600,000, against $25,000,000 to the United States. These figures, however, do not include the trade to and from these countries via Hong Kong, which is of considerable extent. The chief imports in 1894 were opium and cotton goods, and the chief exports tea and silk. In the tea trade China has seriously felt the competition of India, Ceylon, and Japan in recent years. Japan has been an especially formidable competitor for the American market.

The amount of the public revenue of China is not definitely known, but is estimated at from $125,000,000 to $150,000,000. Of the estimate of $150,000,000, the land tax (which does not exceed 75 cents per acre yearly in the north, while it sometimes reaches $3 per acre in the south) is supposed to yield upward of $50,000,000; maritime customs, $35,000,000; inland duty on foreign opium, $3,500,000; inland transit dues, about $9,000,000; native customs, and duty on native-grown opium, $7,500,000; the salt monopoly, $7,500,000; and miscellaneous sources the remainder.

The expenditures of the Chinese government are mainly for the army, and the existing debt has arisen almost entirely out of the war of 1894–95 with Japan. (See JAPAN and COREA, in these Supplements) At the outbreak of the war, China's outstanding debt was about $2,500,000. It is understood that it now reaches the sum of $320,000,000, three quarters of which is in consequence of payments to Japan of the war indemnity and of the price of the retrocession of the Leao-Tong peninsula.

According to Chinese official statistics, the army is composed of—1. "The Eight Banners," including Manchus, Mongols and the Chinese who joined the invaders under Emperor Sunchih, A.D. 1644, with a total of 300,000, of whom 100,000 are supposed to be reviewed by the Emperor at Peking once a year. 2. "The Ying Ping," or national army, having 650,000 men and 6,500 officers. These figures, however, relate to the year 1900, and it is impossible to obtain reliable information of a later date; but it is understood that great improvements have taken place and that large quantities of foreign-made arms have been purchased, while the Chinese arsenals, under foreign supervision, are turning out both arms and ammunition. The active army comprises, first, the army of Manchuria, with 37,000 men, divided into

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two army corps, having their headquarters at Tsitsihar and Moukden, respectively, and to a large extent armed with the Mauser rifle and Krupp eight-centimeter field-pieces; secondly, the army of the center, numbering, in time of peace, 50,000 men, with headquarters at Kalgan, an important town northwest of Peking. These men are of a hardy race, and are armed with Remington rifles. Their number can be doubled in case of war; and thirdly, the army of Turkestan, employed to keep order in the extreme western territories, and probably not available for service farther east in the event of war with a European foe.

The territorial army, or "Braves," is a local militia, capable of being raised to 600,000 men, but kept at 200,000 in time of peace.

The Tartar cavalry of the north, mounted on undersized but sturdy ponies, and wretchedly equipped, are no match for European cavalry.

The Chinese navy, during the war with Japan, disappointed those who regarded it as an effective fighting force. Being required to remain in Chinese waters, it was practically condemned to uselessness. Its seamen were brave, but demoralized under the command of inefficient officers, and in the various engagements of the war a dozen or more vessels were sunk, burned or run ashore. The organization of the fleet in distinct squadrons, severally raised and maintained by the provincial viceroys, operated as a bar to combined action.

The naval strength of China after the war included no battle-ships, 3 port-defense vessels, 7 second-class cruisers, 9 third-class cruisers of 12 knots' speed or more, and 33 of less than that speed; and 7 first-class, 25 second-class and 2 third-class torpedo-boats. There are arsenals or dockyards at Fuchau, Port Arthur, Wei-Hai-Wei, Port Li, Canton, and Shanghai.

THE ANTI-FOREIGN RISING AT PEKIN.—In the month of May, 1900, the Western World was startled by the menace of a serious Chinese uprising in the Province of Chi-li, and especially in and about Pekin, directed against the foreign element in the Empire and threatening the foreign Embassies at the capital. The active leaders of the hostile movement were ostensibly a fanatical organization, of a quasi-military character, known as the "Boxers," whose lawless acts, it was officially given out at Pekin, the Government was unable, for the time being, either to control or to suppress. In reality, as subsequent events proved, the imperial authorities, with the reactionary Dowager-Empress as inspirer of the movement, were behind the Boxers, who found sympathizing colleagues in their extruding if not exterminating designs in the Chinese imperial troops. The situation took on a graver aspect when it became known that repugnance to the foreigner was not only deep-rooted, but was widespread, placing in peril numberless foreign missionaries and their converts throughout the Empire, as well as the tourist and the trader. As the extent of the rift revealed itself between the East and the West, it was seen that Americans and Europeans in the country were in danger of becoming the victims of Celestial fanaticism and the "Yellow Peril." This fear became emphasized when one realized the great gulf that existed between the reactionary and the progressive elements within the Empire and the tenacity with which the ultra-conservative rulers then in power clung to tradition, with a rigid adherence to their ancient religion, civilization, and modes of governing. In conflict with all this are Western ideas, habits, and customs, most obnoxious to the native population, and which are resented not only with conceited pride, but often with religious and racial frenzy. National antipathy is intensified by the aggressive attitude and bearing of the foreigner, who commonly treats the people as barbarians, harps incessantly on trading privileges, treaty concessions, and "open doors," and even talks boastingly of a coming European partition of the country. The effect of all this, upon a people naturally jealous of race encroachment, is to produce chronic alarm and restlessness, with a growing alienation towards the intruder, and the increasing purpose, if possible, to throw off the foreign yoke. This, in brief, is the explanation of the uprising in midsummer of 1900 in the vast, unwieldly Empire, which many have fondly wished might become a derelict among the nations, to be afterwards scrambled for and sliced up by the aggrandizing European Powers.

At first little was known of the extent of the rising or of the aims of the insurrectionary rabble that was disturbing the quiet of the capital and its vicinity. Some inkling of the designs of the Boxers appears, however, to have reached the Legations at Pekin, emphasized by news of outrages against foreigners in other parts of the Empire, and the diplomatic corps took the precaution to interrogate officially the Tsung-li-Yamên as to the measures the government intended to take in dealing with the revolt. The reply to this was far from satisfactory, and as the Boxers proceeded to molest foreigners and commit sundry depredations in and out of the capital, as well as to tear up portions of the railway track between Pekin and Tien-tsin, the Legations called upon the admirals of the foreign warships at Taku to send inland increased guards for the protection of the Embassies and the foreigners who were crowding to the Legations for safety. At this juncture (May 28), the U. S. cruiser "Newark," with Admiral Kempff on board, arrived in the Gulf of Pechili and immediately landed at Taku 108 American marines, who with 100 men each from the British, German, French, Italian, Russian, and Japanese warships, were at once forwarded to Pekin. Additional American battleships, then in Philippine and Chinese waters, were at the same time ordered to rendezvous off Taku, as the Boxer hordes continued to beset Pekin and menace the foreign element.

Meanwhile the attitude of the Chinese government became increasingly suspicious in its dealings with the native so-called rioters, who were now

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entrenching themselves outside Pekin, and in its relations towards the practically imprisoned official representatives of the foreign Powers and their families and those who sought protection at the Embassies. Native susceptibilities were at the same time hurt at the presence in the Gulf of Pechili of no less than 32 warships of the various foreign Powers, and at the landing of so many American and European troops for the protection of the Embassies. That there was justification for Western alarm and for the precautions taken by the Powers was presently seen not only in the hostility of the Boxers and their determination to oppose the advance of more foreign troops on their way to the capital, but in the murders at Pekin, first, of the Japanese chancellor of legation (June 13), and, secondly (June 17) of Baron von Ketteler, the German minister. All uncertainty as to the Chinese government's attitude was, however, removed when, on June 17th, the Taku forts opened fire on the foreign warships, in obedience to orders from Pekin. The ships at once cleared for action, and, after seven hours' bombardment, two of the forts were blown up and the remainder were carried by assault.

With Chinese disguise thus thrown off and no word being permitted, for several anxious weeks, to reach the outer world from the Legations, the allies now attempted to send another relief column to Pekin, under the British Admiral Seymour. This column was, however, unsuccessful in its mission, its progress being daily contested by masses of Boxers and Chinese troops and had finally to be rescued and brought back to Tientsin (June 26). The gravity of the situation increased with news, which, though lacking confirmation, was repeated daily by cable, to the effect that all the ministers of the foreign Powers at Pekin were massacred, together with the missionaries, the military guards, and the foreign residents. Fortunately, the hideous story turned out to be a fabrication, though for many weeks the Legations had been under a heavy fire from Chinese artillery and had bravely suffered the horrors of a prolonged siege. All communications with the ministers had for over a month been cut off, and when news of them was once more permitted to reach the coast it was learned how desperate had been their case, and how greatly the government had violated international comity in its treatment of them. True, it had latterly offered them leave to depart and promised them an escort to the coast; but this the ministers naturally declined, fearing treachery, and doubting the ability of the Chinese authorities to give them safe convoy for themselves and their families. Under the circumstances, there was therefore nothing for them tc do but to remain where they were, and make what defence was within their power, until a relieving army could bring them succor from the coast. The total number besieged in the British Legation, where all had taken refuge, being in the neighborhood of 800, there was added to the perils of the situation the menace of starvation, unless speedy relief could reach them.

Public anxiety was at its height when a courier from Pekin reached the coast (July 4), with a message from Sir Robert Hart, the English Director of the Chinese Maritime Customs, telling of the dire plight of the Legations. Meanwhile the United States and European governments interested were active in their efforts to relieve the situation, and for that purpose had come to a tacit understanding to abstain for the time from all Chinese aggression and seek only the safety of the imprisoned Legations. Besides ordering ships up from Manila to Taku, the United States government, while holding aloof from entangling alliances, had made arrangements to despatch troops to the scene of operations, and had appointed Brig.-Gen. A. R. Chaffee to command the American military force in China. It also landed the Ninth U. S. infantry from Manila at Tien-tsin. The greatest apprehension meanwhile was felt throughout the United States for the safety of Minister Conger, the American representative at Pekin. No word had been received at Washington from him since the 12th of June. It was not until the 20th of July that a despatch, dated Pekin, July 13, reached Washington from Mr. Conger, to the following effect: "British Legation under shot and shell from Chinese troops; quick relief only can prevent general massacre." Before this, however, an international force, some 40,000 strong, had gone forth on its mission of rescue, and had encountered continuous opposition from the enemy in covering the seventy-five miles that separated the capital from Tien-tsin. The relieving column reached Pekin August 14, to find that the Court, under restraint, it is said, of Prince Tuan, accompanied by the chief members of the Tsung-li-Yamên, had left the city two or three days before, bound, it was understood, for Sian-fu, in the province of Shensi. The allies, having beaten off the enemy, made a breach in the walls, and entered the sacred city on the 15th inst. The Japanese began the attack early in the morning, quickly followed by American, British, and Russian soldiers; and with the assistance of a considerable number of armed native Christians, the Legation was reached by some East Indian troops, under British officers, at one o'clock in the afternoon, and two hours later by the American column. The emaciated garrison gave the rescuers joyous welcome. It was found that the besieged had spent nearly all their ammunition, and had but three days' rations left. The Chinese had been attacking the Legation furiously for many days, so that the rescue was very timely. During the siege, 65 of the imprisoned foreigners were killed and 160 were wounded, while 4,000 shells, it was affirmed, had fallen within the enclosing grounds of the Legation.

While the capital had been forced and taken by the allies, the Court, as has been said, had fled from the city. There was, therefore, no authority to parley with, though on the 20th of August Viceroy Li Hung Chang, cabling from Canton in the name of his government, made application to the United States for the appointment of Minister

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Conger or other American official, with authority to open negotiations for the establishment of peace and for fixing definite terms for the settlement of the trouble. The overture was, however, rejected, since the Administration felt that no negotiations were at the moment possible, owing to the fact that there was apparently no *de facto* Chinese Government at the capital of the Empire with which to deliberate proposals of peace and to make a party to any contemplated settlement. The proposal was moreover felt to be inopportune, while the lives of Americans and others were still in peril in the country, and the allied forces at the capital were being treated as intruders and enemies. Before peace proposals could be entertained, it was naturally urged that the Chinese should themselves suspend hostilities and give the Powers proof that the native administration was able to repress revolt and outrage, and act in its relations with foreign governments in accordance with international usage. G.M.A.

PEACE NEGOTIATIONS AND SUBSEQUENT EVENTS. With the full consciousness that further resistance against the foreign forces would be suicidal, and that no concessions short of prompt and complete subjection to the demands of the Powers would be acceptable, the Chinese made the necessary overtures preliminary to the execution of a peace protocol. Active hostilities had been suspended but looting and other outrages were, for a short time, perpetrated on the defenceless natives by some of the international forces, much to the discredit of the latter.

About the close of the year 1900 the Chinese authorities decided to accept the demands of the foreign Allies in China, and January 12, 1901, the Chinese plenipotentiaries, Li Hung Chang and Prince Ching, affixed their signatures to a document containing these provisions:

1. That China should erect a monument to Baron von Ketteler on the site where he was murdered and send an Imperial Prince to Germany to convey an apology.
2. That all officials failing in the future to prevent anti-foreign outrages within their jurisdiction should be dismissed and punished.
3. That rational intercourse should be permitted with the Emperor, as in civilized countries, indemnity paid to states, corporations and individuals, and the Tsung-li-Yamen be abolished and its functions vested in a Foreign Minister.
4. That forts at Taku, and the other forts on the coast of Chi-Li be razed, and the importation of arms and war material be prohibited.
5. That permanent legation guards be maintained and also guards of communication between Peking and the sea.
6. That imperial proclamations be posted for two years throughout the Empire suppressing the Boxers.
7. That indemnity include compensation for Chinese who suffered through being employed by foreigners, but not compensation for native Christians.
8. That China erect expiatory monuments in every foreign or international burying ground where the graves have been profaned.
9. That the Chinese Government undertake to enter upon negotiations for such changes in existing treaties regarding trade and navigation as the foreign governments deem advisable, and with reference to other nations having in view the facilitation of commercial relations.

A few of the more notable events occurring in 1901 subsequent to this preliminary peace protocol were as follows: The organization of a judicial system by the Allied commanders in Peking, January 15. February 21, the Powers agreed to acquire no Chinese territory without international consent. March 8, the Chung-Shun Pass was captured by the Germans. April 3, Japan issued a protest relative to the Manchuria Convention and Russia's reply was that terms would be discussed after their acceptance. On the same date China declared herself unable to sign the Manchuria Convention. April 23, the Germans, in an engagement, forced the Chinese over the Great Wall, but with considerable loss. May 5, Peking was evacuated by the American cavalry and artillery. Two weeks later General Chaffee embarked for the Philippines. May 9, a formal indemnity of 450,000,000 taels was demanded of China by the Powers. The demand was acquiesced in by China, without cavil or unnecessary delay. September 17, the American and Japanese troops in Peking handed over the Forbidden City to the Chinese. November 7, Li Hung Chang, the able Chinese statesman, died. November 18, the New Manchuria agreement between China and Russia was made public, to the effect that the latter was to have exclusive mining and railway privileges in Manchuria and that the Russian authorities were to have command of all Chinese troops there, Russian occupation to end in eighteen months. The Chinese Court took preliminary steps in December for returning to Peking the first of the year 1902.

The Allied Powers concerned in the trouble with China were the United States, Germany, Great Britain, France, Japan, Russia, Italy, Austria-Hungary, the Netherlands, Belgium, and Spain. The total indemnity demanded of China, as previously stated, was 450,000,000 taels or $333,000,000. In the allotment of the amounts to the different Powers, Russia presented the largest claim, 133,316,000 taels, or nearly $100,000,000, while Spain's was the smallest, about $288,000. The United States was modest in her demand compared with some others, in proportion to the interests involved, being 34,000,000 taels, or a little over $25,000,000. Japan was still more modest than the United States in her claims. She sent the largest army, fully 12,000 men, and did the hardest work. They led the march to Peking and did most of the fighting, but her claim was only about $26,000,000, not much over a fourth that of Russia and one-third that of Germany. The Russian force consisted of about 5,000 men, while the United States, England, and France had about 2,500 each. Germany arrived on the scene late with nearly 10,000 men. Italy, Belgium, and Austria did practically nothing and suffered the least of any of the nations.

President Roosevelt in summing up the events with China for the year 1901, in his message to Congress, December 2 of that year, said in part:

"Owing to the rapid growth of our power and our interests on the Pacific, whatever happens in China must be of the keenest national interest to us."

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He then spoke of the troubles of China with the other Powers, the results, negotiations and treaties, and concluded as follows:

"The Chinese Government has agreed to participate financially in the work of bettering the water approaches to Shanghai and to Tien-tsin, the centers of foreign trade in Central and Northern China, and an international conservancy board, in which the Chinese Government is largely represented, has been provided for the improvement of the Shanghai River, and the control of its navigation. In the same line of commercial advantages a revision of the present tariff on imports has been assented to for the purpose of substituting specific for ad valorem duties, and an expert has been sent abroad on the part of the United States to assist in this work. A list of articles to remain free of duty, including flour, cereals, and rice, gold and silver coin and bullion, has also been agreed upon in the settlement.

"During these troubles our Government has unswervingly advocated moderation, and has materially aided in bringing about an adjustment which tends to enhance the welfare of China and to lead to a more beneficial intercourse between the empire and the modern world; while in the critical period of revolt and massacre we did our full share in safeguarding life and property, restoring order, and vindicating the national interest and honor. It behooves us to continue in these paths, doing what lies in our power to foster feelings of good will, and leaving no effort untried to work out the great policy of full and fair intercourse between China and the nations, on a footing of equal rights and advantages to all. We advocate the 'open door' with all that it implies; not merely the procurement of enlarged commercial opportunities on the coasts, but access to the interior by the waterways with which China has been so extraordinarily favored. Only by bringing the people of China into peaceful and friendly community of trade with all the peoples of the earth can the work now auspiciously begun be carried to fruition. In the attainment of this purpose we necessarily claim parity of treatment, under the conventions, throughout the empire for our trade and our citizens with those of all other powers."

Arrangements had been made between China and Russia by which the latter had virtual possession of Manchuria from the franchises granted her for the extension of her great Siberian railroad and the leases made of Port Arthur and other points. Although the designated period for Russia's occupation of Manchuria and the time set for her evacuation had gone by, she was still in possession of and dominating Manchurian territory when the Russo-Japanese War broke out, February 8, 1904. Manchuria became the chief battleground of the contending armies and it at once became obvious that with the fortunes of war favoring Japan, Russia's hold on Manchuria would necessarily relax and the integrity of China be assured. The various reverses Russia suffered during the year, on land and sea, culminating in the capitulation of Port Arthur the first of the year 1904, removed all doubts that might have previously existed of Russia's final abandonment of sovereignty in Manchurian territory and its future domination by China. A.R.R.

CHINAMPAS were the floating or semi-floating islands which abounded in the lakes of Mexico, around the City of Mexico, in ancient times, and of which some still exist. These islands were composed chiefly of vegetable matter, ranging from grass to great logs, formed into thick mattresses, and covered with earth, upon which rich gardens were cultivated. They bore a marked resemblance, though on a smaller scale, to the "sudd" of the upper Nile. W.F.J.

CHINANDEGA, a town and capital of the department of the same name in western Nicaragua· 12 miles from the sea, 18 miles N.W. of Leon The department is very fertile, and produces large quantities of cotton and sugar, the handling of which is the chief industry of the townspeople. The population in 1900 of the department was 20,000; of the town, 12,500.

CHINA-ROOT. See SARSAPARILLA, Vol. XXI, p. 329.

CHINA SEA. A southwestern division of the Pacific Ocean bordering on the southeastern portion of Asia and extending on the northeast to the island of Formosa, on the east bounded by the group of Philippine Islands, and on the southeast by Borneo. The countries of southeastern Asia touching its western waters are French Indo-China, Siam, and the Malay Peninsula. Some of the Asiatic ports reached through these waters are Canton, Saigon, Bangkok and Singapore. Manila, on the western coast of Luzon, is its most important eastern port. The largest island surrounded by its waters is Hainan, lying south of China. The sea is comparatively shallow in the southern portion, many of the soundings being but little over 800 feet, but in the north and off the coast of Luzon depths 15 and 16 times as great have been found. Navigation is greatly endangered on certain periods of the year by the violent typhoons that sweep over the sea. See PACIFC OCEAN, Vol. XVIII, p. 120. A.R.R.

CHINA TREE. A shade tree very popular in China, named in Australia the white cedar, sometimes known as the Pride of India and Persian Lilac. Its lilac-colored flowers in the early spring, its dense foliage throughout the summer and ornamental berries in the late fall make it a tree of rare beauty. A.R.R.

CHINA WAX. See WAX, Vol. XXIV, p. 485.

CHINCH-BUG (*Blissus leucopterus*), a hemipterous insect common in the Mississippi valley regions, and found in almost every state. Probably no insect causes greater damage to the cereal grains and the grass crops. The mature chinch-bug is three-sixteenths of an inch long. The wing-covers are white, with large black spots, and the rest of the body is dark brown. Some of the bugs remain alive during the winter. In the spring the eggs are deposited in the ground. The larvæ suck the sap from the roots of plants. The perfect insects travel from field to field, and destroy the plants in their path. There are two broods in a year, one in early summer and one in autumn. Several infectious diseases are peculiar to the chinch-bug. Within the last five years this fact has furnished the basis of a successful method of preventing their ravages. Bugs artificially infected with one of these diseases are placed in fields where the insects are numerous, and within a few days the disease becomes epidemic. This method of extermination has been applied in several states.

CHINCHILLIDÆ, a family of rodents. See MAMMALIA, Vol. XV, p. 425.

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CHINCOTEAGUE BAY AND ISLAND. See ASSATEAGUE, in these Supplements.

CHINDWARA. See CHHINDWÁRÁ, Vol. V, p. 529.

CHINESE EXCLUSION. The Burlingame treaty of 1868 between the United States and China provided for the enjoyment by the Chinese in America of all rights, in respect to travel and residence, accorded to the most favored nation. The experience of the people of this country with Chinese laborers during many years subsequent to the date of that treaty was voiced by a notorious demagogue in the curt dictum, "The Chinese must go"; and in 1880 a new treaty was concluded with China, whereby the government of the United States might suspend, but not absolutely prohibit, their coming to our shores. In accordance with the provisions of this treaty, Congress passed an act in 1882, with amendments in 1884, which suspended the coming of Chinamen to this country for ten years, but which also provided that if Chinamen already here desired to revisit their own country and return here again, they might do so upon certificates of residence, to be obtained from certain officials before their departure, and to be presented by them at their port of arrival when they returned. It was soon discovered that the purpose of the law was being circumvented, and that new immigrants were constantly gaining admission to this country by the fraudulent transfer and use of these certificates, and a law was passed in 1888 which forbade their issuance and declared all outstanding certificates void.

When the exclusion act of 1882 was about to expire, Congress passed an act, approved May 5, 1892, commonly known as the Geary Law, the main provisions of which were that all prior exclusion laws were extended for a further period of ten years, and that all Chinese laborers, or those of Chinese descent, should, within one year, obtain a certificate of residence from the collector of internal revenue in their district; should, by regulation of the Secretary of the Treasury under authority of this act, each prove his identity by registering and filing three proof-sheet photographs of his face; and that all failing to comply with the provisions of this law should be deported from the United States. A fine of one thousand dollars or imprisonment for five years was imposed for altering or substituting a name in a certificate or for forging or fraudulently uttering a certificate. The Chinese generally failed to comply with the provisions of the law within the time limit, and owing to the wholly insufficient appropriations made for carrying it into effect the deportations could not be made. In 1893 an amendment was passed extending the time for registration six months. The total number of Chinese registered under the Geary Law up to 1895 was 105,312. In 1894 a new treaty with China was sent to the Senate March 9th, and ratified August 13th, prohibiting the coming of Chinese laborers for ten years, but permitting such as left the country with property or near kin behind to return within one year, and in some instances later, if, before leaving they had obtained from the proper official of the United States a certificate reciting the facts.

CHINESE WHITE, a pigment chemically known as the oxide of zinc (ZnO) obtained by distilling zinc in chambers through which a current of air runs. The sublimated oxide is deposited in woolly masses. It cannot be reduced by heat and is used in place of white lead. W.R.B.

CHING-TU OR CHENG-TU is a great Chinese city, the capital of the province of Suchwan. It is well built and attractive, while its citizens are reputed to be the most cultivated and polished in all China. Its chief trade is in the products of Thibet. Its population is more than 800,000. W.F.J.

CHINKAPIN, an American Indian name applied to sweet acorns and their allies, and also to the trees which produce them. Probably the original "chinkapin" is *Castanea pumila*, a dwarf chestnut with a solitary nut in each involucre, or "husk." The name is commonly given also to the oak *Quercus prinoides*, also called "dwarf chestnut-oak," as well as to the large "chestnut-oak," *Q. Prinus*. Also written "chinquapin" and "chincapin."

CHINKIANG, originally written CHIN-KEANG-FOO, a Chinese city and port on the Yangtse river above Shanghai. It is at the junction of the Grand Canal with the Yangtse and the terminus of the projected Anglo-German railway from Tientsin. It is a city that has had many reverses and has but few foreign residents. Estimated pop. 1903, 245,000.

CHINOOK, a wind. See WASHINGTON, Vol. XXIV, p. 406.

CHINOOK OR CHINUK INDIANS, a nearly extinct family of North American Indians, formerly inhabiting the country along the Columbia River from Oregon to Vancouver. They were expert fishermen, subsisting chiefly on fish, berries and roots; were not given to the chase, but secured skins and other articles for clothing by barter with other tribes. They were indolent and thievish, and kept slaves. Only a few scattered families, barely sufficient to keep up tribal relations, remain in parts of Oregon and Washington.

CHINTZ, a certain kind of cotton cloth, printed in a number of colors with a design usually of leaves or flowers, and having the printed surface made smoother than the other by sizing or glazing. Before cotton could be cheaply made, chintz was considered an elegant and tasteful material for ladies' garments. It is now largely used as a summer covering for upholstered furniture and for curtains.

CHIO OR CHIOS, a Greek island. See SCIO, Vol. XXI, p. 487.

CHIPMUNK. See SQUIRREL, Vol. XXII, p. 455.

CHIPPAWA, a town and port of entry of Welland County, Ontario, Canada. It lies on the western shore of the Niagara River, above the falls and opposite the lower end of Grand Island, and at the mouth of the Chippewa River, which is also the mouth of the Welland Canal. It is on the Michigan Central railroad, and is 18 miles from Buffalo, N. Y. It was the scene of an important engagement between American and British forces in the War of 1812. Its population (1904) was about 2,000. W.F.J.

CHIPPEWA FALLS, an important industrial

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city and the county seat of Chippewa County, Wisconsin, in the western part of that state. It is on the Chippewa River, which affords a fine water supply and power, and is reached by the Chicago, Milwaukee and St. Paul, the Chicago, St. Paul, Minneapolis and Omaha, and the Wisconsin Central railroads. Its population in 1900 was 8,094. W.F.J.

CHIPPEWAS. See INDIANS, Vol. XII, pp. 867–871.

CHIPPING-BARNET. See BARNET, Vol. III, p. 327.

CHIPPING-BIRD (*Spizella socialis*), a small North American bird of the sparrow family (*Fringillidæ*). It is also known as chipping-sparrow and chippy.

CHIQUICHIQUI PALM, a native South American name applied to the *Leopoldinia piassaba*, or "piassaba" palm. Its leaf fibers, obtained from the petioles, are extensively used in the northern part of South America for making cables. This fiber has become also an article of commerce.

CHIQUIMULA DE LA SIERRA, a town and the capital of the department of the same name in Guatemala, northern Central America; it is on a tributary of the river Motagua, 68 miles S.S.E. of Guatemala. Population, 9,000.

CHIQUINQUIRA is an important city of Colombia, South America. It is in the state of Santander, about 80 miles north by east of Bogota, and near the headwaters of the Magdalena River. It lies among the mountains, and is an important center of inland trade. Its population in 1900 was nearly 20,000. W.F.J.

CHIRIQUI is the name of a province, a river, a lagoon and an archipelago of the Republic of Panama. The province is at the northwestern extremity of the republic. The river rises in the Cordilleras of Chiriqui, and flows northward into the lagoon, which is a tidal sound, 50 miles long by 25 miles wide, indenting the Panama coast and divided from the Caribbean Sea by the Chiriqui Islands. The three entrances to the lagoon are called Boca del Toro, Boca del Drago, and Boca del Tigre, or Bull's Mouth, Dragon's Mouth, and Tiger's Mouth. W.F.J.

CHISELHURST, a village in Kent, 11 miles S.E. of London. Sir Nicholas Bacon was a native of Chiselhurst. Camden Park estate (now built over) was the residence of Camden the antiquary. Napoleon III died at Camden Place in 1873; his remains and those of the Prince Imperial were removed to Farnborough in January, 1888. There are here an orphanage and a governesses' benevolent institution.

CHITIN, an organic substance which forms the basis of the hard parts of arthropods and many other invertebrates. It is a nitrogenous non-crystalline compound, allied to the proteids. It is only soluble in strong mineral acids (hydrochloric or sulphuric). In the crustaceans and insects it is seen in a quite pure condition at the joints of the body and appendages, but elsewhere it is impregnated with mineral salts, forming a hard substance.

CHITON, a family of gasteropods. See MOLLUSCA, Vol. XVI, p. 664.

CHITON. See COSTUME, Vol. VI, p. 400.

CHITRAL, a district of Afghanistan. See KASHKAR, Vol. XIV, p. 11, and AFGHANISTAN, in these Supplements.

CHITTAGONG-WOOD, a name somewhat vaguely used by cabinet-makers; usually the wood of *Chickrassia tabularis*, a tree of the family *Meliaceæ*, a native of the mountainous countries to the east of Bengal. It is often beautifully veined and mottled.

CHITTENANGO OR CHITTENANGO WHITE SULPHUR SPRINGS, a village and health resort in Sullivan township, Madison County, 15 miles E. of Syracuse and reached from Chittenango Station 4 miles N., on the New York Central & Hudson River and the West Shore railroads. Pop., 1900, 787. C.L.S.

CHITTENDEN, RUSSELL HENRY, educator; was born at New Haven, Conn., on February 18, 1856; was graduated from Yale College in 1875; studied at Heidelberg, became professor of physiological chemistry at Yale in 1882, a lecturer on that topic at Columbia University in 1898, and since the last-named year has been director of the Sheffield Scientific School of Yale University. W.F.J.

CHITTUR, a town of southern India, in the district of Arcot, about 80 miles W. of Madras, on the right bank of the Puni, about 1,100 feet above the sea. Population, 5,572.

CHITTY, JOSEPH, an English lawyer, author and editor of many legal text-books; born in 1776; died in London, Feb. 17, 1843. His works were for many years the highest authority upon the subjects of which they treat, and still constitute the foundation of what is written for instruction in those branches. Among them are his well-known treatise on the *Law of Contracts*, which has run through many editions; *Precedents in Pleading* (1808); *Treatise on Criminal Law* (1816); *Chitty's Blackstone* (1832); *Chitty's Practice of the Law* (1833–38); and many others.

CHIVALRY. See KNIGHTHOOD, Vol. XIV, p. 112.

CHIVES. See HORTICULTURE, Vol. XII, p. 293.

CHIVILCOY is a considerable city of the Argentine Republic, lying in the Province of Buenos Ayres, and about 109 miles west of the capital, near the headwaters of the Salado River. Its population in 1900 was 12,000. W.F.J.

CHIZEROTS AND BURINS form one of those peculiar races in France that live isolated in the midst of the rest of the population, and are despised and hated by their neighbors. They are found in the arrondissement of Bourg-en-Bresse, in the department of Ain, and the communes of Sermoyer, Arbigny, Boz and Ozan belong to them. According to tradition they are descended from the Saracens. Although industrious and prosperous, they are held in the utmost contempt and detestation by their peasant neighbors, who are themselves often indolent and destitute. They are looked upon as covetous and malicious.

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and scarcely would the daughter of a small farmer or well-to-do day-laborer become the wife of one of them, so that they mostly marry among themselves. From time immemorial they have been field-laborers, cattle-dealers, butchers, and the like.

CHLADNI, ERNST, a German physicist; born in Wittenberg, Nov. 30, 1756; died in Breslau, April 4, 1827; the inventor of the Euphon and Clavicylinder, and the author of *Discoveries on the Theory of Sound* (1787), and of *Acoustics* (1802). In order to illustrate his discoveries he invented figures (named after him), which form themselves on a plate of glass or metal, sprinkled over with sand, when its rim is struck with a violin bow.

G.A.S.

CHLANDNI'S FIGURES. See ACOUSTICS, Vol. I, p. 105.

CHLAMYDOSAURUS. See LIZARD, Vol. XIV, p. 743.

CHLAMYS. See COSTUME, Vol. VI, p. 403.

CHLORANTHACEÆ, a small group of aromatic and stimulant plants, chiefly tropical, allied to the peppers. *Chloranthus inconspicuus* is the chu-lan of the Chinese, who use it for perfuming teas.

CHLORASTROLITE, a dark green stone of the quartz or agate family; a hydrated silicate of alumina, occurring as an amygdule in a Lake Superior trap formation, and found only at Isle Royale, Lake Superior. It is of a deep green color, radiate (or testudinate) in structure, is extremely hard, very lustrous and chatoyant, and cuts handsomely for jewelry-mounting. It is locally known as the "turtle-back greenstone," from its tortoise-like markings. Fine specimens have a good commercial value.

CHLORATES. See CHEMISTRY, Vol. V, pp. 428, 429.

CHLORIC ACID. See CHEMISTRY, Vol. V, pp. 428, 429.

CHLORINATION PROCESS. See GOLD AND GOLD MINING, in these Supplements.

CHLORITE, an abundant mineral occurring now and again crystallized in minute hexagonal plates, or in aggregates of small leaflets, either singly or disposed in radial groups, which are scattered over the joint surfaces of certain schistose rocks, or may occur in a thin incrustation upon other minerals. It is rather soft, and is easily broken or scratched with a knife. See MINERALOGY, Vol. XVI, p. 431.

CHLOROPHANE. See FLUOR SPAR, Vol. IX, p. 306.

CHLOROPHYLL. See BOTANY, Vol. IV, p. 77; PHYSIOLOGY, Vol. XIX. pp. 59, 60.

CHLOROSIS. See PATHOLOGY, Vol. XVIII, p. 382.

CHLOROXYLON. See SATIN-WOOD, Vol. XXI, p. 332.

CHOATE, JOSEPH HODGES, U. S. minister to England; born at Salem, Mass., January 24, 1832; was graduated at Harvard College, 1852; became the law partner of William M. Evarts in New York City, 1857, and by reason of his brilliant talents immediately won high rank in the profession, and in 1871 became known to the entire country by his vigorous and successful campaign against the Tweed ring in the New York City government. His forensic triumphs as counsel for General Fitz-John Porter and in other weighty causes brought him fame as the foremost of American advocates. He was president of the New England Club in New York, and of the New York constitutional convention in 1893; and was chiefly instrumental in overthrowing the income tax by an argument before the supreme court of the United States. In January, 1899, he was appointed ambassador to Britain.

JOSEPH H. CHOATE.

CHOATE, RUFUS, an American lawyer; born in Essex, Mass., Oct. 1, 1799. He graduated at Dartmouth College in 1819, remained there as tutor for a year, and then studied law at Cambridge, Mass. He commenced practice at Danvers, Mass., in 1824, but removed to Salem in 1828, became a member of the State House of Representatives in 1825, and State senator in 1826. He sat in the national House of Representatives from 1831 to 1834, in which latter year he removed to Boston and became celebrated as one of the leaders of the Massachusetts bar. In February, 1841, he was chosen to fill the place in the United States Senate vacated by Daniel Webster, who then became Secretary of State in Pres. Harrison's Cabinet. He served until 1845, but declined a re-election. During the period of his senatorship, however, he took frequent part in debate, and made brilliant and elaborate speeches upon the leading questions of the day,—such as the Oregon question, the tariff, etc., many of which were published in pamphlet form. He was attorney-general of Massachusetts from 1853 to 1859. His eloquence was undoubted, but was noted for its extended periods and its somewhat magniloquent style. He died in Halifax, N. S., July 13, 1859.

RUFUS CHOATE.

E.E.T.

CHOIR, is apart from the chancel (q. v., in these Supplements) and the transept, being the place usually occupied by the seats of the singers. In familiar language the word is also used to denote the company of singers who take part in the church service. Until about a generation ago church music in the United States was commonly supplied by both male and female voices joined in quartettes, sextettes, etc.; but since the general introduction in the Protestant Episcopal

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Church of the English custom of having choral choirs, that innovation has been largely adopted by the congregations of other denominations. In surpliced choirs the soprano and alto parts are usually taken by boys, and the bass and tenor by men. All are drilled by a choir-master, who conducts several "practices," or instructions, during the week; the men usually sing gratuitously, while the boys receive a small compensation for each service and practice which they attend. Among the many advantages of surpliced choirs, as these are called, not the least is the good effect which the incidental discipline, instruction and familiarity with Christian worship have upon the boys themselves. R.C.A.

CHOKE CHERRY, a name given to a species of cherry of the Bird-cherry section having small fruit in racemes. The fruit is at first agreeable, but afterwards astringent in the mouth. W.R.B.

CHOKE-DAMP OR FIRE-Ddamp. See *Lighting*, under COAL, Vol. VI, p. 67.

CHOKING COIL. See ELECTRICITY, §78, in these Supplements.

CHOLERA. "It is now generally accepted," says Dr. S. T. Armstrong, "that Asiatic cholera is a specific, infectious disease that is caused by the comma bacillus of Koch. It is not contagious in the same sense as smallpox or typhus fever, but in the manner of its propagation is similar to typhoid fever. The premise of a specific infection leads to the conclusion of some definite method of introduction, and the disease is chiefly propagated by the contamination of water used for drinking, cooking and washing, by the contamination of articles of food, and possibly by the superficial inhalation and subsequent swallowing of dust containing the comma bacillus. This latter statement is based on the report of many cases of the disease, the origin of which is explicable by no other tenable hypothesis." In 1892 the United States narrowly escaped a visitation of this dread disease, which, in that year, entered Europe through Russia. Starting from India in the early weeks of the year, it followed the caravan routes, and, crossing the mountains by the Khyber Pass, it visited Cabul and the Afghan cities, reached the northern line of Russian Transcaspian travel, and made its way westward both by the Merv route and also by way of Persia. It passed across and around the Caspian Sea and broke out in Astrakhan, on its European side, at the mouth of Russia's great river, the Volga, whence it made its way up the Volga valley to Nijni-Novgorod, the city of markets and fairs, and from there it went to Moscow, St. Petersburg and the Baltic Sea. From the Baltic Sea it spread to other parts of Europe, and to America, aided by the great emigration of Russian Jews to the United States and elsewhere which was then in progress under the auspices of Baron Hirsch. Arrangements had been made for the transportation of many thousands of these poor people, and even after the cholera had broken out among them, every effort was made to carry out the contract and dump them on American shores, regardless of the danger to millions of American people. The infection was carried to Hamburg and Havre, and thence to various points in Germany, to Paris, and to other Continental cities. Hamburg suffered especially from the plague, and had at one time 5,000 cases. From there, in the fall, it made its passage by emigrant steamers to New York Harbor, where a quarantine of unsparing rigor effectually checked its progress beyond the shores of the lower bay. The United States government temporarily stopped the admission of emigrants, and with the advance of cold weather the disease died out. In 1893 and 1894 cholera again broke out in many places in Europe, but by a strict quarantine its introduction in the United States was prevented. See CHOLERA, Vol. V, pp. 592–595.

CHOLERA INFANTUM, a warm weather disease, very fatal to children in large cities, resembling cholera in its symptoms. It is due to the combined effects of excessive heat, improper food, with, or without, the concomitant of foul air. It is most fatal in children under the age of two years, especially in those brought up by hand on unsterilized milk, which doubtless contains germs that give rise to the disease. It is characterized by vomiting, purging, great thirst, and complete prostration, and is described as infantile, bilious remittent fever. The pulse becomes feeble, the respiration oppressed, and a comatose state supervenes. In extreme cases death may occur in 24 hours. The remedies are opiates, astringents, and stimulants; above all pure air, pure food and a change to the country, or sea-shore. W.R.B.

CHOLESTERIN, a substance ($C^{26}H^{44}O$) crystallizing in leaflets, with a mother-of-pearl luster and a fatty feel. It occurs in the blood and brain, in the yolks of eggs, and in the seeds of buds and plants. It has also been found as a fat occurring in the feathers of birds, and is present, in considerable proportions, in wool. It was, until 1887, regarded as of no value when occurring in feathers and wool, except as a combustible. Liebrich has experimented with it and produced an extremely pliant, soft mass, absorbable by the skin, and capable of being readily incorporated with various medicaments. It is now being manufactured commercially, and has come into general demand as a basis for salves and cosmetics. See also NUTRITION, Vol. XVII, p. 694.

CHONETES, a brachiopod shell found in Palæozoic formations of Europe and America.

CHONOS ISLANDS. See PATAGONIA, Vol. XVIII, p. 357.

CHORAL. See MUSIC, Vol. XVII, p. 92.

CHORAL SERVICE, in the Church of England, and in the Protestant Episcopal Church of the United States of America, service with intoned responses and the use of music throughout, wherever it is authorized. A service is said to be partly choral when only canticles, hymns, etc., are sung; wholly choral when, in addition to these, the versicles, responses, etc., are sung.

CHORAL SOCIETIES. See MUSIC IN AMERICA, in these Supplements.

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CHORDATA. See VERTEBRATA, Vol. XXIV, p. 193.

CHOREPISCOPUS. See DEAN, Vol. VII, p. 14.

CHORLEY, HENRY FOTHERGILL, musical critic; was born in Lancashire, England, on Dec. 15, 1808, was educated at Liverpool, and was musical editor of the *Athenæum*, of London, from 1833 to 1868, writing also many literary reviews. He was the author of several novels, plays and poems, none of which attained much success, but his *Music and Manners in France and Germany* (1841) and *Thirty Years' Musical Recollections* (1862) won much popularity. He was a strong opponent of Wagner and Berlioz. He died on February 16, 1872. W.F.J.

CHOROGI (*Stachys sieboldi*). The Japanese name of a perennial comestible vegetable, more commonly called "*crosne du Japon*." W.R.B.

CHOROID COAT. See ANATOMY, Vol. I, p. 779.

CHORRILLOS is an important town in the Department of Lima, Peru, on the seacoast about 10 miles south of the city of Lima, to the people of which it serves as a holiday resort. Its permanent population in 1900 was more than 3,000. W.F.J.

CHORUS. See DRAMA, Vol. VII, pp. 349, 350.

CHOSE AND CHOSE IN ACTION. See PERSONAL ESTATE, Vol. XVIII, p. 677.

CHOSEN FRIENDS, ORDER OF. See BENEFIT SOCIETIES, in these Supplements.

CHOUGH. See CROW, Vol. VI, p. 545.

CHOUTEAU, AUGUSTE, an American pioneer; born in New Orleans in 1739. With his brother Pierre (born in New Orleans in 1749) he joined Laclède's expedition for the establishment of the fur trade on the Mississippi, the Missouri, and their tributaries. On February 15, 1764, the Chouteau party founded a post on the present site of St. Louis, where the brothers died, —Auguste, February 24, 1829; and Pierre, July 9, 1849. E.E.T.

CHRISM, an ecclesiastical term signifying the ointment used by the Roman Catholic and Greek churches in confirmation, baptism, ordinations, consecrations, etc., which, in modern times, is blessed and consecrated at a service called "Missa Chrismatis," on Maunday Thursday. It consists of olive-oil mixed with balm, to which it is the custom of the Creek Church to add spices. The significance of the oil is "fullness of grace," and of the balm, "incorruption."

CHRISOME, an ecclesiastical term signifying the cloth or robe anointed with chrism, laid by the priest upon the child in holy baptism, to signify its regeneration and innocence. As the robe was often used for a shroud in case the child died soon after baptism, the phrase *chrisome-child* came to be applied to such children as died within the month of birth.

CHRISTADELPHIANS, a small religious body which arose in the United States about the middle of the nineteenth century, and who claim to represent the true faith and practice of apostolic times. Dr. John Thomas of Brooklyn, New York, the leading advocate of their views, was born in England in 1805, and died in 1871. They believe that God will raise all who love him to an endless life in this world, but that those who do not love him shall absolutely perish in death; that Christ was the son of God, begotten of the Spirit, by the Virgin Mary, and put to death for human sin—to them the devil. They insist on the plenary inspiration of the Bible; the real death of Christ as a sacrifice for sin; his resurrection and ascension; and they look for his return to the earth to reign on the throne of David over the converted, the restored twelve tribes of Israel, and all nations. They believe that death is a state of entire unconsciousness, terminated by a corporeal resurrection for those who have become related to Christ through faith and obedience, or are not responsible for his rejection. Those accepted after the judgment reign forever with Christ, over the nations; those rejected die the second death. Communities of Christadelphians exist in the principal towns of Great Britain, Ireland, and the United States. R.C.A.

CHRISTIAN II, KING OF DENMARK AND NORWAY, son of King John; born July 1, 1480, at Nyborg; attained the throne of Denmark and Norway in 1513, and that of Sweden in 1520. The latter country had risen in arms against him, but he defeated their regent, Sten Sture, in 1518. Immediately after the notables, assembled at Stockholm, had rendered the oath of allegiance, he took terrible vengeance by having 600 of the foremost men of Sweden publicly executed. (The Stockholm Butchery, Nov. 8–10, 1520.) The direct consequence was a new insurrection under Gustavus Vasa, which ended in Sweden's breaking away from the Kalmarian Union. Deposed by the revolting Danes, in 1523, he fled to the Netherlands, was, on his attempt to regain the rule over Norway, captured in 1531 and kept in confinement at the castles of Sonderburg and Kallundborg to the time of his death, January 25, 1559. G.A.S.

CHRISTIAN IV, KING OF DENMARK AND NORWAY, Duke of Schleswig-Holstein, son of Frederick II; was born in Denmark on April 12, 1577, was elected successor to the throne in 1588, and succeeded to the duchy in 1593 and to the kingdom in 1596. He waged two wars with Sweden, played a brief and inglorious part in the Thirty Years' War, surrendered the Protestant leadership to Gustavus Adolphus, and in 1629 withdrew from foreign affairs to devote himself to domestic matters. In these he was more successful. He vastly extended the trade of the country, promoted the arts and sciences, and won the affection of his people in an exceptional degree. Despite his failures in foreign war he became a national hero, and his exploit in a battle at Kiel in 1644, against the Swedes, is commemorated in a national ballad, "King Christian Stood by the Lofty Mast." He died at Copenhagen on February 28, 1648. W.F.J.

CHRISTIAN VII, KING OF DENMARK, son

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of Frederick V; was born on January 29, 1749, and succeeded to the throne on January 14, 1766. He married Caroline Matilda, sister of George III of England. For many years the queen dowager exercised all real authority, and in 1784 Christian was deposed by his son Frederick. In 1807 the half imbecile king was removed to Holstein, where he died on March 12, 1808. W.F.J.

CHRISTIAN IX, KING OF DENMARK, born April 8, 1818, fourth son of William, Duke of Schleswig-Holstein; succeeded to the throne in 1863, his predecessor having been the last of the line of Oldenburg, which had held the government for four hundred years. His accession rekindled certain political disputes of long standing, concerning the status of the duchies of Schleswig-Holstein, and he was soon involved in an unequal war with Austria and Prussia, from which he withdrew by releasing all claim to the disputed territory (which amounted to about one third of his dominion), leaving the other contestants to fight for the prize between themselves in a war which ended with the battle of Sadowa in 1866. To obtain money for the reorganization of his army, he desired to sell to the United States, in 1867, the islands of St. Thomas, St. Jean and Ste. Croix of the Antilles. In 1869 he cemented the union of the Scandinavian peoples by the marriage of his eldest son to the only daughter of Charles XV, King of Sweden. As a ruler he has striven for the moral and material improvement of his people, for their increase in personal and religious liberty, and for the removal of feudal encumbrances from their laws. The two legislative houses voted a new constitution in 1866, and in 1874 a new constitution was granted to Iceland upon the thousandth anniversary of its national existence. In 1892 was celebrated with becoming splendor the fiftieth anniversary of the marriage of King Christian with his consort, the Princess Louise of Hesse-Cassel. Among their children are: *Frederick, the Prince Royal; Alexandra, Princess of Wales; George I, King of the Greeks;* and *Dagmar, Dowager Empress of Russia.* He died January 29, 1906.

CHRISTIAN IX, KING OF DENMARK.

CHRISTIAN, FREDERICK CHRISTIAN CHARLES AUGUSTUS, PRINCE, a younger son of the late Duke Christian Charles Frederick Augustus of Schleswig-Holstein, who ceded his duchy to Denmark, and brother to Prince Frederick Charles Augustus, whose claims to the sovereignty of that duchy, as against the King of Denmark, were made the pretext for the Schleswig-Holstein War on the part of the German powers; born Jan. 22, 1831; married the Princess Helen Augusta Victoria of England, July 5, 1866; is a general in the British army and a Knight of the Garter, and has held other important honorary and lucrative positions with credit to himself and with the good will of the British public.

CHRISTIAN, HELEN AUGUSTA VICTORIA, PRINCESS, third daughter of Queen Victoria of England; born May 25, 1846; married at Windsor Castle, July 5, 1866, to Prince Frederick Christian Charles Augustus of Schleswig-Holstein; received from the British Parliament on the occasion of her marriage a dowry of $150,000 and an annuity of $30,000. She resides at Cumberland Lodge, Windsor, and has living two sons and two daughters.

CHRISTIAN ALLIANCE, a religious association organized in 1887, with its headquarters at 692 Eighth Avenue, New York City. It was founded by Rev. A. B. Simpson, who has been its president from the date of its organization. Its membership, as described by its founder, "consists of all professing Christians who subscribe to its principles and enroll their names." Its objects are stated to be "wide diffusion of the Gospel in its fullness, the promotion of a deeper and higher Christian life, and the work of evangelization, especially among the neglected classes, by highway missions and any other practical methods." The organization is said to be rapidly extending, especially throughout the United States and Canada. Auxiliary to the parent alliance is the "International Missionary Alliance," with a missionary training-school located at 690 Eighth Avenue, New York City. At the end of 1895 the organization had established 265 missionaries in India, China, Japan, Haiti, and Congo Free State. In New York City special work is done for fallen girls by means of "The Door of Hope," a branch "home" opened by the alliance, at 102 East Sixty-first Street, and another, known as "Door No. 2," in Tappan, New York.

CHRISTIAN COMMISSION, THE, was a religious and benevolent organization which did a great work for the spiritual and material welfare of the Federal soldiers in the Civil War. It was founded in the fall of 1861, upon the initiative of the Young Men's Christian Association, under the presidency of George H. Stuart, of Philadelphia, a wealthy and benevolent business man much devoted to religious work. It enrolled thousands of clergymen and laymen for work among the volunteer soldiers, in camp and on the battlefield as well as in the hospitals. W.F.J.

CHRISTIAN ENDEAVOR, THE UNITED SOCIETY OF, is the headquarters and general bureau of the YOUNG PEOPLE'S SOCIETIES OF CHRISTIAN ENDEAVOR, the first of which was formed at Williston Church, Portland, Maine, Feb. 2, 1881, and which, in Nov., 1904, had increased to 64,804 societies, with a membership of 3,888,240 in the United States, Canada, Great Britain and missionary lands. The United Society's offices are at 646 Washington Street, Boston, Massachusetts, and is managed by a board of trustees, who represent the chief evangelical denominations, and who meet quarterly. It levies no taxes and assumes

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no authority over the Young People's Societies, each of which is in some local church and manages its own affairs.

CHRISTIAN KNOWLEDGE. The Society for Promoting, is the oldest of a number of great religious associations connected with the Church of England. It was founded in London in 1698, and has for its main objects the establishment of schools, churches and libraries; and the publication and circulation of religious and moral literature. It is still in active operation and publishes a great number of religious and instructive works. It has contributed largely to the endowment of colonial bishoprics.

CHRISTIAN SCIENCE is the name of a religio-scientific system which was discovered in the year 1866 by Rev. Mary Baker G. Eddy, a native and resident of New Hampshire. She has presented an exposition of this Science in her text-book, *Science and Health with Key to the Scriptures*, and in her other writings, and has founded the Christian Science religious denomination and all its institutional activity.

The teachings of Mrs. Eddy have been accepted by many people who are known as Christian Scientists and have established Christian Science churches and societies. A report dated June, 1904, states that up to that time 850 of these congregations had been formed. Many of these have erected large and costly church edifices. At the head of these is The First Church of Christ, Scientist, in Boston, Mass., which is known as the Mother Church, and has a membership of over thirty thousand. The principal auditorium of this church is estimated to seat five thousand people. Mrs. Eddy is the Pastor Emeritus of the Mother Church and is the acknowledged Leader of the movement. The church edifice at Mrs. Eddy's home city in Concord, N. H., a massive structure of New Hampshire granite, was completed in 1904, and was the gift of Mrs. Eddy to the local church society.

The denomination maintains an educational system, at the head of which is the Massachusetts Metaphysical College; also a Publishing Society, which publishes *The Christian Science Journal*, the *Christian Science Sentinel*, *Der Christian Science Herold*, and other periodicals, books, etc.

The church services consist of Bible reading, prayer, singing, etc., and as a substitute for preaching, two Readers read alternately selections from the Bible and from *Science and Health*, with a view to explaining and interpreting the Scriptural teaching concerning various subjects.

The Mother Church exercises certain denominational authority over the branch churches, but the latter are practically independent and exist under a purely democratic or congregational form of church government. Such statistics as are accessible, indicate large and rapid congregational growth.

Mrs. Eddy claims to disclose the actual Science of Christianity, or the Science of Jesus' teaching and works. She emphasizes the statement that God is Spirit, and that in the realm of the real, all is spiritual; all is the divine, infinite Mind and Mind's ideas. Christian Science holds to the supreme spiritual individuality of God as Omniscience and rejects all man-made creeds and all limited, finite conceptions which have been substituted for actual scientific knowledge of Deity.

It declares that there can be but one true religion or theology; that true or scientific religion is knowable and demonstrable, and it announces itself as a step in advance of speculative religions which have involved themselves in mystery, and the world in sectarian contention.

Christian Scientists declare that they believe in "prayer without ceasing," in the inspiration of the Scriptures, the divinity of Christ, the immortality of life, in the necessity of repentance and reform, in sinless living, and in all the essentials of the Christianity which Christ Jesus taught and demonstrated. In their church services they avoid ceremonials, ritualism, and forms, and claim to have no other models than the Ten Commandments, the Sermon on the Mount, and the life and teachings of the Saviour. Christian Science differs from many other religious beliefs in that it affirms that God has not procured or instituted any evil. It disposes of the so-called mystery of evil by the statement that it is an illegitimate abnormity, a false, material sense of being, and that all evil can be eliminated, and in time will be abolished. Christian Science denies the present or prospective existence of eternal hell and devil. It states that through ignorance, superstition, fear, sin, and an utterly erroneous sense of existence, humanity has involved itself in mortality and in all the suffering which is incidental to mortals who are governed by the "carnal mind" instead of by the divine Mind, or God. It claims that sickness is unnatural, unlawful, and unnecessary, and that it is as essential that humanity should emerge from the realm of disease, as that it should emerge from that of sin.

Christian Scientists affirm that the healing by Jesus was done on the basis that life and health are normal, and that disease is neither an entity nor of irresistible impulsion.

A distinctive feature of Christian Science is seen in its teaching, which declares that it presents the true, scientific therapeutic system or science of healing; also the Principle upon which such healing rests, and the rule whereby it may be accomplished. It is declared that all such healing is rational, lawful, and scientific, that it is the same as was exhibited by Christ Jesus, and that its practice was and is an indispensable incident of Christianity. It is claimed that by these means more than a million instances of healing have been accomplished, and that nearly every known disease has been mastered.

Edward A. Kimball, C.S.D.

August, 1904.

CHRISTIANIA, the capital of Norway. It has advanced rapidly under the stimulus of modern industrial activity. In 1898 it had 375 factories employing 17,383 hands, and 1899 its port was entered by 2,710 vessels of 1,000,740 tons. Pop. 1900, 227,626. See Christiania, Vol. V, p. 597.

CHRISTIANS or CHRISTIAN CONNECTIONS, the name of a religious body in the U.S., which seceded from the Methodists of Va. and N. C., led by Rev. J. O'Kelley, and at first called "Republican Methodists." The name was changed that it might express their renunciation of all sectarianism. They must not be confounded with the "Christian Churches" or "Disciples of Christ." About 1800, they received accessions from Baptist churches in Vt., under Dr. Abner Jones and others, and from Presbyterians in Ky. In 1901 they had 1,520 churches, 1,248 ministers and 113,000 communicants. Antioch College, O.; Lincoln College, Neb.; Union Christian College at Meron, Ind.; and the Christian Biblical Institute of Stanfordsville, N. Y., are among their institutions.

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CHRISTMAS ISLAND, a large, low atoll in the Pacific Ocean, lat. 1° 57′ N., long. 157° 27″ W. It has good anchorage, and is the headquarters of an American guano company.—Another CHRISTMAS ISLAND, annexed to Britain in 1888, lies about 250 miles southwest of Java. It is 6x4 m.

CHRISTOLOGY. From Greek *Χριστος*, Christ, and *λογος*, a treatise. The doctrine of the person of Christ, or a treatise relating to it. The doctrine, as now generally held, was developed slowly. The early Christians usually contented themselves with the employment of Biblical language in regard to the person of Christ, without much attempt to explain it. The Jews and pagans who heard them understood it to teach his deity, and the Jews attacked them for preaching two Gods, and thus contradicting the monotheism of the Old Testament. This led them to a study of the Scriptures, and an effort to construe their statements carefully.

We may divide the history of the doctrine into two main periods, and a third period must be added to embrace the recent labors of theologians in this field.

1. The first period extends from the debate of Justin Martyr with Trypho the Jew, about 140, to the Council of Nicæa, 325, during which the church labored to define the relation of the Logos in Christ to the Father, and incidentally to the Spirit also. Justin, in his debate with Trypho, maintained that "God, before all creatures, begot of himself a certain reasonable power called the glory of the Lord, the Son, the Logos." This generation was at a certain definite period in eternity, and its product, the Logos, was subordinate to the Father, not only in functions, but in nature. Tertullian carried the doctrine much further; he was the first to use the word *trinity*, and to teach that God is a tripersonality in himself. Yet he held that the Logos, though inherent in God, did not become a personal being till the work of creation was to begin, and is always subordinate in nature. To Origen we owe the statement that the Logos is without beginning, and is always personal, and that Christ is "the God-man." Yet he also held that the Logos is inferior to the Father in nature. All the preceding writers maintained that the Logos was generated by an act of the divine will. Thus far had the Christian world advanced in its interpretation of the Scriptures, when the Arian controversy burst upon it, and led it to the conviction, never since shaken, that the Logos is equal to the Father in nature, being of the same numerical substance; that he is generated eternally, and had no beginning; and that he is always generated by the nature of the Father, and not by a determination of the divine will. The doctrine is, in other words, that it is the nature of God to exist as a trinity of persons in a unity of substance.

2. Having defined the teaching of the Bible concerning the relation of the Logos in Christ to the Father, it remained for the Church to define its teaching concerning the relation of the Logos in Christ to the human nature in Christ. There were long and bitter controversies, leading to the condemnation of the doctrine of Apollinaris, that the Logos took the place of the human reason in Christ, leaving only a partial humanity; of the Nestorians, that while there are two complete natures in Christ, the divine and the human, they are united only morally, somewhat like a husband and wife well adapted to each other; of Eutyches, that while the two natures in Christ were originally complete, the human was quickly absorbed by the divine, leaving in fact only the latter, slightly modified by the appropriation of the former; and several other unacceptable theories. The resultant doctrine is, that in Christ the two natures are whole and entire, and so perfectly united as to constitute but a single person.

3. The doctrines of the trinity, and of the relation to each other of the divine and human in Christ, as they were thus early set forth, are now generally held in the Christian world. The second, however, has led to certain difficulties, which some modern writers have sought to remove without disturbing the doctrine itself, so that it is now passing through another stage of development, which promises good fruit.

Until recent times it was taught by theologians in general that the divine nature in Christ did not suffer, since it is impossible for God to suffer. Moreover, the divine nature in Christ retained all its attributes, and continued to perform all its accustomed offices, during the whole of his earthly life and death—his infancy, his childhood, his maturity, his waking, his sleeping, his final unconsciousness on the cross. His divine nature had infinite knowledge, and if his human nature was ever ignorant of anything, there would seem to have been an imperfect union of the two,—a supposition which the creed pointedly excludes. Did Christ, then, only seem to be limited in knowledge, as when he looked for fruit on the barren fig tree? Still further, there are passages of Scripture which lead naturally to the conclusion that the entire being of Christ suffered, like the record of the agony in the garden. There are others which lead to the conclusion that in the incarnation a change took place in the Logos himself, so that the life of Christ was a humiliation, or an "emptying," to use the Greek word of Phil. ii, 6, 7, of the divine nature which he possessed: "Who, being in the form of God, thought it not a thing to be clutched at to be on an equality with God; but emptied himself, and took upon himself the form of a slave."

Considerations such as these led Thomasius to the belief that in the incarnation the Logos so limited himself that he laid aside his omnipotence, omniscience, and omnipresence, and became as fully unconscious as the human nature of the new-born babe; that he gradually grew into the consciousness of his divine nature; that he possessed himself of so much of divine power and knowledge as he needed for the accomplishment of his

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mission; that he exposed himself to all the sufferings of life and death; and that, at his ascension, he resumed the full glory of the attributes which he had laid aside. These conjectures, falling on the congenial soil of Germany, so quick to respond to every germinal suggestion, has produced a rich harvest of varied speculations. The theory of Thomasius has not been generally accepted, but neither has it been generally rejected, and an increasing number of theologians are finding themselves in sympathy with it. F. JOHNSON.

CHRISTOPHE, HENRI, king of Haiti; born in Grenada, W. I., Oct. 6, 1767. Accounts of his early life differ; but he seems to have been sold as a slave in San Domingo at the age of twelve, becoming a cook. Later he became an overseer on a San Domingo plantation. On the rising of the blacks, he took such an active part in the cause of independence that Toussaint l'Ouverture commissioned him brigadier-general. His success in quelling an insurrection made him governor of the Province of the North. In 1802, on the invasion of his territory by the French, Christophe and Dessalines were declared outlaws, and when Toussaint l'Ouverture was captured the two raised a rebellion and drove the French from Haiti. During Dessalines's brief administration Christophe was general-in-chief, and in February, 1807, after Dessalines's death, Christophe was elected president for life. Pétion, however, was in chief favor in the southern half of the island, and, a republic having been organized in that section, he was elected president. A civil war which lasted 11 years was the result. In 1811 Christophe proclaimed himself king of Haiti under the title of Henri I, and organized an hereditary monarchy and order of nobility. He also promulgated a code, based on the Code Napoléon. But his rule was severe, and his subjects rose in revolt. Deserted by his army, he shot himself, Oct. 8, 1820. E.E.T.

CHRIST'S HOSPITAL, popularly known as the Blue-Coat School, from the picturesque dress of the boys educated there, which consists of a blue tunic and yellow breeches and stockings, is situated in Newgate Street, London (occupying the site of the old Greyfriars monastery), and accommodates 700 boys. It was founded by King Edward VI, in 1553, as a hospital for poor orphans and foundlings, but it has gradually become a public boarding-school for the sons of London freemen and Anglican clergymen. It has also a girls' and boys' preparatory school at Hertford, founded in 1683, where there are 120 boys and 350 girls, the boys only coming up to the London school when old enough. In 1890 two day schools, for 600 boys and 400 girls, were opened. The original endowment has been largely increased, notably by King Charles II, and the income amounts to some three hundred thousand dollars per year. The education is essentially classical, but modern languages and literature are also taught. Boys leave the school at 15, except the mathematical scholars and the "Grecians," who are sent on scholarships, either to Oxford or Cambridge. There are about thirty instructors at the London school. The first building was destroyed by the great fire of 1666, and was rebuilt by Sir Christopher Wren. The present one was built by Shaw in 1825. At this institution, Camden, Stillingfleet, Richardson (the novelist), Coleridge, Charles Lamb and Leigh Hunt received their education.

CHROMATIN, the name of one of the constituents of the cell-nucleus. The nucleus in its resting stage is composed of a semi-fluid hyaline substance, and a more solid fibrillar network in which are distributed a number of granules of a substance readily stained, and hence called "chromatin." For illustration, see KARYOKINESIS, in these Supplements.

CHROMATE OF LEAD. See LEAD, Vol. XIV, p. 379.

CHROMATIC PRINTING-PRESS. See PRESSES, in these Supplements.

CHROMATOPHORES. See MOLLUSCA, Vol. XVI, p. 707.

CHROMATYPE, a photographic picture in which the paper employed has been sensitized by some of the salts of chromium.

CHROME STEEL. See IRON AND STEEL, in these Supplements.

CHROMIC ACID. See CHROMIUM, Vol. V, p. 612.

CHROMITE OR CHROMIC IRON. See MINERALOGY, Vol. XVI, p. 402; CHROMIUM, Vol. V, p. 612.

CHROMO-LITHOGRAPHY. See LITHOGRAPHY, Vol. XIV, p. 706.

CHROMOMETER. In the petroleum industry, chromometers are used to determined the color of oil, and separate it into the commercial grades known as water white, superfine white, prime white, standard white and good merchantable. The Wilson chromometer is much used, but the Stammer chromometer is much more accurate. The latter has a cylindrical case within which is a cylinder with a glass bottom, so arranged that the oil is looked at lengthwise of the cylinder. By turning a screw, the length of this cylinder is altered, and the inspector is able to bring it to a tint matching a sample, and then by noting the length of the column of oil on the scale he finds its color-value in terms of the standard. This chromometer has also been used to test lubricating oils. It has been somewhat improved in detail by Robert Redwood.

A form of chromometer is also used by metal lurgists, in assaying, to compare the intensity of the color of the bead, when an ore is fused with borax, with the color given by a known quantity of the metal.

CHROMOSOMES. In nuclear division the fibrillar network (see CHROMATIN) breaks up into a definite number of segments, to which the name *chromosomes* has been given. The movements of these chromosomes during nucleat division are an essential feature of the process. Much interest is attached to chromosomes, as they are claimed by many biologists to be the

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material carriers of hereditary tendencies. For illustration, see KARYOKINESIS, in these Supplements, and also see the article on REPRODUCTION in the same.

CHROMOSOMES. See EMBRYOLOGY AND HEREDITY, in these Supplements.

CHROMOSPHERE. See ASTRONOMY, Vol. II, p. 690.

CHRONOGRAM OR CHRONOGRAPH, a whimsical device of the later Romans, by which a date is given by selecting certain letters from among those which form an inscription, and printing them larger than the others. The principle will be understood from the following example, made from the name of George Villiers, first Duke of Buckingham:

GEORGIVs DVX BVCkINGAMIÆ.

The date MDCXVVVIII (1628) is that of the year in which the Duke was murdered by Felton at Portsmouth. Another well-known example conveys the date in the inscription upon a medal struck by Gustavus Adolphus in 1632:

CHRISTVS DVX; ERGO TRIVMPHVS.

CHRONOGRAPH See GUNNERY (Vol. XI, pp. 264–268) AND BALLISTICS, in these Supplements.

CHRONOLOGY. See CHRONOLOGICAL EVENTS, following "Biographical Dictionary," Vol. XXIX.

CHRONOSCOPE, an instrument contrived by Sir Charles Wheatstone to measure the duration of certain short-lived luminous phenomena, such as the velocity of light, the electric spark, or the velocity of projectiles, of which the eye itself can be no judge, owing to the persistence of impressions on the eye after the cause of sensation has ceased. The phenomenon is observed by reflection in a mirror in such rapid motion that the image of the luminous object would appear to describe a circular arc, the length of which must be a measure of the duration of the light.

CHRYSALIS. See BUTTERFLIES, Vol. IV, p. 594.

CHRYSANTHEMUM. See HORTICULTURE, Vol. XII, p. 254.

CHRYSELEPHANTINE, sculpture in gold and ivory; a fashion which prevailed in Greece and Asia at an early day. Two celebrated works in these costly materials were the statue of *Athene* in the Parthenon and that of the *Olympian Zeus* in his temple at Elis—masterpieces of Phidias. The exposed portions were done in ivory, the drapery and accessorial enrichments in gold. Upon the statue of *Athene*, 26 feet high, the enormous amount of fifty talents of gold was used.

CHRYSIS, a genus of hymenopterous insects. They are popularly known as "cuckoo-flies" in England, and as "golden-wasps" in Germany. They are noted for their brilliant metallic colors.

CHRYSOBALANUS, a genus of trees and shrubs of the family *Rosaceæ*, natives of tropical and subtropical America and Africa. The cocoa-plum (*C. Icaco*) of tropical America produces an edible fruit.

CHRYSOBERYL, a hard semi-transparent gem, of a green color, inclining to yellow, found in Ceylon, Siberia, Peru, Brazil, and Connecticut. It is composed of alumina, glucina and a little protoxide of iron. It occurs crystallized in six-sided prisms often as twin crystals and has double refraction. The fine specimens are very beautiful, exhibiting an opalescent play of light. See MINERALOGY, XVI, p. 402. W.R.B.

CHRYSOCOLLA, copper ore. See COPPER, Vol. VI, p. 308.

CHRYSOLITE. See PERIDOTE, Vol. XVIII, p. 544; MINERALOGY, Vol. XVI, p. 427.

CHRYSOPRASE, a kind of quartz which constitutes a costly variety of chalcedony. It is generally apple-green in color, often extremely beautiful, and highly prized in jewelry, being sometimes set with diamonds and pearls. It is nearly as hard as flint, translucent, and sometimes semitransparent, and occurs in Oregon, California and elsewhere. See MINERALOGY, Vol. XVI, p. 405.

CHRYSOTYPE, a photographic process invented by Sir John Herschel as an embellishment of his well-known "cyanotype," or "blue-print" process. It consists in treating the sensitized paper with a neutral solution of chlorid of gold after the image has appeared, but before washing. This gives a purple tint to the image, which, after being freely washed in water, is then "fixed" with a weak solution of iodid of potassium, which converts any unaltered chlorid of gold into a soluble salt easy to remove by a final washing.

CHUB (*Leuciscus cephalus*). See ANGLING, Vol. II, p. 39; ROACH, Vol. XX, p. 597.

CHUBB, CHARLES, English inventor, who died May 16, 1845. See SAFES, Vol. XXI, p. 152; also LOCK, Vol. XIV, pp. 752, 753.

CHUBUT OR CHUPAT. See PATAGONIA, Vol. XVIII, p. 358.

CHUCK-WILL'S-WIDOW. See GOATSUCKER, Vol. X, p. 634.

CHUDLEIGH, CAPE, on the north coast of Labrador, at the entrance of Hudson Strait, lat. 60° 12′ N., long. 65° 25′ W.

CHU HI OR CHU HE, a Chinese philosopher and statesman who flourished during the Sung dynasty in the twelfth century. Born A.D. 1130, at Hihchau, in the province of Nganwui, he early became a studious and precocious child, and was an ardent reader of Confucius. When about 24 years old he became a submagistrate, and from that time exhibited such qualities of forethought, careful observation, diligence and integrity that his suggestions as to the needs of the empire and the welfare of the people were not only received with favor by the emperor, but, on important occasions of famine or pestilence, were asked and he became a confidential adviser of the government. His public life was marked by industry, force of character and moderation. His name signifies "brilliant vermilion," and was bestowed in childhood as being characteristic of great talents; but upon his marriage he adopted the name YUEN HWUI, "original obscurity." His writings were very numerous, and some of them remain in use to this day. He was the best interpreter of the Chinese classics, and a constant inculcator of moral philosophic teachings. *Outlines of General*

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History; Memoirs of Illustrious Ministers; Domestic Ritual, or Rules for the Use of Families; Commentaries on the Dialogues of Confucius; Treatise on the Duties of Children; Commentary on the Diagrams of the Great Extreme; and *Youth's Guide for Studying the Book of Changes*, are the titles of some of his works. He died A.D. 1200.

CHU KIANG, PEARL RIVER OR CANTON RIVER, is one of the many arms which form the delta of the Si Kiang, in the province of Kwang Tung, in southern China. It is a broad tidal stream. At its mouth are the famous Bogue forts, which were captured by the British in 1841, and again in 1856. W.F.J.

CHULALONGKORN I, KING OF SIAM, born Sept. 21, 1853; succeeded to the throne of his father, Oct. 1, 1868; died Aug. 16, 1894; was a just and high-minded ruler, a Buddhist, and a scholar. Among the important reforms which he inaugurated were the partial abolition of slavery and the reform of the calendar, by which he established a new astronomical year, to commence April 1st.

CHULPAS, ancient burial towers of the South American Incas. See illustration of ruins, under ARCHITECTURE, Vol. II, p. 395.

CHUMBUL, a river of central India, rising in the Vindhyan Mountains at a height of 1,800 feet above the sea, and entering the Jumna after a generally northeast course of 514 miles. It is subject to sudden floods, and is not navigable.

CHUMASHAN INDIANS, a nearly extinct linguistic stock of North American Indians, originating in the Santa Barbara Islands of the Pacific coast of North America, and at one time congregating around the California missions of Santa Barbara, San Luis Obispo, San Buenaventura and their vicinity.

CHUNAM (Tamil *chunnam*, lime), the East Indian name for a fine kind of quicklime made from burnt seashells and used to "chenam" (*i. e.*, kalsomine) walls, apartments, terraces, halls, floors, tombs, and even ships and the roofs of temples. It is also used with sand as plaster. The natives also use it to chew with betel. W.R.B.

CHUNG KING, a large city and river port of the province of Suchwan, China, standing upon a rocky promontory at the junction of the Kialing and Yangtse rivers. Of the nine gates in its walls, eight open upon the rivers. It is the principal port of the province, and has been officially open to foreign trade since 1891. The Yangtse for many miles below is, however, filled with shoals and rapids, making navigation difficult and dangerous for anything larger than river junks. The population of the city proper, within the walls, is about 250,000, but the immediate suburbs contain at least 450,000 more. W.F.J.

CHUQUISACA. See SUCRE, Vol. XXII, p. 651.

CHURCH, ALBERT E., an American mathematician; born at Salisbury, Conn., in 1808. He graduated from the Military Academy at West Point at the head of his class, in 1828, with the rank of second lieutenant, and was assigned to the Third Artillery. From 1828 to 1831 he was acting assistant professor of mathematics at the Military Academy; from 1833 to 1837, assistant professor; 1837–38, acting professor; and from the last-named date to the time of his death, he held the full professorship. He was made first lieutenant in 1836, but resigned his lieutenancy of artillery in 1838. The degree of A.M. was conferred upon him by Washington College (now Trinity College), Hartford, Conn., in 1837; and by the College of New Jersey (now Princeton University) in the same year. He was the author of *Elements of Analytical Geometry* and *Elements of the Differential and Integral Calculus*, containing the *Elements of the Calculus of Variations*. He died at West Point, N. Y., March 30, 1878. R.W.C.

CHURCH, ALFRED JOHN, an English divine and author; born in London, January 20, 1829. He was educated at King's College, London; and Lincoln College, Oxford, graduating 1851. Was ordained 1853; assistant master at the Royal Institution School, Liverpool, and at the Merchant Taylors' School, London, 1857–70; head master at Henley Grammar School, 1870–72; and Retford Grammar School, 1873–80; professor of Latin in University College, London, 1880–89; rector of Ashley, Tetbury, Wilts, 1892; published a number of translations from and editions of the Greek and Latin classics, but is best known by a series of volumes in which he sought to make the classics popular with the young, among which were *Stories from Homer; Stories from Virgil; The Story of the Persian War; Stories from Livy.* He also wrote *The Chantry Priest of Barnet; With the King at Oxford; Stories of the Magicians*, and *To the Lions*, a tale of the early church; and translated a number of Tennyson's poems into Latin verse, published under the title *Horæ Tennysonianæ.* R.G.A.

CHURCH, ARTHUR HERBERT, an English chemist; born June 2, 1834; educated at London and Oxford; professor of chemistry in the Royal Academy of Arts and Sciences since 1879; well known as the discoverer of turacin, an animal pigment containing copper, and of several new mineral species, including the only British cerium mineral. Among his writings are *Precious Stones* (1883); *English Earthenware* (1884); *English Porcelain* (1886); and of the *Laboratory Guide for Agricultural Students*, which reached its sixth edition in 1888. He was elected fellow of the Chemical Society in 1856 and of the Royal Society in 1888.

CHURCH, FREDERICK EDWIN, painter, was born at Hartford, Connecticut, in May, 1826, and was a pupil of Thomas C le. For years he lived and worked among the Catskill Mountains, and many of his earlier pictures are landscapes of that romantic region. He twice visited South America, and as a result produced his famous paintings of *The Heart of the Andes*, *Cotopaxi*, *The Andes of Ecuador*, *A South American River*, etc. He also visited Labrador, and from his observations

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there painted his *Icebergs*. Another of his best-known works is his panoramic view of Niagara Falls. He visited Jamaica in 1866 and made many pictures of scenes in that island. Two years later he went to England, and thence through the Continent, to Greece and to Palestine. Pictures of the Parthenon, of Jerusalem, and of various other eastern subjects, were the fruits of this journey. An exhibition of his works was held in London, and attracted much favorable attention. At the Paris Exposition of 1867 he received a medal for his *Niagara*, and he also exhibited at the Paris Exposition of 1878. He was an accomplished architect, and built for himself at Hudson, N. Y., a notable chateau, which is one of the landmarks of that part of the Hudson River. He was one of the foremost exponents of the American school of landscape painters of his time, and is sure of an honorable fame. The chief fault of his work, common with his contemporaries, was the paying of too much attention to the exact reproduction of detail, and too little to general effect. Nevertheless his larger pictures are singularly impressive. He died in New York City on April 7, 1900. W.F.J.

CHURCH, Frederick Stuart, an American painter; born at Grand Rapids, Mich., 1841; member of the National Academy and of the American Water-Color Society; resides in New York; animals and allegories were among his favorite subjects. *Mad as March Hares* and *The Sea Princess* are two of his best-known pictures.

CHURCH, Irving Porter, an American educator; born in Ansonia, Connecticut, July 22, 1851. He was educated at Cornell University and has been professor of Applied Mechanics and Hydraulics in the College of Civil Engineering at Cornell since 1892. He has published *Mechanics of Materials* (1887); *Hydraulics and Pneumatics* (1890); *Notes and Examples in Mechanics* (1892) and other text-books. W.M.C.

CHURCH, John Adams, engineer, was born at Rochester, New York, on April 5, 1843, and was educated at the School of Mines of Columbia College. He also studied in Europe. He was for three years professor of mineralogy and metallurgy in the School of Mines, editor of the *Engineering and Mining Journal*, a member of the U. S. Geological Survey, a professor in the Ohio State University, and a lieutenant of Li Hung Chang in developing the mining industries of Mongolia. He is now a mining engineer in New York City. W.F.J.

CHURCH, Richard William, clergyman and author, best known to the world as Dean Church; was born of English parents at Lisbon, Portugal, on April 25, 1815. Much of his early life was spent in Italy, where he received the inspiration for some of his writings. He was graduated from Oxford, and became a fellow of Oriel, and in 1853 was settled as rector of Whatley, near Frome. His *Essays and Reviews*, published in 1854, gave him rank among the most scholarly and graceful writers of the time, and thereafter he was a frequent contributor to literature. His works comprise *Human Life and Its Conditions* (1878); *The Gifts of Civilization* (1880), and *The Discipline of the Christian Character* (1885), these being collections of sermons and lectures; a *Life of St. Anselm* (1871); *The Beginning of the Middle Ages* (1877); *Dante* (1878); *Spenser* (1879); *Bacon* (1879), and *The Oxford Movement* (1892), the last named being published after his death. He was the author also of many occasional essays and addresses, on such subjects as the sacred poetry of early religions, Cassiodorus, Montaigne, and Pascal, all of marked and permanent value. His greatest work, however, from the ecclesiastical point of view, was performed as Dean of St. Paul's Cathedral, London. He was elected to that place in 1871, and succeeded in transforming the cathedral from a merely formal monument of ecclesiasticism into a particularly active and vital center of religious and spiritual activity. He was personally much esteemed and beloved, and exercised more authority in church affairs than most of his contemporaries. He died on December 9, 1890. W.F.J.

CHURCH, Sanford Elias, jurist, was born at Milford, N. Y., on April 18, 1815, and was educated for the bar, to which he was admitted in 1837 and to that of the supreme court of the State in 1841. He was elected to the legislature in 1841; appointed district attorney in 1846 and in the same year elected to that office; elected lieutenant-governor for the years 1851–54, and in 1857 was elected State controller. In 1870 he was elected chief judge of the new court of appeals, and in that place had a distinguished career. He was several times suggested as a candidate for the Presidency. He died on May 4, 1880. W.F.J.

CHURCH-ALE, an obsolete English merry-making church festival, usually held at Easter or at Whitsuntide, with a view to making money for church purposes. Ale and other refreshments, contributed by the parishioners, were on sale in the vicinity of the church, and the festivals, being largely attended, attracted peddlers, jugglers, morris-dancers and other strollers, until the church-ales became very like the modern fairs.

CHURCH CONGRESS, an organization of members of the Church of England, which has become recognized as a national institution. It originated as an independent body of clerical and lay-members of the church, and first met at Cambridge in 1861, under the presidency of Dr. Wilberforce, bishop of the diocese, and discussed matters of church interest. Annual congresses have been held since. The Episcopal Church in the United States has organized a congress of the same order. R.C.A.

CHURCH GOVERNMENT. See Erastus, Vol. VIII, p. 458.

CHURCHILL, John Wesley, an American educator; born in Fairlee, Vermont, May 26, 1839. He was graduated from Harvard in 1865 and from the Andover Theological Seminary in 1868. He was a professor at Brown University, Phillips Academy and Wellesley College, and

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since 1884 professor of homiletics and pulpit oratory at Andover. From 1884 to 1894 he was one of the editors of the *Andover Review*. W.M.C.

CHURCHILL, RANDOLPH HENRY SPENCER, LORD, an English statesman; third son of the seventh Duke of Marlborough; born at Blenheim, Feb. 13, 1849; educated at Merton College, Oxford; entered Parliament in 1874; made his maiden speech in opposition to making Oxford a garrison town, and by his argumentative strength and reckless utterances in debate soon made himself conspicuous in that assembly. In 1880 he became a Tory leader, chief of a political group, small in numbers, but composed of men of mark, known as "the Fourth Party," who were extremely conservative as to religion and statecraft, and caused the Liberals much trouble by their daring and persistent assaults. Churchill likewise assailed the "old" Tory party, and sought to make his clique of "Conservatives" popular by declaring in favor of universal suffrage and other advanced ideas, after the manner of Bismarck. With this design he founded the Primrose League, of which he became president, and which had a large membership throughout England. In 1885 Churchill became Secretary of State for India in the Marquis of Salisbury's first ministry, but the speedy downfall of that administration gave him little time to adjust the Afghan boundary question. In July, 1886, with Salisbury again in power, he became Chancellor of the Exchequer and leader of the House of Commons. He found the finances in great disorder, and sought to put an end to certain administrative abuses, but only succeeded in drawing upon himself the anger of his fellow-workers, especially of Lord Wolseley. He resigned Dec. 23, 1886. In 1891 he made a journey to South Africa, where he had financial interests, and in the following year published *Men, Mines and Animals in South Africa*. In 1874 he married a daughter of Leonard Jerome of New York. He died in London Jan. 24, 1895. His *Speeches from 1880 to 1888* have been published in two volumes (1889).

LORD RANDOLPH CHURCHILL.

CHURCHILL, LADY RANDOLPH, editor and proprietor of the *Anglo-Saxon Review* and vice-president Ladies' Grand Council, Primrose League of England, was born in 1854 at Brooklyn, N. Y., and is the daughter of the late Leonard Jerome. She was educated mainly in France and in 1874 married Lord Randolph H. S. Churchill (3rd son of the 7th Duke of Marlborough), who died in 1895. In 1899 Lady Churchill organized the hospital ship "Maine" for service in South Africa as a token of American brotherhood with Great Britain. On learning of the capture of her son, Lt. W. S. Churchill, by the Boers, Lady C. proceeded to the Cape in the "Maine." On her return to England she married Lt. Geo. Cornwallis West. See CHURCHILL, WINSTON L. SPENCER.

CHURCHILL, WINSTON LEONARD SPENCER, son of the above and of the Rt. Hon. Lord Randolph Churchill, was born Nov. 1874, and educated at Harrow and Sandwich. He entered the British army in 1895, having previously served with the Spanish forces in Cuba. In 1897–98 he served with distinction in India and in Egypt and received a medal and clasp for his gallantry at Omdurman. In 1899, he went to the Transvaal, and while acting as war correspondent of the *Morning Post*, he was captured in an armored train near Estcourt by the Boers. Published *The Story of the Malakand Field Force* (1898).

CHURCHILL, WINSTON, American novelist, was born at St. Louis, Mo., Nov. 10, 1871, son of Edward S. Churchill, of Portland, Me., and Emma B. Blaine, of St. Louis. He was educated at St. Louis and graduated in 1894 from the U. S. Naval Academy. Was for a time editor of the *Army and Navy Journal* and managing editor of the *Cosmopolitan Magazine*. Has written a number of short naval stories and sketches, and published *The Celebrity* (1898), *Richard Carvel* (1899), and *The Crisis* (1901). The two latter stories have won him much fame.

CHURCHILL RIVER, of Canada, rises between the north branch of the Saskatchewan and the Athabasca, under lat. 55° N., and flows generally northeast through a series of lakes, first as the Beaver, then as the Missinnippi, and finally as the Churchill or English River, to Hudson Bay, which it enters near Fort Churchill, after a course of nearly one thousand miles.

CHURCHING OF WOMEN, a religious usage, prevailing in the Christian Church from an early period, of women, on their recovery after childbearing, going to church to give thanks.

CHURCH JURISDICTION. See ECCLESIASTICAL LAW, Vol. VII, p. 543.

CHURCH OF GOD OR WINEBRENNERIANS, a religious society in the United States, composed largely of Germans, which was formed in the year 1825, by separation from the German Reformed churches at Harrisburg, Pennsylvania, under the leadership of Pastor John Winebrenner. The first congregation was organized in 1829, with no creed or discipline but the Bible, and with the practice of baptism (adults only) by immersion. They practice, as a church ordinance, the washing of one another's feet, in imitation of Christ's washing the feet of his disciples. They are spread over the Western states, but are principally in the Ohio valley. They have a college at Findlay, Ohio. In 1901, they had 460 ministers, 580 churches, and 38,000 communicants.

CHURUBUSCO, a small village in the southern suburbs of the City of Mexico, and about six miles from that capital. It is now a favorite place of residence, but is best known historically as the scene of one of the battles of the Mexican War, on August 20, 1847, in which the Mexicans under General Santa Anna were defeated by the Americans under General Winfield Scott, and

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which led to the fall of the City of Mexico itself. The Mexican loss on that day was about 7,000 and the American 1,053. W.F.J.

CHUTNEY, an East Indian condiment compounded of sweets and acids. Ripe fruit (mangoes, raisins, etc.), spices, herbs, cayenne, lemon juice, are the ordinary ingredients. W.R.B.

CHYLE. See ANATOMY, Vol. I, p. 743.

CHYME. See DIGESTIVE ORGANS, Vol. VII, p. 196.

CIALDINI, ENRICO, Italian general and statesman; was born at Castelvetro (Modena), Aug. 8, 1811. In 1831 he marched with General Zucchi in aid of the insurrection in Romagna, but after the Austrian intervention in central Italy, he was obliged to go to Paris where he studied chemistry and medicine. He responded to an offer of service in Spain, taking part in the war of succession, acquiring the grade of lieutenant-colonel. In 1848, responding to the call of Mazzini he returned to Italy for the purpose of aiding the provisional government of Milan; and later marched, under Durando, on Vicenza, where he was wounded and rendered helpless. He was sent to the Crimea in 1855 by the Sardinian government with the rank of general, and won distinction at Tchernaya. In 1859, in the war in Italy, the first in the allied army to fire a shot, he forced the passage of Sesia against the fire of the Austrians, whom he drove from their position. His army corps then started to prosecute a campaign in Tyrol, but the peace of Villafranca brought this project to a close. In 1860 he defeated the papal army under General Lamoricière, winning the battle of Castelfidardo. In command of the Italian national troops in 1861 he took Gaeta after a bombardment of 17 days, and 15 days later captured the citadel of Messina. He was created Duke of Gaeta and made general of the army (equivalent to field-marshal), and viceroy of Naples, in which capacity he was successful in suppressing brigandage. In 1864 he became senator, and in the campaign of 1866 against Austria he took a leading part. He was later appointed minister to Austria, but he declined to serve. He became commander-in-chief of the troops in central Italy, and ambassador to Paris in 1870–78 and again in 1880–81. He died at Leghorn, Italy, Sept. 8, 1892. R.C.A.

CIBOL OR SHALLOT. See HORTICULTURE, Vol. XII, p. 300.

CIBORIUM. See ARCHITECTURE, Vol. II, p. 405.

CIBRARIO, LUIGI, Italian historian (1802–70). See POLITICAL ECONOMY, Vol. XIX, p. 400.

CICADA, a genus of insects belonging to the family *Cicadidæ*, order *Rhynchota*, inhabiting chiefly the warm regions of the earth. They remain for a long period in the larval state, in many cases for several years, the North American species *C. septemdecim* being known as the seventeen-year locust, since that period of time elapses between the generations of mature insects. They are stout-bodied, with a short, broad head on the sides of which are inserted short, stiff antennæ. The fore wings are larger than the hind pair, both being often glossy and transparent, but sometimes finely colored and more or less opaque. The song is made only by the male and is caused by the rapid vibration of a tense membrane on the under side of the abdomen. R.W.C.

CICELY, a name given to several sweet aromatic species of *Umbelliferæ*, notably the *Myrrhis odorata* of Europe, with sweet fruits. In the United States the name is given to the species of the genus *Osmorrhiza*, in which the root is aromatic.

CICUTA OR CONIUM. See HEMLOCK, Vol. XI, p. 577.

CIENFUEGOS, a city and seaport on the south coast of Cuba, about 147 miles southeast by east from Havana. It has a large and landlocked harbor, and is the chief center of commerce for that part of the island. Its population is more than 50,000. W.F.J.

CILIATA. See PROTOZOA, Vol. XIX, p. 886.

CIMA, GIOVANNI BATTISTA, Italian painter; surnamed after his birthplace DA CONEGLIANO; born in 1460; died about 1520. His prototypes were Vivarini and Giovanni Bellini. His most famous paintings are *Mary and the Child Jesus Adored by Jean the Baptist and Ste. Maria Magdalene* (in the Louvre of Paris). To be mentioned are also *Mary with the Saints; Christ's Baptism; Entombment of Christ; Christ Appearing to the Unbelieving Thomas; The Enthroned Mary and the Saints; Christ Blessing; Mary's First Walk to the Temple; Madonna under the Orange Tree.* The paintings of his son Carlo are equally famous. G.A.S.

CIMOLIAN EARTH, a fine white earth found in the island of Cimoli, one of the Cyclades in the Grecian Archipelago, and used by fullers for whitening cloth.

CINCINNATI, one of the great cities of the United States, the capital of Hamilton County, southwestern Ohio, and the chief city of the Ohio valley, had a population of 325,902 by the census of 1900, being an increase of 28,994 inhabitants, or 9.8 per cent over its population in 1890. Its manufactures in 1900 employed a capital of $109,582,000, against $50,000,000 in 1880; and paid $34,000,000 in wages to 70,000 employees during 1900, against $20,000,000 paid to 55,000 employees in 1880. Its manufactories converted $76,516,000 of material into $157,806,834 of product in 1900 against $62,000,000 of material converted into $105,000,000 of product in 1880.

The "Paris of America" and "Queen City of the West," as Cincinnati is popularly called, has became a delightful center of art and music, and a city of rural homes and elegant suburbs. (For its general history and description, see Vol. V, p. 683–685.) Fountain Square, an expansion of Fifth Street, containing the esplanade on which is erected the magnificent fountain designed by Dr. August von Kreling, the son-in-law of Kaulbach, and cast in the Royal Bronze Foundry at Munich, may be called the business center of the

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city. The Rookwood Pottery, established in 1880 by Mrs. Storer, a daughter of Joseph Longworth, who founded the Art School, and incorporated in 1890, is one of the notable enterprises of the city, and produces the finest of modern artistic work, true faience ware, made from Ohio valley clays with underglaze ornamentation. Its exhibit at Paris in 1889 received a gold medal above all competitors, and the beauty of its designs is world-famous.

The Art Institute and School have received gifts amounting to over a million dollars, and are the best-endowed in the country. They occupy costly buildings of handsome architecture designed by McLaughlin, situated on the top of Mount Adams, in Eden Park, 350 feet above the Ohio River. The school has a dozen teachers and some five hundred pupils, while the Museum embraces collections of paintings, sculpture, engrav-

ODD FELLOWS' BUILDING, CINCINNATI.

ings, etchings, metal-work, textile fabrics, pottery, American ethnology and archæology of great value. Among the paintings are examples of Calame, Haydon, Lessing, Maratti, Rubens (No. 93), Tiepolo (No. 105), Tintoretto (No. 106), and modern French, German and American masters. Haydon's heroic painting of *The Public Entry of Christ into Jerusalem*, finished in 1820, is in the loan collection, and shows the face of William Hazlitt as St. Peter, that of John Keats as the youthful St. John, and those of Wordsworth, Sir Isaac Newton and the cynical Voltaire among the spectators. The Bookwalter loan collection affords good illustrations of Oriental art, and the art of wood-carving has been revived with a success which rivals the excellence of the best mediæval work. The private art collections of a number of Cincinnati's wealthy citizens have often been described, and contain numerous examples of Lessing, Achenbach, Millet, Gérôme, Kaulbach and other masters.

Cincinnati in its early days was fortunate in receiving a literary, social and educational impetus from a distinguished band of bright and vigorous thinkers, who were among its early settlers. Even Charles Dickens, on the occasion of his first visit to our land, who then found so little to commend in America, was captivated by the air of social refinement which he found here; and the city now has the advantage of numerous institutions for the cultivation of liberal arts and studies which have grown out of the taste and scholarship of its founders. The Literary Club, the University Club, the Historical and Philosophical Society, the Society of Natural History and the Cuvier Club deserve mention. The immense soap manufactory at Ivorydale, the largest in the world, by its system of profit-sharing among its employees gives an object-lesson in the practical application of progressive ideas.

Cincinnati has taken the lead in the popular movement for the development of musical culture. Its College of Music was opened in 1878 and had Theodore Thomas for its president. Its large body of German-born or German-descended citizens gave force and volume to its grand musical festivals, and its fame as a musical center has stimulated its sister cities to similar efforts.

The value of the principal commodities manufactured in Cincinnati during the year 1900 is as follows, expressed in millions of dollars: Boots and shoes, 9; clothing, 18; carriages, 7; furniture, 4; leather, 4; liquors, distilled, 10; liquors, malt, 6; lumber, 3; machinery, 12; packing-house products, 7; saddlery and harness, 1; safes and vaults, 1; soap, 2; tobacco, 6.

The free Public Library contained in 1895 over 200,000 books and pamphlets; the Young Men's Mercantile Library, some 50,000 volumes; and the Law Library, over 8,000 volumes. The Zoölogical Garden, well supplied with animals and birds, covers some 60 acres, its hills and ravines forming a most attractive and picturesque retreat. Population, in 1900, 325,902.

CINCINNATI, ORDER OF THE. See COLONIAL SOCIETIES, in these Supplements.

CINCINNATI GROUP OR AXIS. See OHIO, Vol. XVII, p. 754.

CINERARY URNS, urns in which the ashes of the dead were deposited, after the body was burned. Those used by the Greeks and Romans were often of great artistic beauty and were made of marble, glass or pottery-ware. See POTTERY AND PORCELAIN, Vol. XIX, pp. 619, 642.

CINNAMON BEAR, a variety of the common American black bear (*Ursus Americanus*), common in the western United States. It is of a light reddish-brown color.

CINNAMON-STONE, a variety of garnet found in Scotland, Ireland and Ceylon. See JACINTH, Vol. XIII, p. 541.

CINQUE CENTO, an Italian term indicating the style of decorative art and architecture peculiar to the early part of the sixteenth century, when there was an attempt to revert to classical purity of form. The words mean "five hundred,"

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a contraction for fifteen hundred, and have reference to the numbers of the years, counting from the Christian era. See ARCHITECTURE, Vol. II, p. 383.

CINQUEFOIL, the common name of the large rosaceous genus *Potentilla*, containing both herbs and shrubs, characterized by the palmately compound leaves, often of five leaflets. The flowers are mostly yellow or purple, and some of them are conspicuous enough to be prized in cultivation. Known also as "five-finger."

CINURA OR THYSANURA. See INSECTS, Vol. XIII, p. 160.

CIPHER. See CRYPTOGRAPHY, Vol. VI, p. 592.

CIRCÆA (from *Circe* q. v.), a genus of little herbaceous plants of the natural order *Omagraceæ* *C. lutetiana*, is a native of the northern United States and Britain and is popularly known as "enchanter's nightshade" and in Germany "witches' herb," names of uncertain origin. W.R.B.

CIRCLE CITY. See ALASKA, *ante*, p. 114*b*.

CIRCLE OF PERPETUAL APPARITION, any circle in the heavens which is parallel to the celestial equator, has the pole-star for its center, and a radius long enough to include in its sweep all the stars which do not pass below the observer's horizon.

CIRCLEVILLE, a village and the county seat of Pickaway County, Ohio, in the south-central part of that state. It is situated on Darby Creek, a tributary of the Scioto River, is named for a circle of prehistoric Indian mounds, and is reached by the Cincinnati and Westwood and the Norfolk and Western railroads. Its population was 6,556 in 1890 and 6,991 in 1900.

W.F.J.

CIRCUIT. See TELEGRAPH, Vol. XXIII, p. 131.

CIRCUIT COURT OF APPEALS, an intermediate Federal court of appeals created by statute approved March 3, 1891, for the purpose of relieving the pressure on the supreme court. A circuit court of appeals, consisting of one justice of the supreme court and two circuit judges, was created in each circuit. One term each year is held, and by the provisions of the statute the decision of the court of appeals is rendered final, except in certain cases, where serious questions of constitutional law, life and death, or other grave cause, are involved. The object of the statute was also to save expense to litigants and expedite a final judgment.

CIRCULAR POINTS AT INFINITY, in geometry, the two points of contact of two real, or imaginary, circles, that intersect the infinitely distant right line in its plane. See CURVE, Vol. VI, p. 639. W.R.B.

CIRCULATION OF THE BLOOD. See ANATOMY, Vol. I, p. 789.

CIRCULATION OF SAP. See PHYSIOLOGY, Vol. XIX, p. 52.

CIRCUMSTANTIAL EVIDENCE. See EVIDENCE, Vol. VIII, p. 647.

CIRCUMVALLATION, LINES OF, an outer circuit of redoubts and lines of parapets surrounding a force engaged in besieging a fortress, the faces of the lines being outward so as to guard against attempts at relief by a field army. Such lines were much used in the sieges of former times, but to-day they are not so necessary, because artillery shortens the siege. W.R.B.

CIRCUS. The modern circus is chiefly an exhibition of feats of horsemanship and acrobatic displays, often combined with a menagerie, or collection of wild beasts. Exhibitions of magic, legerdemain and gymnastics are also usually associated with the circus, while probably its most pleasing exhibition is when some bold feats of equestrianism are shown in dramatic setting, such as "Mazeppa's Flight on the Ukraine," or "Dick Turpin's Ride to York." See Vol. V, p. 691; Vol. X, p. 59; Vol. XX, p. 850.

CIRRIPEDIA OR CIRRHIPEDIA, a subclass of degenerated crustacea, including the numerous forms of barnacles and acorn-shells. See CRUSTACEA, Vol. VI, p. 588.

CIRRUS. See METEOROLOGY. Vol. XVI, p. 131.

CIRRUS OR TENDRIL, in botany, a leaf altered into a tender spiral, which, by twisting around objects, attaches the plant thereto and enables it to climb, where otherwise, owing to stem weakness, it would lie prostrate. W.R.B.

CIRTA, Numidia, the ancient capital of Massylii, formerly occupying the site of Constantine, Algeria. It was renamed by Constantine, who restored Cirta after the overthrow of Jugurtha. See CONSTANTINE, Vol. VI, pp. 265, 266. C.L.S.

CISALPINE REPUBLIC was the name of a state organized by Napoleon Bonaparte immediately after his victory in the battle of Lodi, in May, 1796. It lay on both sides of the Po River, and embraced Lombardy, Mantua, Brescia, Bergamo, Cremona, Verona and Rovigo, with the Duchy of Modena, the Principalities of Massa and Carrara, and the legations of Bologna, Ferrara and the Romagna, and its capital was Milan. The republic was dissolved in 1799, by the Austrians and Russians, but was re-established by Bonaparte after Marengo, with some additions of territory. In 1802 its name was changed to the Italian Republic, and Bonaparte was chosen as its president. Three years later a delegation from it conferred upon Bonaparte, who had then become Emperor, the title of King of Italy, and thereafter the republic was known as the Kingdom of Italy until its final abolition in 1814. See BONAPARTE and ITALY. W.F.J.

CISCAUCASIA, that part of the lieutenancy of the Caucasus which lies north of the Caucasus Mountains. It includes the provinces of Kuban, Terek, Tchernomorsk, and Stavropol. Its area is 89,497 square miles; population, 1897, 3,786,784.

CISCO, Texas, a farming and coal-mining town of Eastland County, 115 miles W. of Fort Worth, at a junction of the Rio Grande division of the Texas and Pacific and the Texas Central railroads. Pop., 1900, 1,514. C.L.S.

CISSAMPELOS (Gr., ivy-vine), climbing

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shrub of which *C. pareira*, a native of the West Indies, is a typical example. It is a climbing shrub with small hairy scarlet berries. W.R.B.

CISSEY, Ernest Louis Octave Courtot de, was born in Paris, of Burgundian stock, on December 23, 1810. He served with distinction in Algiers in the Crimean War, and in the war with Germany in 1870–71, in which last he was taken prisoner at Metz. He was prominent in the suppression of the Commune in 1871, and on that account was much hated by the Socialists. Afterward he served in Parliament, and as Minister of the Interior and of War, and in 1875 was made life Senator of France. He died in Paris on June 16, 1882. W.F.J.

CISSOID OF DIOCLES, a curve of the third degree, invented by Diocles to solve two problems in geometry—*viz.*, the trisection of a plane angle and the construction of two geometrical means between two given straight lines. W.R.B.

CISTERN. See Building, Vol. IV, p. 450; Sewerage, Vol. XXI, pp. 749 et seq.

CISTUS or ROCK-ROSE, a genus of dicotyledonous plants giving its name to the family *Cistaceæ*, which contains about two hundred known species, chiefly natives of the south of Europe and the north of Africa. Some of them are beautiful evergreen shrubs. From *Cistus Creticus*, *Cistus ladaniferus* and other species, gum ladanum is obtained. The genus *Helianthemum* is the "rock-rose" of the United States, and the "cistus" of England.

CITATION, the act of calling a party into court to answer to an action, to give evidence, or to perform some other judicial act. See Summons, Vol. XXII, p. 676.

CITHARA, a kind of stringed musical instrument. See Lyre, Vol. XV, p. 115. W.R.B.

CITIZEN, a term applied either specifically to a dweller in a town, or to any one who is either born in the country or has become legally naturalized in it. From the point of view of American constitutional law, a citizen being a member of the political community to which he belongs, every person born in the United States and subject to its jurisdiction (except untaxed Indians) falls within the definition. An alien may become a citizen by being naturalized under the acts of Congress. A citizen of the United States residing in any state of the Union is a citizen of that state. There being a government in each of the several states, as well as a government of the United States, a person may be, and usually is, at the same time a citizen of both, but his rights as a citizen under one of these governments differ legally from those under the other. On the other hand, a person may be a citizen of the United States and not be a citizen of any particular state, having his residence in one of the territories, or not having a fixed residence in any state. Citizenship is not confined to those who have a right to vote, as minors and women are usually citizens without those rights.

In France, during the Revolution, the word *citizen* was adopted by the republicans as the most appropriate term to express the principle of *liberté, égalité et fraternité*. It took the place of *monsieur*. Every Frenchman became *citoyen* in relation to other Frenchmen, the highest in official station being so addressed by the lowest. The usage gradually died out after the assumption of imperial power by Napoleon.

CITIZENSHIP IN THE UNITED STATES embraces the following persons: 1. All individuals born in the United States and not subject to any foreign power (except untaxed Indians). This includes all children of alien parents, other than those of foreign official representatives. 2. All children born elsewhere to fathers who were at the time of their birth citizens resident at some time in the United States. 3. All naturalized persons. 4. Women, though not born in the United States, nor naturalized (if not incapable of naturalization), who are married to citizens. 5. All Indians born within the United States, who have withdrawn from tribal relations, and who are enrolled as taxpayers, or who have accepted lands in severalty under the Congressional act of 1870.

A naturalized citizen is one of foreign birth who has become a citizen by adoption or naturalization. The conditions under and the manner in which an alien may be admitted to citizenship in the United States are described by sections 2165–2174 of the Revised Statutes of the United States. They substantially include the following: The alien must declare, upon oath, before a circuit or district court of the United States, or a district or supreme court of the territories, or a court of record of any of the states having common-law jurisdiction and a seal and clerk, two years, at least, prior to his admission, that it is his intention, *bona fide*, to become a citizen of the United States, and to renounce forever all allegiance and fidelity to any foreign prince or state, and particularly to the one of which he may at the time be subject. He must also declare, on oath, before one of the courts named, "that he will support the constitution of the United States, and that he absolutely and entirely renounces and abjures all allegiance and fidelity to every foreign prince, potentate, state or sovereignty, and particularly, by name, to the prince, potentate, state or sovereignty, of which he was before a citizen or subject," which proceedings must be recorded by the clerk of the court.

If it shall appear to the satisfaction of the court to which the alien has applied that the applicant has resided within the United States continuously for five years, and that during that time "he has behaved as a man of good moral character, attached to the principles of the constitution of the United States, and well disposed to the good order and happiness of the same," he will be admitted to citizenship. If the applicant has borne any hereditary title or order of nobility, he must make an express renunciation of it at the time of his application. Any alien 21 years old and upward who has been in the armies of the United States, and has been honorably discharged

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therefrom, may become a citizen, on his petition, without any previous declaration of his intention, provided that he shall have resided in the United States at least one year previous to his application, and is of good moral character. Any alien under the age of 21 years, who has resided in the United States three years next preceding his arriving at that age, and who has continued to reside therein to the time he may make application to be admitted a citizen thereof, may, after he arrives at the age of 21 years, and after he has resided five years within the United States, including the three years of his minority, be admitted a citizen; but he must make a declaration on oath, and prove to the satisfaction of the court, that for two years next preceding it has been his *bona fide* intention to become a citizen. The children of persons who now are or have been citizens of the United States are, though born out of the limits and jurisdiction of the United States, considered as citizens thereof. The naturalization of Chinese is expressly prohibited by section 14, chapter 126, Laws of 1882.

CITRONELLA (*Andropagon schœnanthus*) a perennial tufted grass with long leaves, known as "lemon grass." It grows wild and is also cultivated in Ceylon and many parts of India. It yields an essential odoriferous oil, used in perfumery. Citronella is also a perfume obtained from balm, a plant native to the south of Europe, having an agreeable lemon-like smell and yielding an essential oil called "oil of balm." It is also obtained from the rind of the citron (*Citrus medica*). W.R.B.

CITRON WOOD OR CITRUS WOOD, the *Calletris quadrivolvis* or *Thuja articulata*, a tree of the *Coniferæ* family, native of Algeria. It seldom exceeds the height of 30 feet and has hard, dark-colored, fragrant wood that takes a fine polish and is used in ornamental cabinet work, highly prized by the Greeks and Romans. The resin of the tree is known as sandarach. W.R.B.

CITRUS, a genus of plants of the natural order *Aurantiaceæ*, consisting of trees and shrubs natives of tropical Asia, but commonly cultivated in all warm climates on account of their fruit. To this genus belong the orange, lemon, citron, lime, shaddock, pompelmoose, etc. W.R.B.

CITTADELLA, Italy, a city and railway junction, in the province of Venetia, on the Brenta, 14 miles northeast of Vicenza. It has manufactures of textiles and paper. Population, 9,000. C.L.S.

CITY, an important town. In the United States a city is an incorporated town, usually governed by a mayor, aldermen and common council. In some states ten thousand inhabitants are requisite to the formation of a city government, while in the new states a less number is required, some having incorporated cities of fewer than three thousand inhabitants. In several of the Western states cities are organized under a general law, by which they are designated according to the number of inhabitants, as cities of the first, second and third class. The term *city*, as used in Great Britain, is generally applied to all towns which are incorporated, and which either are or have been sees of bishops. In the case of towns which have grown greatly beyond their original dimensions it is not unusual to give the name of city to the space which they originally occupied; thus we speak of the city of London, in contradistinction to the metropolis, *la cité* of Paris, and similarly of other places.

CITY ISLAND, an island in Long Island Sound, formerly comprising an independent village, but now a part of the Borough of The Bronx of the city of New York. It is a place of suburban residence, and has important shipyards and fishing industries. W.F.J.

CITY OF REFUGE. The Jewish law set apart six cities, three on each side of the Jordan as cities of refuge for the unintentional homicide, where he might flee for safety from the avenger of blood. These cities were Bezer, Ramoth-Gilead and Golan on the east, and Hebron, Shechem and Kadesh on the west.

CITY POINT, a village of Prince George County, Virginia, on the south bank of the James River just below the junction of the Appomattox, 18 miles from Richmond and 10 miles from Petersburg. It is reached by the Norfolk and Western railroad. It was an important base of operations in the Civil War. W.F.J.

CIUDAD REAL OR ROYAL CITY, a city and the capital of the province of the same name, in south-central Spain, due south from Madrid and midway between it and the Mediterranean. It stands in the plain between the Guadiana and Jabalon rivers, and has some fine buildings of ancient date, though for the most part it is a shabby and almost squalid place. It has some manufactures of woolen and linen cloths. Its population (1900) is about 15,000. W.F.J.

CIUDAD RODRIGO, a fortified town of central western Spain, in the province of Salamanca, 17 miles from the Portuguese frontier, and 56 S.W. of Salamanca by rail, on a steep hill above the river Agueda, which is here crossed by a fine bridge. It is a poor, squalid town, chiefly of interest for its sieges during the Peninsular War. Population, 8,330.

CIUDAD VICTORIA, a city and the capital of Tamaulipas, northwestern Mexico, on the Monterey and Mexican Gulf railroad, 295 miles directly N. of Mexico. It is beautifully located in a fertile valley in the Sierra Madre. Sugar-cane is much grown in the neighborhood. Population, nearly 10,000.

CIVIC FEDERATIONS. See LAW AND ORDER SOCIETIES, in these Supplements.

CIVICS, a new word introduced by Dr. Henry Randall Waite, who defined it as follows: "The body of knowledge or science which devotes itself to the consideration of citizenship relations, including the reciprocal relations of government and citizenship." Civics seeks to properly co-ordinate, as parts of an integral science, the essential truths with which the citizen must be familiar. It includes,—1. *Ethics*, defined by Dr. E. Benjamin

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Andrews as "the doctrine of duties in society"; in other words, the study and setting forth of the conditions of human character which are essential to the welfare of the citizen, society and government. As right character is the natural source of right action, the science of civics first concerns itself with the facts which underlie and account for these essential characteristics of the good citizen. That the citizen may be qualified to act the part of an intelligent juror in all affairs submitted to the decision of the suffrage, it is essential that he be adequately informed as to other facts in civics, as follows: 2. *Civil Polity.* Government methods and machinery; suffrage rights and obligations; the qualifications and duties of public officials; executive, legislative and judicial affairs; and all other matters having relation to the orderly and proper administration of government.—3. *Law.* The principles and facts of the law in applications most directly involving the interests of society, and especially of the citizen and the government.—4. *Economics.* The principles or laws which explain or control the production, distribution and ownership of that which constitutes or is technically called wealth; the facts relating to the development of natural resources, to manufactures, and to internal and foreign commerce; questions of supply and demand, labor and capital; and matters of like character, considered with reference to their effects upon the citizen, and in their relations to government.—5. *History.* Collateral facts illustrative of tendencies and results growing out of given conditions, considered in connection with ethics, civil politics, law and economics. Civics offers an opportunity for the differentiation of facts hitherto considered within the scope of the sciences which it included, as well as for corresponding exactness in deductions. It differs from what is called social science in general, or sociology, in confining itself to the consideration of sociological facts in their bearings on affairs of citizenship and government.

CIVICS, AMERICAN INSTITUTE OF, a national educational institution, with a charter from the United States government. Founded in 1885 by the late Chief Justice Morrison R. Waite and Justice William Strong of the United States supreme court; Noah Porter, late president of Yale University; John Bigelow, Mellen Chamberlain, Theodore W. Dwight, John Jay, Ex-Governor Hugh S. Thompson of South Carolina; General H. B. Carrington, W. E. Sheldon, the late Dr. Alexander Winchell, Henry Randall Waite, General William Preston Johnston of Louisiana; General Joseph R. Hawley, Bishop J. H. Vincent, and other distinguished citizens. Assuming that the voter is a trustee, charged with sacred responsibilities, the institute aims to secure such attention to the facts of civics on the part of all citizens as shall surround the suffrage with the safeguards which grow out of a proper sense of obligations, integrity of purpose, and an adequate degree of intelligence as to affairs in issue. The institute is controlled by 33 trustees, and has auxiliaries, styled "councils," in every state and territory. The immediate direction of its affairs is intrusted to a president and faculty, now numbering 12 members.

CIVIL DAMAGE ACTS are laws under which persons who have sustained material loss or injury through the drunkenness of an individual may obtain by suit at law damages from the person who supplied him with the liquor upon which he became intoxicated. Their effect has been salutary, in restraining liquor sellers from supplying drink to habitual drunkards. See LIQUOR LAWS, in these Supplements. W.F.J.

CIVIL ENGINEER. See ENGINEERING, Vol. VIII, p. 194.

CIVIL ENGINEERING SCHOOL. See TECHNICAL SCHOOLS, in these Supplements.

CIVILIS, CLAUDIUS. See Germany, Vol. X, p. 430.

CIVILIZATION. See ARCHÆOLOGY, Vol. II, p. 300; ANTHROPOLOGY, Vol. II, p. 106.

CIVIL LIST is the annual allowance provided for the use of the sovereign of a constitutional monarchy for the support of the "household" and court. In England the grant is annually voted by Parliament. Previous to the Restoration, in England, all the expenses of the government were defrayed from what was called the royal revenue, which was derived partly from crown lands and partly from other sources, and was at the disposal of the crown. At the Restoration, a distinction arose between the "civil" and the "military" lists, the expenses of the latter being partly defrayed from the crown lands still available, and partly by an annual grant voted by Parliament. During the reign of William III, after the war with France in 1698, the civil list was £700,000, the expenses being for the following: The royal household; the privy purse; the royal palaces; the salaries of the chancellor, judges, great officers of state and ambassadors; the incomes given to the other members of the royal family; the secret-service money, pensions and other irregular claims. On the accession of George IV, the civil list was fixed at £850,000, besides the transference of £255,000 of expenditure to other funds. On the accession of Queen Victoria, the sovereign surrendered the hereditary revenues of the crown for life, receiving in lieu thereof a yearly sum of £385,000, to be devoted solely to the support of her Majesty's household, and personal expenses, *plus* the revenues of the Duchy of Lancaster (£86,138) of which her Majesty was paid £61,000. To this sum was added £1,200, to be granted in pensions in recognition of services to the public, or in literature, science, and art. This was exclusive of annuities to the then Prince of Wales. When the latter, in 1901, came to the throne on the demise of Queen Victoria, the civil list was augmented to £470,000, inclusive of £110,000 per annum as a provision for the privy purse of King Edward VII, and his consort, Queen Alexandra. The new civil list also provides for an annuity of £20,000 to the heir presumptive, the Prince of Wales (Duke of Cornwall), and £10,000 to his wife.

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The civil list of the Emperor of Austria is $3,720,000; of the Czar of Russia (estimated), $12,000,000; of the King of Prussia, $3,852,770, besides a vast amount of private property, out of which the expenses of the court and royal family are defrayed; of the King of Italy, $3,000,000.

In republics, such as Switzerland, France, the United States, Brazil, etc., there is no civil list of the kind alluded to above. But the term *civil list* has been applied to the list of the entire expenses of the civil government, the revenue appropriated to the support of the same and the officers of the civil government paid from the public treasury. In such a "list" the salary of the President is but a mere item. The salary of the President of Switzerland is $2,700; that of the President of France about $12,500, with an extra allowance of the same amount; of the United States, $50,000.

CIVIL RIGHTS, a term applied to the privileges which are accorded to every citizen by virtue of his citizenship, without regard to race, color or previous condition of servitude. The condition of the colored race in the United States after the abolition of slavery led to the adoption of the fourteenth and fifteenth amendments to the constitution, by which it is provided that "no state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States"; and that the "right of citizens of the United States to vote shall not be denied or abridged by the United States, or by any state, on account of race, color or previous condition of servitude." The words *privileges* and *immunities* have been held to mean such as are of a general nature, as security to life and liberty, the right to acquire property, to have access to courts of justice, and freedom to pursue and obtain happiness and safety, with such restrictions as are necessary to the public good. Whatever guaranties states accord to their own citizens upon these points must be extended to the citizens of other states. The effect of the fifteenth amendment to the constitution in respect of many questions of right in the several states has not been settled by the courts, but the object of that amendment is well understood. It abrogates all state legislation or constitutional provision creating distinctions among citizens of the United States based upon race and color, and prevents the introduction of such distinctions either by the action of the state or by the general government.

CIVIL RIGHTS ACT, an act of the United States Congress, passed in 1875, forbidding the exclusion of any person from the enjoyment of inns, public conveyances, theaters, etc., on account of race or color. Under the provisions of this act, or in some states under state statutes similar in terms, colored citizens have brought suit successfully against hotel-keepers and others refusing them accommodations. The Supreme Court has, however, affirmed the right of a railroad company to provide cars, popularly termed "Jim Crow cars," exclusively for colored citizens, and to require them to travel therein.

CIVIL RIGHTS BILL, an act passed in 1866 by the United States Congress, conferring citizenship upon all persons born in the United States, not subjects of other powers, "of every race and color, and without regard to any previous condition of servitude."

CIVIL SERVICE is the general name of all departments of the public service, national, state or municipal, apart from the enlisted or commissioned forces of the army and navy, including the civilian officers and employees of the War and Navy departments. It is chiefly applied to the national service, and in that sense comprises the three grand divisions of the American government; to wit, executive, legislative and judicial. Under the first head are comprised all the officers and employees of the various departments of the Cabinet, such as the post-office, the treasury, the customs service, etc. The second comprises the employees of Congress, and the third all connected with the Federal courts. The first of these three is so much the largest class, however, that the term is commonly regarded as applying to it alone. With the growth of the nation the number of public employees has increased, until now they are numbered by scores of thousands.

At the beginning of the United States government these functionaries were regarded as permanent clerks, who were appointed to place upon their merits, and were to hold their places as long as they discharged their duties satisfactorily. Under the presidency of Andrew Jackson, however, their status underwent a radical change. As William L. Marcy, while United States Senator from New York, afterward expressed it, Jackson held that "to the victors belong the spoils," and the public offices were regarded as the spoils of political warfare. The practice was then begun of turning out all or nearly all officeholders at each change of administration, and filling the places with the political adherents of the successful candidate. This naturally led to great demoralization of the service and to much corruption, since officeholders felt that their tenure of place was brief, and they therefore sought to make it as profitable as possible while it lasted. During the administration of President Grant a reaction against this "spoils system" made itself felt, and "Civil Service Reform" was begun, a beneficent movement which has now spread to many state and municipal governments. This "Merit System," as its advocates prefer to call it, has been the object of incessant attacks by professional politicians of the old "spoils" school, but has made steady progress ever since its inception, and may now be considered securely and permanently established. See CIVIL SERVICE RULES, infra. W.F.J.

CIVIL SERVICE RULES. President Grant, in 1872, appointed a "commission" to "devise rules and regulations" for admission to and continuance in the civil service of the United States. The commission prepared and reported such rules,

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based upon competitive examinations, and the government officers began at once to carry them out, to some extent. But the political pressure brought to bear upon many of the Senators and members of Congress by their constituents for place and promotion was such that the progress made in the proposed reform was much less rapid than had been expected. In 1879 President Hayes renewed the efforts of President Grant, and the reform was specially observed in the New York post-office and some other large post-offices. Since that date considerable progress has been made, and the system of competitive examinations has been extended, not only to the Federal offices, but also to the civil service in several of the states and chief cities.

The act of Congress prescribing rules and the extent of their application was passed in 1883. It provides for the appointment, by the President, of three Civil Service Commissioners, with a chief examiner, a secretary and other employees, and makes it the duty of the commission to aid the President in preparing rules for carrying the new act into effect; to make regulations for examinations, and for office records and reports, and to provide, also, for the enforcement of the act. The headquarters of the commission is in Washington, District of Columbia. The act prescribed that the President can revise or modify the rules from time to time for the regulation of the service. As revised May 6, 1896, the rules include the following points:

Qualifications for Applicants. Every applicant must be a citizen of the United States, of proper age, mentally and physically sound, of good moral character, or who has not been guilty of a crime or other notorious misconduct, etc. All are otherwise eligible, without respect to political or religious creed, or race.

Branches of the Service. The service includes and is arranged in branches, as follows: The Departmental Service, the Custom-House Service, the Post-Office Service, the Government Printing Service, and the Internal Revenue Service. *The Departmental Service* includes all officers and employees of whatever designation, except persons merely employed as laborers or workmen, and persons who have been nominated for confirmation by the Senate, however or for whatever purpose employed, whether compensated by a fixed salary, or otherwise, who are serving in or on detail from the several executive departments, the commissions and offices in the District of Columbia; the Railway Mail Service; the Indian Service; the several pension agencies; the Steamboat Inspection Service; the Marine Hospital Service; the Lighthouse Service; the Life-Saving Service; the several mints and assay-offices; the Revenue Cutter Service; the force employed under custodians of public buildings; the several subtreasuries; the Engineer Department at large; and all executive officers and employees outside of the District of Columbia, not covered in the above, of whatever designation, whether compensated by a fixed salary, or otherwise, who are serving in a clerical capacity, or whose duties are in whole or in part of a clerical nature; in the capacity of watchman or messenger; in the capacity of physician, hospital steward, nurse, or whose duties are of a medical nature; in the capacity of draftsman, civil engineer, steam-engineer, electrical engineer, computer or fireman; or who are in the service of the Supervising Architect's Office in the capacity of superintendent of construction, superintendent of repair, or foreman; or in the service of the Treasury Department in any capacity.

The Custom-House Service includes the officers and employees serving in any customs district, whose employees number at present, or may hereafter number, as many as five, who have been, or may hereafter be, classified under the Civil Service Act.

The Post-Office Service includes the officers and employees in any free-delivery post-office who have been, or may hereafter be, classified under the act, the latter occurring whenever a free-delivery system shall be established in any post-office, or when any post-office shall be consolidated with a free-delivery post-office. Similarly, *The Government Printing Service* and *The Internal Revenue Service* include all officers or employees who have been, or may hereafter be, classified under the act. The rules provide for certain employees and positions that shall not be subject thereto, which refer to minor or local offices which require only a portion of the time of the holder; to persons in the military and naval service detailed for civil service duties; to persons employed in the foreign service under the State Department; or any person whose duties are of a quasi military or quasi naval character.

Examinations. The examinations to test the fitness of applicants for positions are of a practical and suitable character, involving such subjects and tests as the commission may direct. The dates of these examinations are such as shall be deemed most suitable for the convenience of applicants and the needs of the service. The board of examiners are appointed from persons in the government service. The examination papers are rated on a scale of 100, and 70 marks or over are considered entitling the candidate to eligibility for appointment. A probationary period of six months is authorized, and vacancies, transfers, employment, appointment and promotion of substitutes, reinstatements, etc., are all controlled by the rules, and applicable to all alike.

Age Limitations. The age limitations for entrance to the different positions in the service are as follows: *Departmental Service:* Page or messenger-boy, from 14 to 18; apprentice (or student), from 16 to 20; printer's assistant and messenger, from 18 upward; positions in Railway Mail Service, from 18 to 35; superintendent, physician, supervisor, day-school inspector and matron, Indian Service, from 25 to 55; all other positions in the Indian Service, from 21 to 45; all other positions, from 20 upward. *Custom-House Service:* Clerk and messenger, from 20 upward; other positions, from 20 upward. *Post-Office Service:* Letter-carrier, from 21 to 40; other positions, from 18 upward. *Government Printing Service:* All positions (male), from 21 upward; all positions (female), from 18 upward. *Internal Revenue Service:* Clerk, from 18 upward; other positions, from 21 upward.

Apportionments of appointments are made among the several states and territories and District of Columbia upon a basis of population, except to appointments in the Government Printing-Office; to the position of printer's assistant, skilled helper and operative in the Bureau of Engraving and Printing; to positions in the post-quartermaster's office, in the pension agency and other local offices in the District of Columbia; and to the positions of page and messenger-boy, and apprentice or student. Vacancies outside the District of Columbia are filled by districts; that is, an eligible shall be certified to vacancy in the district in which he resides.

Non-Competitive Examinations. In pursuance of the provisions of the act, wherever competent persons can be found who are willing to compete, no non-competitive examination are given, except as follows: (*a*) To test fitness for transfer, or for promotion in a part of the service to which promotion regulations have not been applied. (*b*) To test fitness for appointment of Indians as superintendents, teachers, teachers of industries, kindergartners, and physicians in the Indian service at large. The non-competitive examinations of Indians for the positions mentioned shall consist of such tests of fitness, not disapproved by the commission, as may be determined upon by the Secretary of the Interior. A statement of the result of every non-competitive test, and all appointments, transfers or promotions based thereon, shall be immediately forwarded to the commission.

Exceptions from Examination or Registration. The following-named employees or positions which have been, or

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may hereafter be, classified under the Civil Service Act are excepted from the requirement of examination or registration: Private secretaries or confidential clerks (not exceeding two) to the President or to the head of each of the eight executive departments; Indians employed in the Indian service at large, except those employed as superintendents, teachers, teachers of industries, kindergartners and physicians; one cashier in each customs district; one chief or principal deputy or assistant collector in each customs district whose employees number as many as 150; one assistant postmaster, or chief assistant to the postmaster, of whatever designation, at each post-office; one cashier of each first-class post-office when employed under the roster title of cashier only; one cashier in each internal revenue district. As far as possible, all promotions are to be made by competitive examinations. The age limitations are relaxed in the case of persons honorably discharged from military or naval service; and *per centum* of proficiency in examinations of applicants claiming preference under rule 1754 of the Revised Statutes is reduced to 65.

CIVITALI, MATTEO, sculptor; born in Lucca, Italy, about 1435; followed the trade of a barber until thirty years of age; subsequently he became so skilled in his art that his figures were compared with those of Ghirlandajo. In 1472 he executed the monument of Pietro da Noceto in the Cathedral of Lucca, which also contains his monument of Domenico Bartini (1479), besides a small temple in the left aisle with the figure of St. Sebastian; and on the right side of the choir the altar of St. Regulus. The angels and the Madonna of the latter work, as well as the statues of the three saints attain remarkable grandeur and freedom of style. G.J.H.

CLADOCERA. See CRUSTACEA, Vol. VI, pp. 573, 575.

CLAFLIN, LEE, philanthropist, was born at Hopkinton, Mass., on November 19, 1791, and became a manufacturer and banker. He was the first to propose the founding of Boston University and was a benefactor of it, as he was also a trustee and benefactor of Wesleyan University and of Wesleyan Academy at Wilbraham, Mass. At the close of the Civil War he was the founder of Claflin University, at Orangeburg, South Carolina. He died in Boston on February 23, 1871. W.F.J.

CLAFLIN, HORACE BRIGHAM, merchant, was born at Milford, Massachusetts, on December 18, 1811, and was brought up in mercantile life by his father. After conducting a store in Worcester, Massachusetts, he removed to New York City in 1843, and there established a wholesale dry goods business which in time, under the name of H. B. Claflin & Co., became one of the largest in the world. Mr. Claflin lived in Brooklyn, where he was one of the foremost members of Plymouth Church and a close friend of its pastor, Henry Ward Beecher. He was a man of noble public spirit and vast charities, taking a particular interest in assisting deserving young men to prosper in business. During the anti-slavery agitation he was a prominent advocate of emancipation, and in the Civil War he was a staunch and generous supporter of the Union. He died in New York City on November 14, 1885. W.F.J.

HORACE B. CLAFLIN.

CLAGGETT, THOMAS JOHN, an American clergyman; born in Prince George County, Md., Oct. 2, 1742. He graduated at the College of New Jersey in 1762, and studied theology. He was ordained deacon, Sept. 20, and priest, Oct. 11, 1767, by the Bishop of London (to whose diocese all the American colonies were at that time attached). Up to the period of the Revolutionary War he was rector of All Saints' parish, in Calvert County, and subsequently the parish of St. James was added to his pastoral charge. After the war, however, the Episcopal Church in the United States became separated from the parent Church in England, and on the organization of the diocese of Maryland under the new administration, which derived its Apostolic succession through the consecration of several American clergymen by Scotch bishops and the Archbishop of Canterbury, the Rev. Mr. Claggett was elected its first bishop and was consecrated in 1792. He died in Maryland, Aug. 2, 1816. E.E.T.

CLAIBORNE, WILLIAM, colonial statesman, was born in England about 1587 of a noble family, and after being well educated was sent out to Virginia in 1621 as a surveyor, and made the first trustworthy map of that colony. He remained in Virginia and became the proprietor of 50,000 acres of land. In 1625, when the Virginia charter was annulled and the colony made a crown colony, he was appointed secretary of state under the royal governor, and was instructed to take possession of all lands northward to the Susquehanna River. He accordingly planted colonies on the northern shore of the Chesapeake, and thus presently came into conflict with the Calverts of Maryland, who disputed his rights there. A long controversy arose, which materially affected the subsequent history of the two colonies. Claiborne was summoned to London, and eventually was compelled to acknowledge the superior title of the Calverts. By way of consolation, the King appointed him in 1642 treasurer of Virginia for life. The next year the quarrel with the Calverts was renewed, and Claiborne invaded Maryland and drove out the governor. In 1650 he joined the Parliamentary party in England, and was appointed a member of the council of Virginia, and the next year was one of the commissioners for reducing the colony to submission to the English crown. In 1652 he was appointed secretary of state in Virginia, and in 1654 again took possession of Maryland, holding it for three years. In 1663–66 he was one of the leading members of the colonial legislature of Virginia, and was an officer of the colonial troops in the Bacon rebellion. He died in 1676, leaving an unblemished personal reputation, but a record of

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much bitterness in his dealings with Maryland.
W.F.J.

CLAIBORNE, WILLIAM CHARLES COLE, statesman; was born in Sussex County, Virginia, in 1775, and spent his early life in New York city. In 1791 he was enrolling clerk of the House of Representatives. Afterward he became a lawyer in Tennessee, and was a member of the convention which framed the first constitution of that state. He became a judge of the supreme court of Tennessee, and then a Representative in Congress from 1797 to 1801, as such casting the vote which made Jefferson President instead of Burr. He was in 1801 appointed governor of the Mississippi territory, and two years later was a fellow commissioner with the traitor Wilkinson for receiving the formal cession of Louisiana. He was governor of the Louisiana territory for three years, the governor of the territory of Orleans, and when the latter was erected into the state of Louisiana he was elected its first governor, and took the lead in defending it in the War of 1812. He was elected United States Senator in 1816, but died on November 23, 1817, before he had an opportunity to take his seat in the Senate. He was a wise and prudent statesman, an able administrator, and a patriot of lofty character.
W.F.J.

CLAIBORNE GROUP, a name given in America to certain beds of clay, lignite, shelly sands, and marly limestone which occur in the vicinity of Claiborne, Alabama, and are believed to belong to the Eocene system.

CLAIM. See PATENT, Vol. XVIII, p. 360.

CLAIMS, COURT OF, a United States court established by act of Congress, February 24, 1855. The law gave jurisdiction to this court to hear and determine all claims founded upon any law of Congress, or upon any regulation of an executive department, or upon any contract with the government, and all claims referred by either house of Congress. Claims for damages, liquidated or unliquidated, in cases not sounding in tort, in respect of which claims the party would be entitled to redress against the United States, either in a court of law, equity or admiralty, if the United States were suable, except claims growing out of the late Civil War and commonly known as war claims, and certain rejected claims, are also referable to this court.

It has jurisdiction, also, of claims of like character which may be referred to it by any executive department, involving disputed facts or controverted questions of law, where the amount in controversy exceeds $3,000, or where the decision will affect a class of cases or furnish a precedent for the future action of any executive department in the adjustment of a class of cases, or where any authority, right, privilege or exemption is claimed or denied under the constitution. In all the above-mentioned cases the court, when it finds for the claimant, may enter judgment against the United States, payable out of the public treasury. An appeal, only upon questions of law, lies to the supreme court on the part of the defendants in all cases, and on the part of the claimants when the amount in controversy exceeds $3,000. The findings of fact by the court of claims are final, and not subject to review by the supreme court.

By the act of March 3, 1883, chapter 116, called the Bowman Act, the head of an executive department may refer to the court any "claim or matter," pending in his department, involving controverted questions of fact or law. The court is required to find the facts and its conclusions of law, and to report the same to the department for its guidance and action. The same act authorizes either house of Congress, or any of its committees, to refer to the court any "claim or matter" involving the investigation and determination of facts, the court to find the facts and report the same to Congress for such action thereon as may there be determined. This act is extended by act of March 2, 1887, chapter 359.

There is a statute of limitations which prevents parties from bringing actions on their own motion beyond six years after the cause of action accrued, but the departments may refer claims at any time, if they were pending therein within the six years. The only limitation under the Bowman Act is, that the court shall have no jurisdiction of any claim barred before the passage of the act by any then existing provision of law.

By act of Jan. 20, 1885, Congress gave to the court jurisdiction over "claims to indemnity upon the French government, arising out of illegal captures, detentions, seizures, condemnations and confiscations prior to the ratification of the convention between the United States and the French republic, concluded on the thirtieth day of September, 1800." The time of filing claims is limited to two years from the passage of the act, and all claims not presented within that time are forever barred. The court finds the facts and the law, and reports the same, in each case, to Congress.

By act of March 3, 1891, chapter 538, the court is vested with jurisdiction of certain Indian depredation claims.

There are five judges, who sit together in the hearing of cases, the concurrence of three of whom is necessary for the decision of any case.

The court sits at Washington, District of Columbia, in the Department of Justice Building, 1509 Pennsylvania Avenue, on the first Monday in December in each year, and continues into the following summer, and until all cases ready for trial are disposed of. Cases may be commenced and entered at any time, whether the court be in session or not.

Prior to the establishment of this court, those having claims against the government had no remedy but to petition Congress, and thence to obtain a bill for their relief. This proceeded on the principle of law that no individual can maintain a suit against a sovereign or government unless with the express consent of the proposed defendant. It was the multiplicity of these petitions to Congress which gave rise to the court of

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claims, which, it may be stated, is a court of law, devoid of equitable jurisdiction. *Revised by* R.W.C.

CLAIRVAUX, a town in the Department of Aube, France, on the Aube River. It is best known for St. Bernard of Clairvaux, and for the Cistercian Abbey which he founded there, which is now used as a prison. Its population (1900) was about 2,200. W.F.J.

CLAIRVOYANCE. See SPIRITUALISM, Vol. XXII, pp. 419–422; MAGIC, Vol. XV, p. 205.

CLAM, a name given to several species of bivalve molluscs, but more commonly applied to *Mya arenaria*, found in abundance in the mud and sand between high and low water mark along the New England coast. This variety is a common article of food and is also much used as fishing bait. Other genera and species, sometimes called clams, are *Venus mercenaria*, also known as the quahaug or hard clam; and *Tridacna gigas*, an edible variety inhabiting the East Indian seas and growing to an enormous size. R.W.C.

CLAMATORES, a group of birds now restricted to the *Gallinæ*. The name refers to their crowing or clamoring, which is well illustrated by domestic fowls. The simple singing apparatus, or syrinx, is the chief distinguishing anatomical feature.

CLAN-NA-GAEL, THE. See HOME RULE, in these Supplements.

CLANWILLIAM, a division of the western provinces, north of Cape Town, South Africa, embracing within its area the rich valley of Olifant River West, with a large stretch of mountain and "karroo" on each side. Chief village, Clanwilliam, on Jan Dissels River.

CLAP, THOMAS, an American educator; born in Scituate, Mass., June 26, 1703. He graduated at Harvard in 1722, studied divinity, and from 1726 to 1739 had a pastoral charge at Windham, Conn. In the latter year he succeeded the Rev. Elisha Williams in the presidency of Yale College. He was eminent for his proficiency in mathematics, astronomy, and natural philosophy; an impressive preacher, and a man of exemplary piety. He constructed the first orrery ever made in America. He had a controversy with Jonathan Edwards respecting Whitefield, opposing the latter from a misapprehension of his designs. He published, among other works, *The Religious Constitution of Colleges* (1745); *Doctrines of the Churches of New England* (1755); and a *History of Yale College* (1766). He died in New Haven, Conn., Jan. 7, 1767. E.E.T.

CLAQUE (Fr. *claquer*, "to clap the hands," or "applaud"), the name given, in France, to an institution designed to secure the success of a public performance or production, by bestowing upon it preconcerted applause, thus giving the impression that it is favorably received. The *claque* is of great antiquity, but first became a regularly organized and paid body during the time of Napoleon III, in the famous struggle between Mdlle. Georges and Mdlle. Duchesnois at the Théâtre Français. The performances of the *claqueurs* are directed by a leader, who arranges the points at which applause, laughter or tears are to be forthcoming, and each *claqueur* has a special *rôle* allotted to him. Thus in various parts of the theater are placed *rieurs*, those who laugh at the comic sallies; *pleureurs*, those who weep at pathetic passages; *bisseurs*, who call *bis* or *encore*, and so on; while all occasionally join in hand-clapping and applause.

CLARE, SCEFI, born in 1194, at Assisi, in the Papal states; entered, in 1212, with her sister Agnes, first two Benedictine monasteries, later the convent of St. Damian, established by St. Francis, and founded the order of Franciscan nuns of St. Clare, of which 144 orders are now in existence. She died Aug. 11, 1253, and was canonized by Alexander IV in 1255. G.A.S.

CLARE ISLAND. See MAYO, Vol. XV, p. 657.

CLAREMONT, England, a palace 15 miles southwest of St. Paul's, London, near Esher, Surrey. It was built for Lord Clive in 1768 and is now royal property, occupied by the widowed Duchess of Albany. The exiled king of France died there in 1850. C.L.S.

CLAREMONT, a town of Sullivan County, New Hampshire, in the southwestern part of that state. It lies near the Connecticut River, just north of Eagle Hill, and is reached by the Boston and Maine railroad. Its population was 5,565 in 1890 and 6,498 in 1900. W.F.J.

CLARENCE, the title of a number of Royal Dukes of England. The name comes from the Greek Klarenza, and was brought into England by Philippa of Hainault, wife of Edward III, and bestowed upon her son Lionel. Other Dukes of Clarence were the second son of Henry IV, who fell at Beauge; the brother of Edward IV, who is reputed to have been drowned in wine and is celebrated by Shakespeare in his Richard III; King William IV, who bore the title before his accession, and the eldest son of Edward VII, who died in 1892. W.F.J.

CLARENCEUX OR CLARENCIEUX, the first of the two provincial kings-of-arms in England; formerly called Surrey or southern king, because his jurisdiction extended over all the country south of the Trent; Norroy being the name of the northern king, whose jurisdiction was over the country to the north of that river. The name of Surrey was changed by Henry V to Clarencieux, in honor of the Duke of Clarence, third son of Edward III. Henry V also instituted a new king-of-arms called Garter, who was made principal king-of-arms, with the two former under him. The duties of Clarencieux are to survey the coats of arms within his province, to register descents and marriages, and to marshal funerals not under the direction of his superior.

CLARENDON, a town and the capital of Monroe County, western central Arkansas, on the Cache River, two miles above its junction with the White, on the Arkansas Midland and the St. Louis, South-Western railroads, 55 miles E. of Little Rock. Its industries are the manufacture of lumber and cotton products. Population, 1890, 1,060; 1900, 1,840.

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CLARENDON, a town of Rutland County, Vermont, in the southern part of that state. It lies six miles south of Rutland, and is reached by the Bennington and Rutland railroad. Its population in 1900 was 915. W.F.J.

CLARENDON, CONSTITUTIONS OF, were a set of laws made by a council of prelates and noblemen in 1164, under which King Henry II of England was authorized greatly to restrict the special privileges of the Roman Church, and to make it and its clergy more amenable to the civil law of the realm. The then primate, Thomas Becket, reluctantly signed them, but revoked his signature when the pope refused to sanction them, and thus began his tragically ending quarrel with the king. See ENGLAND, Vol. VIII, p. 334, and HENRY II, Vol. XI, p. 586. The ordinances were so called because they were drawn up at the hunting lodge of Clarendon, near Salisbury.

W.F.J.

CLARENDON PRESS, publishing branch of the University Press, Oxford, England. In 1672, before the act of 15 George III, chap. 53, which gave universities a perpetual copyright of the works published at their presses, *Clarendon's History of the Rebellion* was issued by the university, the copyright of the work being confirmed to the University by the act. From the proceeds of the first edition of this work the university erected the Clarendon Building, which is used by the Clarendon Press as a publishing department. The issue of Bibles is undertaken by the University Press. See also OXFORD, Vol. XVIII, p. 99.

CLARET, the English name for Bordeaux wines of a dark-red color. Its origin is obscure, as the French word of *Clairet* stands for wine of light-red color, and the word *Clairette* for a light white wine. *Claret* is derived by some from Clairac in the Gascogne, a great place of export of wine to England, by others from the Clairette grapes of which the red wine Picardan is made.

G.A.S.

CLARETIE, JULES, the assumed name of ARSÈNE ARNAUD, a French author; born at Limoges, Dec. 3, 1840; was educated at the Lycée Bonaparte in Paris; became a noted dramatic critic, feuilletonist and novelist, in 1885 director of the Comédie Française, and, in 1888, member of the Academy. He won fame principally by his novels, among them, *Pierrille* (1863); *Un Assassin* (1866); (his best work) *Mademoiselle Cachemire* (1867); *Madeleine Bertin* (1868); *Les Muscadins* (1874); *Le Train No. 17* (1877); *La Maison Vide* (1878); *La Maitresse* (1880); *Monsieur le Ministre* (1882); *Candidat!* (1887); *L'Américaine* (1892); *Divette* (1896). To his historical writings, showing strong anti-German tendencies, belong *Histoire de la Révolution de 1870–71* (5 vols., 1875–76); *La France Envahie* (1871); *Paris Assiégé* (1871); *Le Champ de Bataille de Sedan* (1871). Of less importance are his historical dramas, among them *Les Mirabeau*.

G.A.S.

CLARIFICATION, the process of clearing a fluid from a turpid condition. Natural waters containing much organic matter are clarified by the addition of a little alum, which is precipitated with the organic matter, and the water then becomes healthful and refreshing. An addition of cold water to hot coffee, etc., causes a deposit to be thrown down, which clears the solution.

CLARINDA, a city and the capital of Page County, southwestern Iowa, on the Nodaway River, on the Chicago, Burlington and Quincy and the Humiston and Shenandoah railroads, 62 miles S.E. of Council Bluffs; has a woolen factory and a flour-mill. Pop. 1890, 3,262; 1900, 3,276.

CLARINET OR CLARIONET. See OBOE, Vol. XVII, p. 727.

CLARION, a city and the capital of Wright County, northern central Iowa, on the Burlington, Cedar Rapids and Northern and the Mason City and Fort Dodge railroads. Wheat, corn, oats and hay are raised in the vicinity. Population 1900, 1,475.

CLARION, capital of Clarion County, central western Pennsylvania, on the Clarion River, and on a branch of the Pittsburg and Western railroad. The village is in the oil region, and the prosperity of the place is much increased thereby. Clarion Seminary is here. Population 1900, 2,004.

CLARK, ABRAHAM, patriot; was born at Elizabethtown, now Elizabeth, N. J., on February 15, 1726, and was a lawyer and surveyor. He was a delegate to the Continental Congress, and one of the signers of the Declaration of Independence. He was a member of the convention at Annapolis in 1786 which was to devise a uniform commercial system for all the states, and also of the convention which framed the Federal Constitution, though ill health prevented him from participating in the latter. He was a member of Congress most of the time from 1776 to 1794. He died at Rahway, N. J., of sunstroke in the late summer of 1794. W.F.J.

CLARK, ALONZO, physician, was born at Chester, Mass., on March 1, 1807, and was educated at Williams College (1823) and the College of Physicians and Surgeons in New York. He was professor of physiology, pathology, and practical medicine in the latter institution for many years, beginning in 1844. He was also prominently connected with Bellevue, St. Luke's, and other New York hospitals; was president of the New York State Medical Society; was the author of numerous papers on professional topics, and for many years was one of the foremost members of his profession. He died on September 13, 1887.

W.F.J.

CLARK, ALVAN, optician, was born at Ashfield, Mass., on March 8, 1804, and became first an engraver of blocks for calico printing and then a successful portrait painter. About 1844 a friend who was an optician sought his advice as to the making of a lens, and so interested him in that work as to incline him to enter it himself. He thereupon established at Cambridgeport, Mass., what became the most important factory in America and perhaps in the world for the production of

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telescope lenses. He there made a thirty-inch lens for the Pulkova observatory in Russia, a thirty-six inch lens for the telescope of the Lick observatory, California, and many other large glasses of the highest quality. He also invented several valuable improvements in the mechanism of telescopes, and was an expert practical astronomer. He received honorary degrees from various American and European universities in recognition of his services to science, and was regarded as one of the foremost promoters of astronomical research of his time. His sons, George Bassett Clark and Alvan Graham Clark, were associated with him in business, and continued the work after his death, which occurred on August 19, 1887. W.F.J.

CLARK, ALVAN GRAHAM, optician, son of Alvan Clark (q. v.), was born at Fall River, Mass., on July 10, 1832, and became associated with his father and brother in the manufacture of telescope lenses at Cambridgeport, Mass. He entered the firm in 1852, and after the deaths of his father in 1887 and of his brother in 1891 became the head of the establishment, which he conducted with great success. He made the forty-inch lens for the observatory at the University of Chicago, and other noteworthy glasses. He was an accomplished astronomer, and received the Lalande gold medal from the French Academy of Sciences for his discovery of the companion star to Sirius. He made observations of several eclipses of the sun, and of other astronomical phenomena, with interesting and valuable results. He died on June 9, 1897. W.F.J.

CLARK, SIR ANDREW, physician; was born at Aberdeen, Scotland, on October 28, 1826, and was educated there and at Edinburgh. He settled in London in 1854, and became one of the foremost physicians, especially for diseases of the respiratory and digestive organs. He was president of the Royal College of Physicians, had many distinguished men and women for his patients, was the author of numerous professional writings, and died on Nov. 7, 1893. W.F.J.

CLARK, CHARLES EDGAR, an American naval officer; born at Bradford, Vermont, Sept. 29, 1840. He entered Annapolis, 1860, and in 1863 was promoted to acting ensign. He served on the steam-sloop *Ossipee*, 1863–65, taking part in the battle of Mobile Bay, Aug. 5, 1864, and of Fort Morgan, Aug. 23. He became master in 1866; lieutenant, 1867; lieutenant-commander, 1868; commander, 1881, and captain, 1896. At the beginning of March, 1898, he was in command of the battleship *Oregon*, stationed at Mare Island, San Francisco, when he received orders to sail his ship to the North Atlantic Station. The *Oregon* left San Francisco March 19, and her commander took her through the Straits of Magellan and up the Atlantic coast, touching at Callao, Peru; Punta Arenas, Rio de Janeiro, and at Barbados, arriving at Key West, May 26, 1898. His progress was watched with intense interest on account of the length of the trip and the possibility of his being intercepted by the Spanish fleet, which was expected to be cruising in his path. He eluded the enemy, and reported his ship in perfect condition, after steering a course of 16,764 miles. He was present at the battle of Santiago, July 3, 1898, and aided materially in the destruction of the Spanish fleet under Cervera. He became a rear-admiral in 1902. R.C.A.

CLARK, CLARENCE DON, United States Republican Senator; born at Sandy Creek, N. Y., April 16, 1851; was educated at the Iowa State University; and admitted to the bar in 1874. He practiced law in Delaware County, Iowa, until 1881. He then removed to Wyoming, locating at Evanston, and was prosecuting-attorney for Vinta County for four years; and in 1889 appointed associate-justice of the territory, but declined the office. After the admission of the territory as a state (1890), he was elected to Congress, serving in the 51st and the 52d Congresses (1889–92). He was defeated for re-election to the 53d Congress (1893), as a result of Democrat-Populist fusion. In 1895 he was elected to the United States Senate for the term ending March 3, 1899, to fill the vacancy caused by the failure of the legislature to elect in 1892–93, and was re-elected Jan. 29, 1899, for the term, March 4, 1899, to March 3, 1905. In 1888, and again in 1900, he was a delegate to the Republican National Conventions. R.C.A.

CLARK, DANIEL, lawyer and Senator, was born at Stratham, New Hampshire, on October 24, 1809, was educated at Dartmouth College, and became a lawyer. He was a member of the New Hampshire legislature, and from 1857 to 1866 was a United States Senator. It was he who in 1861 moved for the expulsion of the secessionist Senators. He died on January 3, 1891. W.F.J.

CLARK, FRANCIS EDWARD, clergyman; born of New England parentage in Aylmar, Quebec, Canada, Sept. 12, 1851 (father's name Symmes); was adopted by his uncle, Rev. E. W. Clark, whose name he assumed; graduated at Dartmouth College in 1873; studied theology at Andover; became pastor of the Williston Church (Cong.), Portland, Me.; and while there founded the Young People's Society of Christian Endeavor in 1881. He was pastor of the Phillips Church, South Boston, in 1883–87; and subsequently applied himself wholly to Christian Endeavor work as president and editor. G.J.H.

CLARK OR CLARKE, GEORGE ROGERS, an American soldier and explorer; born near Monticello, Virginia, November 19, 1752. He studied surveying and in 1772 settled in Ohio, serving in the Indian wars of that region. He removed to Kentucky in 1775. At the outbreak of the Revolution he became a general in the patriot army, serving against the Indians on the frontier and campaigning vigorously against the British throughout Illinois, Ohio and Kentucky. After the massacre at Wyoming in 1778, he took the command of a body of troops, designed to operate against the Indians for the protection of the frontiers. He captured the British post of Kaskas-

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kias in the Mississippi, and also reduced three other towns higher up the river. In the meantime he was informed that the British governor of Detroit was about to attack him; this movement he anticipated, and surprised the British commander, and made him and his garrison prisoners. He built Fort Jefferson on the western bank of the Mississippi below the Ohio in 1779. At Fort Washington when a treaty was made with the Indians Clark had but 70 men in his command. The Indians in council appeared peaceable, excepting three hundred Shawnees, whose chief made a boisterous speech, and then placed on the table his belt of black and white wampum, to intimate that he was prepared for either peace or war, while his 300 savages applauded him. Clark with his cane coolly pushed the wampum from the table; then rising, as the savages muttered their indignation, he trampled on the belt, and with a voice of authority bid them instantly quit the hall. The next day they sued for peace. Clark subsequently supported the cause of the French of the Mississippi valley against the Spaniards. He died near Louisville, Kentucky, February 18, 1818. W.M.C.

CLARK, Henry James, naturalist; was born at Easton, Mass., on June 22, 1826, and was graduated from New York University in 1848. He studied zoölogy under Agassiz and was associated with him in work. In 1860 he became professor of zoölogy at the Lawrence Scientific School, in 1866 professor of botany, zoölogy and geology at the Agricultural College of Pennsylvania, and in 1872 professor of veterinary science at the Massachusetts Agricultural College. He died on July 1, 1873. W.F.J.

CLARK, Horace Francis, an American legislator and capitalist; born in Southbury, Connecticut, November 29, 1815. He was graduated from Williams College in 1833, studied law and was admitted to the bar in 1836. Removing to New York city he was twice elected to Congress. Having married a daughter of Commodore Vanderbilt, he became interested in the Vanderbilt properties, serving as a director in the New York and Harlem railroad, the Western Union Telegraph Company and other corporations. In 1871 he was one of the committee of citizens who destroyed the power of the Tweed ring. He died in New York city, June 19, 1873. W.M.C.

CLARK, John Bates, an American educator; born in Providence, R. I., Jan. 26, 1847. He was educated at Brown University, Amherst College (graduating in 1872), and at the universities of Heidelberg and Zurich. He was professor of political economy at Carleton, Smith, and Amherst colleges; lecturer at Johns Hopkins University; and has been professor of political economy at Columbia since July 1, 1895. E.E.T.

CLARK, Jonas, an American clergyman; born in Newton, Mass., Dec. 25, 1730. He was pastor at Lexington, Mass., and was an ardent patriot, taking an active part in the agitation against the encroachments of the British government in the times preceding the Revolution. The first blood of the Revolutionary War was shed close to his door. Throughout the war the anniversary of the battle was observed by his church, he preaching the first anniversary sermon in 1776. He died Nov. 15, 1805. E.E.T.

CLARK, Latimer, engineer; was born at Great Marlow, England, on March 10, 1822, and became a railroad engineer. In 1847 he was engaged in the construction of the Britannia tubular bridge over the Menai Strait, and afterward wrote a treatise on such bridges. He made important researches and discoveries in telegraphy, became engineer to the first Atlantic Cable Company, and suggested the words "volt," "ohm" and "farad" to express electrical units. He championed the claim that the first clear proposal of an electric telegraph was made by a Scotchman in 1758. He invented a new cell for electric batteries, and constructed thousands of miles of telegraphic cables in all parts of the world. He wrote several standard treatises on electrical engineering, was made a chevalier of the Legion of Honor, and died on October 30, 1898. W.F.J.

CLARK, Thomas March, clergyman; was born at Newburyport, Massachusetts, on July 4, 1812, studied at Yale and Princeton, was pastor of the Old South Church, Boston, for a little time, and then entered the ministry of the Protestant Episcopal Church. He was made bishop of Rhode Island in 1854, and had a distinguished career in that office. He published a number of books, including compilations of his sermons, and a treatise on Sunday School work. He was for years the senior bishop of his church. He died on Sept. 7, 1903. W.F.J.

CLARK, William Smith, educator; was born at Ashfield, Mass., on July 31, 1826, and was graduated from Amherst College in 1848, afterward studying at Göttingen. He became a professor at Amherst in 1852, and president of the Massachusetts Agricultural College in 1867. He organized the Imperial College of Agriculture in Japan, and introduced into America many valuable Japanese plants. He was a member of the Massachusetts State Board of Agriculture, and in 1864, 1865, and 1876 a member of the legislature. He died on March 9, 1886. W.F.J.

CLARKE, Sir Andrew, an English army officer; born at Hampshire in 1824, died in 1902; studied at Canterbury and Woolwich, and entered the army in 1844. From 1847–48 he served in the New Zealand campaign; was, in 1851, member of the legislative council of Tasmania; in 1853, surveyor-general of Victoria, and minister of public lands down to 1857. In 1863 he was sent on a special mission to the west coast of Africa, when he settled the troubles arising in the Ashanti country. Returning home he became director of works of the navy, in which capacity he, from 1864–73, designed and constructed the great extension of naval arsenals at home and abroad; from 1873–75 he was governor of the Straits Settlements, bringing Malay native states under English protectorate; from 1873–80, minister of public works in India, and from 1881–86, inspector-general of fortifications. In 1886 he was promoted lieutenant-general. G.A.S.

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CLARKE, Sir Caspar Purdon, art expert and archæologist; was born in England in 1846, was educated and trained as an architect, and became a student of art and archæology. He was for some years keeper of the art collections and assistant director of the South Kensington Museum in London, and then for a number of years was director of the Art Museum there. He was several times sent to Persia and India on important missions, semi-political and semi-artistic, and made the finest display of Indian art ever seen in Europe. He was made a C.I.E. in 1883, and was invested with knighthood in 1902. In 1905 he was chosen to succeed the late General Luigi di Cesnola as director of the Metropolitan Museum of Art in New York city, and came to America to assume the duties of that place in February of that year.

W.F.J.

CLARKE, Charles Baron, an English scientist; born at Andover, Hampshire, June 17, 1832; educated at Trinity and Queen's colleges, Cambridge where he was graduated B.A. in 1856. He was called to the bar at Lincoln's Inn in 1858; was elected fellow of Queen's College, Cambridge, in 1857, and was mathematical lecturer there from 1858 to 1865; entered the Bengal educational service in 1866, and became superannuated in 1887. His works include *Speculations from Political Economy* (1886) and *Class-Book of Geography* (1889). He is a fellow of the Royal and other societies, and gained repute for his studies in botany.

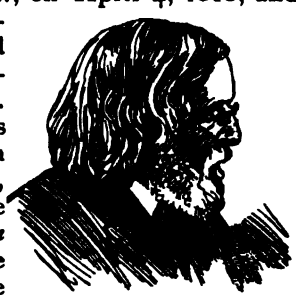
CLARKE, Charles Cowden, and Mary Victoria Cowden, his wife, authors and Shakespearean students, were so closely associated in their work that they must be considered together. Charles was born at Enfield, England, on December 15, 1787, and was the friend who inspired Keats to become a poet. Mary was born in London in 1809, the sister of Novello, the music publisher. They were married in July, 1828, and in their London home enjoyed the friendship of most of the men and women of letters of their time. Mrs. Clarke published her great *Concordance to Shakespeare*, upon which she had worked for 16 years, in 1845, marking an epoch in Shakespearean study, while her husband, in 1834, began his famous 20 years' course of lectures on Shakespeare and other dramatists and poets. Some of these lectures were published, and in 1859 he published *Carmina Minora*, a volume of original verse. The two together produced a *Shakespeare Key* (1879), an annotated edition of Shakespeare's works (1869), and *Recollections of Writers* (1878). Charles died at Genoa on March 13, 1877. Mary afterward wrote a biography of her husband and an autobiography. She died on January 12, 1898. W.F.J.

CLARKE, Frank Wigglesworth, chemist; was born in Boston on March 19, 1847, and was educated at the Lawrence Scientific School of Harvard University, from which he was graduated in 1867. He has been an instructor at Cornell University, a professor at Howard University and at the University of Cincinnati, and, since 1883, chief chemist of the U. S. Geological Survey and honorary curator of the U. S. National Museum. He has written various works on chemistry and other topics. W.F.J.

CLARKE, Hugh Archibald, musician; was born in Canada on August 15, 1839, and was educated at Knox College. He devoted himself to music, and wrote several oratorios and other compositions. He became professor of music in the University of Pennsylvania in 1875, and received the degree of Doctor of Music from that institution in 1886. W.F.J.

CLARKE, Hyde, English financier and philologist; born in London, Dec. 14, 1815; was employed in England as a civil engineer in the improvement of Morecambe Bay, and next in the promotion of telegraph and railway service in upper India. In 1868 he founded the Council of Foreign Bondholders, whose affairs he administered for some years; and he did much to promote the Anthropological Institute and the Press Fund. His works treat of mythology and comparative philology, especially on the native American languages and their supposed connection with those of the Old World, among them being *The Pre-Hellenic Inhabitants of Asia Minor* (1864); *The Mediterranean Populations, from Autonomous Coins* (1882). Died in London Mar. 1, 1895.

CLARKE, James Freeman, clergyman, was born at Hanover, N. H., on April 4, 1810, and was graduated from Harvard College in 1829 and from the Cambridge Divinity School in 1833. From 1833 to 1840 he was pastor of a Unitarian Church at Louisville, Ky., and while there edited the *Western Messenger*. In 1841 he became pastor of the Church of the Disciples in Boston, and engaged in much literary work. His books were chiefly on practical phases of religion, but some of them were controversial and some historical. He also wrote some fine hymns, and edited a hymn-book and service-book for the use of his congregation. Though not a radical abolitionist, he joined the movement against slavery. In theology he was an "evangelical Unitarian" and a firm believer in "supernaturalism in theology." He was conspicuously broad and catholic, however, and did not hesitate to exchange pulpits with the radical Theodore Parker, and to invite the "infidel" Charles Bradlaugh to address his Sunday School. He also paid much attention to investigations of the phenomena and professions of Spiritualism. In 1867–71 he was professor of natural religion and Christian Doctrine at Harvard, and afterward a lecturer there. He was personally much beloved by all who knew him, and executed a wide influence far beyond the limits of his congregation. He retained his intellectual alertness until the very end of his long life, and wrote one of his best poems only a few weeks before his death. He died on June 8, 1888. W.F.I.



JAMES FREEMAN CLARKE.

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CLARKE, JOHN, an American clergyman; born in Suffolk, Eng., Oct. 8, 1609. He was a physician in London, but came to Massachusetts and was associated with the party of Anne Hutchinson, with whom he went to Rhode Island. In 1644 he founded the second Baptist Church in America and became its pastor. He was later driven out of Massachusetts for preaching false doctrines. In 1651 he went to England with Roger Williams, and published there a book entitled *Ill News from New England; or, a Narrative of New England's Persecution.* At the end of a twelve-years mission he secured a second charter for the colony, guaranteeing to every person at all times his own judgment and conscience in matters of religious concernment. He returned in 1663 and retained his pastorate until his death, April 20, 1676. E.E.T.

CLARKE, JOHN SLEEPER, actor, was born in Baltimore, Md., on September 3, 1833, and made his first stage appearance at the age of eighteen, in Boston. Later he became associated with the elder John Drew in Philadelphia, and with Edwin Booth in New York. He went to England in 1867, attained great popularity, and spent most of his life thereafter in that country. He visited America again in 1870, 1879, and 1884. As *Paul Pry*, *Major Wellington de Boots*, *Dr. Pangloss*, *Toodles*, and *Bob Acres*, and in similar parts of eccentric humor, he was one of the most accomplished comedians of his time. He died on September 25, 1899. W.F.J.

CLARKE, MCDONALD, sometimes called the "Mad Poet," from his eccentricities of dress and conduct; was born in Connecticut on June 18, 1798, and spent most of his life in New York city, where he was a familiar figure on Broadway and a sort of "society poet." One phrase of his has become a household word. It is commonly quoted,

> "Now twilight lets her curtain down
> And pins it with a star,"

but as he wrote it it was,

> "Whilst twilight's curtain spreading far
> Was pinnéd with a single star."

The lines occur in his *Death in Disguise*. He died in New York on March 5, 1842. W.F.J.

CLARKE, REBECCA SOPHIA, author; was born at Norridgewock, Maine, on February 22, 1833, began writing in childhood, and published her first story in 1860. Under the pen-name of "Sophie May" she wrote many children's books, the best known of which are the *Little Prudy* and *Dotty Dimple* series. W.F.J.

CLARKE, SAMUEL FESSENDEN, naturalist, was born at Geneva, Illinois, on June 4, 1851, and was educated at Yale and Johns Hopkins Universities. He was attached to the United States Fish Commission in 1874–5, became a lecturer in Smith College in 1882, and is now professor of natural history in Williams College, at Williamstown, Massachusetts. He has written several treatises on natural history. W.F.J.

CLARKE'S FORK is the name of two rivers in Montana. One, otherwise called the Flathead, is in the northwestern part of the state, flows through Flathead Lake and empties into the Bitter Root River. The other rises in the Shoshone Mountains, Wyoming, flows northward into Montana, through some deep canyons, and empties into the Yellowstone River near Billings, Montana. W.F.J.

CLARKSBURG, a town and the county seat of Harrison County, West Virginia, in the north-central part of that state. It lies on the Monongahela River, and is reached by the Baltimore and Ohio, the Monongahela River, and the West Virginia and Pittsburg railroads. It is in the heart of a rich bituminous coal region, and has important mining and other industries. Its population was 4,050 in 1900. W.F.J.

CLARKSON, THADDEUS STEVENS, an American soldier, was born at Gettysburg, Pennsylvania, in 1840. He enlisted April 16, 1861, within two hours after the appearance of President Lincoln's call for seventy-five thousand men for three months, in Company A, First Illinois Artillery. He went to Cairo, served under General Grant there; re-enlisted for the war, July 16, 1861; was promoted Dec. 1, 1861, to adjutant of the Thirteenth Illinois Cavalry; served with that regiment, on the staff of General John W. Davidson, and participated in the battles with that commander on the march to Helena and Little Rock, Arkansas. He was assigned to the command of the regiment during the Arkansas campaign. In August, 1863, he assisted in raising the Third Arkansas Cavalry, composed of Union white men of that state; was promoted to the rank of major, and commanded the regiment until nearly the close of the war, participating in nearly all of the battles in Arkansas, under General Steele. He came to Nebraska, settling in Omaha, with his brother, the late Bishop Clarkson, in March, 1866, and lived in the state for thirty years. He was postmaster of Omaha under President Harrison's administration. Major Clarkson was on the executive committee of the National Council of Administration, Grand Army of the Republic, for three consecutive years; was elected department commander of Nebraska by acclamation at the encampment in February, 1890. He was also commander of the Loyal Legion of Nebraska. He was elected commander-in-chief of the Grand Army of the Republic at the annual encampment at Minneapolis on Sept. 4, 1896.

CLARK'S STANDARD CELL. See ELECTRICITY, § 107, in these Supplements.

CLARKSVILLE, a city and the county seat of Montgomery County, in the western part of the "northern tier" of Tennessee. It is on the north bank of the Cumberland River, 43 miles northwest of Nashville, and is reached by the Louisville and Nashville railroad. Its population was 7,924 in 1890 and 9,431 in 1900. W.F.J.

CLARKSVILLE, a city and the county seat of Red River County, Texas, near the northeastern corner of the state. It lies 15 miles south of the Red River and the border of the Indian Ter-

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ritory, and is reached by the Texas and Pacific railroad. Its population was 1,588 in 1890 and 2,069 in 1900. W.F.J.

CLARK UNIVERSITY, THE, a Methodist educational institution at Atlanta, Georgia, founded in 1870 under the auspices of the Methodist Episcopal Church. In 1904 the institution had 25 instructors, 570 students and a library containing 2,000 volumes. The grounds and buildings of the university are valued at $400,000. The institution is regarded as the leading Methodist college in the South. The president in 1905 was Charles M. Melden. W.M.C.

CLARK UNIVERSITY, THE, a non-sectarian educational institution at Worcester, Massachusetts, founded in 1887 by Jonas G. Clark. The university is devoted almost exclusively to post-graduate work in the sciences. The institution received the generous endowment of $2,000,000 from its founder, and has 30 scholarships valued at from $200 to $600 each. The library contains upwards of 32,000 volumes. There were 12 professors and 65 students at the university in 1904. The college buildings consist of one large main structure and several smaller buildings, together with a laboratory, class buildings, a library and two memorial halls. The president in 1905 was G. Stanley Hall. W.M.C.

CLARK UNIVERSITY.

CLARY (*Salvia sclarea*), a plant of the same genus with sage, a native of the south of Europe. Its flowers are used for making a fermented wine, esteemed for its flavor.

CLASSICS OR CLASSICAL LEARNING. The term *classici* was originally applied to those citizens of Rome that belonged to the first and most influential of the six classes into which Servius Tullius divided the population. As early as the second century after Christ it was applied figuratively to writers of the highest rank, and this mode of designation has since been generally adopted both in literature and art. As the great productions of writers and artists of antiquity have continued to be looked upon by moderns as models of perfection, the word *classics* has come to designate, in a narrower sense, the best writers of Greece and Rome. See ITALY, Vol. XIII, p. 516.

*CLASSIFICATION (of plants), usually styled *Taxonomy*. The current classifications of plants have been the natural development of all previous schemes of classification. The earliest observers were impressed with the necessity of reducing plants to some orderly arrangement, and this phase of botany became so impressed upon the science that until very recent times it was little more than a science of classification. In this form it appealed to the collector spirit, and hence became a very popular pursuit. The earliest classifications were necessarily based upon the most superficial observations, and numerous "artificial systems" became current, culminating in the famous one devised by Linnæus. These systems were "artificial," in that they selected some one character as a basis, which would usually result in bringing an aggregation of plants together that held no real relationship to each other, just as the words in a dictionary are arranged in alphabetical sequence, resulting in bringing into juxtaposition words of most diverse origin. The dogma of the permanency of species lent itself kindly to these artificial arrangements; and if the determination of the name of a plant were the end of classification, artificial schemes would never fall into disuse, as they are far easier of manipulation than any natural scheme. Many of the earlier botanists were fully conscious of the fact that a natural scheme must ultimately replace the artificial ones, but they were entirely cut off from any attempt at its construction by lack of knowledge. It was only after the idea of evolution had become a dominant one, and morphological investigation had yielded a large amount of data, that any attempt could be made to arrange plants according to their genetic relationships. Botanists had been writing of "families" of plants, but not at all implying "blood relationship" by the name. Natural systems of classification have been rapidly multiplying ever since the first attempt, and rightly so, for continuous morphological investigation is ever adding new facts, which demand a shifting of the old lines. Any scheme of classification is simply an expression of current knowledge concerning relationship, and as knowledge increases, classifications must change. It is reasonably safe to assume, however, that most of the large lines have been permanently drawn, and that subsequent shiftings will be concerned with details.

It would not be profitable to give a complete account of systems of classification, but a few prominent ones will serve to illustrate the subject. Probably the first system proposed that is worthy of scientific attention is that of John Ray, published in 1703. His grouping is as follows:

1. Herbs.
   a. Flowerless plants.
   b. Flowering plants.
      (1) Dicotyledons.
      (2) Monocotyledons.
2. Trees.
   a. Monocotyledons.
   b. Dicotyledons.

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In this scheme, the primary division into herbs and trees is a relic of the older classifications, and is essentially artificial. The grouping, also, of the "flowerless plants" under herbs was simply a shelving of that great assemblage of lower forms about which very little was known. The notable feature of the scheme, however, is its recognition for the first time of the fundamental distinction between Dicotyledons and Monocotyledons.

The system of Linnæus, dating from 1733, was even more confessedly artificial, but at once became so popular that it continued in use for more than a century. It was based upon the number, relative position and union of the stamens with regard to each other and to the pistil. The names of his 24 groups are self-explanatory to any one familiar with botanical terminology, and are as follows: (1) Monandria, (2) Diandria, (3) Triandria, (4) Tetrandria, (5) Pentandria, (6) Hexandria, (7) Heptandria, (8) Octandria, (9) Euneandria, (10) Decandria, (11) Dodecandria, (12) Icosandria, (13) Polyandria, (14) Didynamia, (15) Tetradynamia, (16) Monadelphia, (17) Diadelphia, (18) Polyadelphia, (19) Syngenesia, (20) Gynandria, (21) Monœcia, (22) Dicœcia, (23) Polygamia, (24) Cryptogamia.

Such a scheme enabled the student of botany to determine rapidly the name of a plant, but it taught him nothing of its relationships.

The classification proposed by Antoine de Jussieu, bearing the date 1789, is probably the first that deserves to rank as a natural scheme. It is as follows:

1. Acotyledons (Cryptogams in general).
2. Monocotyledons.
   a. Flowers hypogynous.
   b. Flowers perigynous.
   c. Flowers epigynous.
3. Dicotyledons.
   a. Apetalæ. { Flowers hypogynous. / Flowers perigynous. / Flowers epigynous.
   b. Monopetalæ. { Flowers hypogynous. / Flowers perigynous. / Flowers epigynous.
   c. Polypetalæ. { Flowers hypogynous. / Flowers perigynous. / Flowers epigynous.
   d. Diclines irregulares.

De Jussieu is certainly to be commended for his recognition of the fundamental character in any natural system of the hypogynous, perigynous, and epigynous conditions.

The classification proposed by De Candolle in 1819 is as follows:

1. Vascular plants.
   a. Exogens.
      (1) Diplochlamydeæ.
         (a) Thalamifloræ.
         (b) Calycifloræ.
         (c) Corollifloræ.
      (2) Monochlamydeæ.
   b. Endogens.
      (1) Phanerogams.
      (2) Cryptogams.
2. Cellular plants.

It will be noted that up to this time no attempt was made to characterize the Cryptogams. They were disposed of in a lump, with some negative statement.

Although presenting no scheme of classification, the name of Robert Brown cannot be omitted, as in 1827 he published his demonstration of the nature of Gymnosperms, and showed that they could not be longer associated with Dicotyledons, though with wonderful persistence this obsolete association continues in manuals still current.

Endlicher, in 1836–40, proposed the following scheme, which contains several new points:

1. Thallophytes.
   a. Protophytes (algæ and lichens).
   b. Hysterophytes (fungi).
2. Cormophytes.
   a. Acrobrya (mosses, ferns, etc.).
   b. Amphibrya (monocotyledons).
   c. Acramphibrya (gymnosperms and dicotyledons).

Although somewhat fantastic in his group distinctions of Cormophytes, the scheme is notable for its attempt to incorporate the Cryptogams.

It is in Brongniart's classification of 1843 that the familiar grouping into Cryptogams and Phanerogams appears, as follows:

1. Cryptogams.
   a. Amphigenæ (algæ and fungi).
   b. Acrogenæ (mosses and ferns).
2. Phanerogams.
   a. Monocotyledons.
   b. Dicotyledons.
      (1) Angiosperms.
      (2) Gymnosperms

This classification is probably more familiar to English-speaking botanists than any other, as it has ever since been current in their manuals. With the exception of the disposition of the Gymnosperms, it well indicates the larger groupings as accepted to-day.

Alexander Braun, in 1864, proposed the following arrangement, in which more of the terminology of to-day appears, and which properly places the Gymnosperms:

1. Bryophytes (algæ, fungi, mosses).
2. Cormophytes (ferns, equisetums, lycopods).
3. Anthophytes.
   a. Gymnosperms.
   b. Angiosperms.
      (1) Monocotyledons.
      (2) Dicotyledons.

It was due to the researches of W. Hofmeister (1849–51) that the real relation between "Cryptogams" and "Phanerogams" was established, and systems of classification began to be arranged upon a more scientific basis. Among these more modern systems but three need to be mentioned, the last of which represents the most recent complete statement.

The classification proposed by Sachs, and made familiar to American students by Bessey, is as follows:

1. Thallophytes.
   a. Protophytes.
   b. Zygophytes.
   c. Oöphytes.
   d. Carpophytes.
2. Bryophytes.
   a. Hepaticæ.
   b. Musci.
3. Pteridophytes.
   a. Equisetineæ.
   b. Filicineæ.
   c. Lycopodineæ.
4. Phanerogams.
   a. Gymnosperms.
   b. Angiosperms.
      (1) Monocotyledons
      (2) Dicotyledons.

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The special feature of the scheme is the primary grouping of Thallophytes, which is based upon reproductive characters, instead of the presence or absence of chlorophyll.

The Eichler system of 1883 follows the same general lines, except that the Thallophytes are primarily divided into Algæ and Fungi.

The system of Engler, outlined in 1892, is just now appearing in detailed statement in the great work, *Die Natürlichen Pflanzenfamilien.* As in all of the more modern arrangements, its peculiar features are to be found in the grouping of the Thallophytes, concerning whose proper arrangement there is the greatest diversity of opinion. Even the primary divisions of plants are somewhat modified as follows:

1. Myxothallophyta (the slime-molds).
2. Euthallophyta (the real Thallophytes).
3. Embryophyta zoidiogama (including the Bryophytes and Pteridophytes, and named from their possession of spermatozoids. To the same group the name "Archegoniates" is often applied, referring to the characteristic female sex-organ, the archegonium).
4. Embryophyta siphonogama (referring to the development of a pollen-tube. The group otherwise known as Phanerogams, Anthophytes and Spermaphytes).

Engler's larger grouping of his Euthallophytes is as follows: (1) Schizophyta, (2) Dinoflagellata, (3) Bacillariales, (4) Gamophyceæ (including the green, brown and red algæ), (5) Fungi.

The changes soon to be made in grouping will doubtless concern the breaking up and establishing of primary divisions among what are now known collectively as Thallophytes, and the association of those forms developing an archegonium (Bryophytes, Pteridophytes, and possibly Gymnosperms) as a primary division bearing the name Archegoniates. The fact that Gymnosperms develop both an archegonium and a seed will continue to make them a troublesome factor in grouping.

In conclusion, the scheme of classification in largest use at present, and referable to no botanist in particular, is as follows:

1. *Thallophytes:* Vegetative organs (such as root, stem and leaf) and tissues mostly undifferentiated; alternation of generations wanting or but feebly developed; reproduction non-sexual or sexual, in the latter case showing no differentiation of sex, or a distinct differentiation into the sex-organs known as *antheridium* and *oögonium.*
   a. Algæ: Plants containing chlorophyll.
   b. Fungi: Plants without chlorophyll.
2. *Bryophytes:* Vegetative organs and tissues differentiated, but with no development of a vascular system; alternation of generations distinct, the gametophyte developing the vegetative organs; sexual reproduction by means of an antheridium (developing spermatozoids) and an archegonium.
   a. Hepaticæ (liver-worts): Plants more or less thalloid and usually dorsiventral in their symmetry.
   b. Musci (mosses): Plants with distinct axis, bearing leaves, and radial in their symmetry.
3. *Pteridophytes:* A vascular system developed; alternation of generations distinct, but the sporophyte bearing the vegetative organs; sexual reproduction as in Bryophytes.
   a. Filicineæ (ferns.)
   b. Equisetineæ (horse-tails).
   c. Lycopodineæ (club-mosses).
4. *Spermatophytes:* Alternation of generations indistinct through great reduction of the gametophyte and consequent development of the structure known as the "seed."
   a. Gymnosperms (cycads, conifers and gnetums).
   b. Angiosperms.
      (1) Monocotyledons.
      (2) Dicotyledons.
         (a) Archichlamydeæ.
         (b) Sympetalæ.

JOHN M. COULTER.

CLASSIS, from the Latin, meaning a class, order, or sort. The word was formerly used in common speech precisely as "class" is now used. It is now chiefly applied to a court or convention in the Dutch Reformed and some other churches, corresponding somewhat with the presbytery of the Presbyterian Church. It stands between the consistory of the individual church and the synod of the general church, and is commonly entrusted with the authority to ordain, confirm, and depose ministers. It is composed of clerical and lay elders, and sends delegates to the synod. W.F.J.

CLASTIC ROCKS are those composed of fragmental materials. The term includes all rocks of a secondary or derivative origin, as conglomerate, sandstone, shale, etc., which have been formed out of the remains of previously existing rocks. Besides the large class of sand and gravel rocks, it also embraces many rocks of organic origin, such as certain limestones, composed of the *débris* of shells, corals, etc.; coals made up of the remains of plants; some ironstones, consisting in whole or in part of organic *débris.* Fragmental volcanic rocks, such as tuff and agglomerate, come also into the same division.

CLAUSEWITZ, KARL VON, a Prussian general and military author; born in Burg, June 1, 1780, died in Breslau, Nov. 16, 1831. He served in the Prussian army from 1792–94, 1806–12; in the Russian army in 1812, and again as chief of the general staff of a Prussian army corps in 1813 and from 1815–18, when he became director of the War Academy and inspector of artillery. His work on *War and Warfare* (10 vols., 1832–37) in which he treated most brilliantly on the history of war, effected a complete revolution in the theory of war. G.A.S.

CLAUSIUS, RUDOLF JULIUS EMANUEL, a physicist; born at Köslin, Pomerania, Jan. 2, 1822, studied at the University of Berlin, and became in 1855 professor at the Polytechnicum and later at the University of Zurich, in 1876 professor at the University of Würzburg, and in 1869 at the University of Bonn, where he died, Aug. 24, 1888. He devoted himself principally to the treatment of thermodynamics, *i. e.*, the theory of mechanical heat. (See ATOM, Vol. III, pp. 35, 36.) In order to establish the fundamental law of heat on mechanical principles, Clausius introduced the *Virial*, and proved the correctness of his theory by combining the principle of Carnot with that of Mayer, both treating on the equivalency of heat and dynamics. His principal works are *Die Mechanische Wärmetheorie* (3 vols., sec. edition, 1876–91); *Die Potentialfunktion und das Potential* (1885). G.A.S.

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CLAUSSON, PEDER, a Norwegian author; born April 1, 1545; died Oct. 15, 1614. See DENMARK, Vol. VII, p. 79; and NORWAY, Vol. XVII, p. 603.

CLAUSTHAL. See KLAUSTHAL, Vol. XIV, p. 110.

CLAVARIA (from Lat., *clava*, a club), a striking species of fungi growing from an eighth of an inch to a foot high, but the majority average from one to three inches. The species are numerous, some simple in form, and some having thick branches. They are found upon trees of various kinds, sometimes in meadows and at others, in damp, shady places. *C. botrytis*, a species found in oak and beech woods in Germany, is used as food. Other species, as *C. flava*, *coralloides*, and *aurea* are edible. W.R.B.

CLAVICLE, an important part of the pectoral girdle of vertebrates, perhaps most familiarly known in the collar-bone of man and in the "merry thought" of birds. It is well developed in those mammals in which the fore-leg or arm is used very strongly and freely, but is poorly developed or absent in many cases, as in carnivores and ungulates. In most flying-birds it is strong, and often fused to the breast-bone. It is a paired bone superadded from the skin as an auxiliary to scapula and coracoid. Its position is ventral and anterior to the coracoid, and it is often associated with an interclavicle. See ANATOMY, Vol. I, p. 724.

CLAVICORNES, a great family of coleopterous insects, of the section *Pentamera*. Most of the beetles of this family feed on animal substance, and many of them find their appropriate food in substances undergoing decay. See COLEOPTERA, Vol VI, p. 119.

CLAVIJERO, FRANCISCO XAVIER, a Mexican priest and historian; born in Vera Cruz about 1722. He was educated for the priesthood and in 1748 entered the order of the Jesuits. He early studied the history and language of the Aztecs and other native Mexican tribes and collected valuable paintings and manuscripts. On the suppression of the Jesuits by the Spanish government in 1767 Clavijero went to Italy, where he wrote his *Mexican History*. He died in Bologna, Italy, in 1793. W.M.C.

CLAXTON, KATE. See STEVENSON, MRS. CHARLES A., in the Supplements.

CLAY, a term applied to those kinds of earth or soil which, when moist, have a notable degree of tenacity and plasticity. The clays appear to owe their origin to the decomposition of various rocks, and to consist chiefly of aluminic silicate along with other ingredients, which vary in character with the nature of the parent-rock from the degradation of which they are derived. Thus common clay is a mixture of kaolin or China clay (which is a hydrated clay) and the fine powder of some felspathic mineral which is anhydrous and not decomposed. See MINERALOGY, Vol. XVI, p. 442.

CLAY, CASSIUS MARCELLUS, statesman, was born in Madison County, Kentucky, on October 19, 1810, and was graduated from Yale College in 1832. He was the son of a slaveholder, but became an abolitionist after hearing William Lloyd Garrison speak upon the subject, and thereafter devoted much of his life to vehement opposition to slavery. He became a practicing lawyer at Lexington, Kentucky, and served for three terms in the legislature of that state. In 1845 he founded *The True American* at Lexington, a paper devoted to the anti slavery propaganda. Despite the prominence of his family and the personal esteem in which he was held, his office was mobbed and he was compelled to remove it to Cincinnati, where he continued to publish his paper and whence he sent it into Kentucky for wide circulation. He served with distinction as a volunteer officer in the Mexican War. though he was opposed to the object for which that war was waged. Upon the formation of the Republican party in 1854 he identified himself with it and supported Fremont and Lincoln for the Presidency. At the outbreak of the Civil War he strongly opposed secession and gave his support to the Union cause, and in 1861–62 was a major-general of volunteers. President Lincoln sent him as minister to Russia, where he served from 1862 to 1869, and did much to cultivate the friendship of Russia during the Civil War. In 1872 he advocated the election of Horace Greeley to the Presidency, and in 1876 supported Tilden, but thereafter acted with the Republican party again. The closing years of his life were spent in retirement at his ancestral home, Whitehall, Kentucky, and were marked with some distressing eccentricities of conduct. In his old age he married a girl of sixteen, and on her account had violent quarrels with his family and friends, and kept his house in a state of siege. He died on July 22, 1903. A volume of his anti-slavery and other speeches was published in 1848. W.F.J.

CASSIUS M. CLAY.

CLAY, CLEMENT CLAIBORNE, statesman, was born at Huntsville, Ala., in 1819, and was graduated from the University of Alabama in 1835. He was admitted to the bar in 1846, served in the Alabama legislature, and was elected United States Senator in 1853 and again in 1859. In 1861 he withdrew with other secessionists, and was also expelled. He became a Confederate Senator from Alabama, was in 1864 a secret agent of the Confederacy in Canada, and met Horace Greeley there in fruitless negotiations for peace. At the end of the war he was charged with complicity in the murder of Lincoln, and was for a time imprisoned. He resumed law practice, and died on January 3, 1882. W.F.J.

CLAY, HENRY, JR., an American soldier, son of the statesman, Henry Clay; born in Fayette County, Ky., April 10, 1811. He graduated at

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Transylvania University in 1828, and at West Point in 1831, but resigned the same year. He studied law and practised in his native county, and was a member of the State legislature, 1835–37. He entered the volunteer service in the Mexican War as lieutenant-colonel, and was killed at Buena Vista, Feb. 23, 1847. E.E.T.

CLAY CENTER, a town and the capital of Clay County, northeastern Kansas, situated on the Republican River, about 125 miles W. of Leavenworth, also on the Chicago, Rock Island and Pacific and the Union Pacific railroads. It contains a variety of manufactories, and is an important center of trade. Population 1900, 3,069.

CLAY CROSS, a town in Derbyshire, northern central England, 4½ miles S. of Chesterfield, on the Midland railroad, the center of a coal and iron district. Population 1900, 3,069.

CLAYDEN, ARTHUR WILLIAM, an English scientist; born at Boston, Lincolnshire, Dec. 12, 1855; educated at Christ's College, Cambridge, obtaining a foundation scholarship in 1875, and graduating with distinction in natural sciences in 1876. In 1887 he became lecturer in London on the University Extension Schemes of Cambridge and London. He is a fellow of most of the scientific societies, and has contributed important papers to the society journals, including *On the Thickness of Shower Clouds* (1886); *On a Working Model of the Gulf Stream*, in which is described an invention demonstrating the wind theory of ocean currents (1889); *Note on Some Photographs of Lightning and of "Black" Electric Sparks* (1889); *On "Dark" Flashes of Lightning* (1889). The two latter papers showed that a phenomenon that had long been a scientific puzzle was nothing more than a form of photographic reversal.

CLAY-EATERS. See AMERICA, Vol. I, p. 617; and GEOPHAGISM, in these Supplements.

CLAYS, PIERRE JEAN, painter; was born at Bruges, Belgium, on November 27, 1819, studied in Paris under Gudin, and devoted himself to *genre* and marine paintings, in which he attained great success. He won the first rank in critical esteem among the marine painters of Belgium, and in 1883 was elected a member of the Royal Academy. Many of his pictures have been exhibited at the Paris Salon, and at the various universal expositions held in that city, and for them he received medals in 1867 and 1878. He was also made a commander of the Order of Leopold and a member of the Legion of Honor. Some of his best works are in America. W.F.J.

CLAYTON, a town and the county seat of Barbour County, Alabama, in the southeast part of the state. It lies in a cotton raising country, and is reached by the Central railroad of Georgia. Its population was 998 in 1900. W.F.J.

CLAYTON, a village of Jefferson County, northwestern New York, on the Rome, Watertown and Ogdensburg railroad, 19 miles N.N.W. of Watertown, and on the St. Lawrence River, at the western end of the region of the Thousand Islands. It is a summer resort, and a place where some boat-building is carried on. Population 1890, 1,748; 1900, 1,913.

CLAYTON, HENRY HELM, scientist, was born at Murfreesboro, Tenn., on March 12, 1861, and was educated in the common schools. He became proficient in meteorological science, and was an assistant at the observatory of the University of Michigan in 1884–85, at the Harvard Astronomical Observatory in 1885–86, observer at the Blue Hill Observatory in 1886–91, and local forecaster of the U. S. Weather Bureau in 1891–93. Since 1894 he has been meteorologist at the Blue Hill Observatory. W.F.J.

CLAYTON, JOHN, an American botanist; born in Fulham, England, in 1686. About the age of 20 he emigrated to Virginia. Educated as a physician, he devoted much time to botanical research. He contributed papers to the Royal Society of London which were published in the *Philosophical Transactions*. He also corresponded with, and sent dried specimens of the Virginia flora to, the botanist Gronovius, who named a genus of plants after him. He published *Flora Virginica* in 1762. He died in Virginia, Dec. 15, 1773. E.E.T.

CLAYTON, JOHN M., an American statesman; born in Dagsborough, Del., July 24, 1796. He graduated at Yale in 1815, and at the Litchfield law school in 1819. In 1829 he was elected to the United States Senate, and in 1831 to the State Constitutional convention. In 1835 he was re-elected senator, but resigned in 1837 to become chief justice of the Supreme Court of Delaware, resigning, however, in 1840. Again elected senator in 1845, he resigned in 1849 to become Secretary of State under President Taylor, but was re-elected in 1851. His legislative career was a brilliant one; but he is perhaps best known by the treaty he negotiated with Great Britain, the so-called Clayton-Bulwer Treaty. He died in Dover, Del., Nov. 9, 1856. E.E.T.

CLAYTON, POWELL, statesman, was born at Bethel, Penn., on August 7, 1833, and became a civil engineer in the west. He served in the U. S. Army in the Civil War, rising to the rank of brigadier-general of volunteers, and afterward became a planter in Arkansas. He was governor of Arkansas in 1868–71, and United States Senator in 1871–77. Since 1897 he has been United States Ambassador to Mexico. He has for many years been a prominent leader of the Republican party. W.F.J.

CLAYTON-BULWER TREATY is the designation of a highly important convention concluded between the United States and Great Britain in 1850, the negotiators and signatories being John M. Clayton for the United States, and Sir Henry Bulwer for Great Britain. The acquisition of California and the discovery of gold there, and the consequent great rush of people thither by way of the South and Central American isthmuses, made the opening of a canal at Panama or Nicaragua a matter of interest to the United States. In 1846 a treaty had been made with Colombia, giving the United States special rights of way at Panama, and in 1849 the United

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States made a treaty with Nicaragua providing for the construction of a ship canal across that country. But Greytown, Nicaragua, the Caribbean terminus of the canal route, was then held by the British, and the British government consequently claimed the right of control over that place and over the proposed canal. Instead of insisting upon British withdrawal from quite groundless pretensions, which were afterward relinquished by England, the United States made the Clayton-Bulwer treaty, for a joint protectorate over the proposed canal, and also prohibiting either of the powers from acquiring any further territorial rights in Central America. The treaty was chiefly a source of vexation, and actually operated as a bar to canal construction. It was replaced by the Hay-Pauncefote treaty in 1901.

W. F. J.

CLAYTONIA, an American and Siberian genus of low herbs, belonging to the family *Portulacaceæ*. In the eastern United States *C. Virginica* is the common species of early spring, with a pair of opposite leaves and a raceme of delicate white to rose-colored flowers. The species are commonly known as "spring beauties."

CLEARANCE is a certificate given by the collector of a port showing that the commander or master of a vessel has entered and cleared his vessel according to law. It is a permission to sail, and contains the name of the commander, the name or description of the vessel, the name of the port for which the vessel sails, and, if required, a description of the goods on board. The laws of the United States require the collector to annex to the clearance of any duly registered vessel, bound on a foreign voyage, a schedule of the rates to be allowed according to law. The master of a vessel bound for a foreign port must furnish to the collector a sworn manifest of all the cargo on board, and the value thereof, whereupon he shall be entitled to a clearance for his vessel. If he shall depart on such voyage without a clearance, the master shall forfeit five hundred dollars for each offense. It is also very necessary for the safety of a vessel that a clearance be obtained, for if found at sea without a clearance, the vessel may be legally taken and carried to some court on a charge of piracy.

CLEAR, CAPE, a headland of Clear Island, the most southerly point of Ireland, with a lighthouse on a cliff 455 feet in height, and a telegraph station for reporting vessels.

CLEARFIELD, a borough and the capital of Clearfield County, western central Pennsylvania, on the Pennsylvania, the Beach Creek and the Buffalo, Rochester and Pittsburg railroads, and on the west branch of the Susquehanna. Population 1890, 2,248; 1900, 5,081.

CLEARING-HOUSE. The first clearing-house in New York City was organized Oct. 11, 1853, 38 bankers forming an association for that purpose. Since that time until November, 1895, the amount of clearances have been over $850,000,000,000. The figures, in millions, were: For the year 1892, $36,662; for 1893, $29,045; for 1894, $22,051; for 1895, $26,931. The bank clearing-house is situated at No. 77 Cedar Street. Sixty-six banks are associated for the purpose of exchanging the checks and bills they hold against each other. Other banks, not members of the association, clear through members. The representatives of the members appear at their desks in the clearing-room at ten a.m. every business day, with the checks and bills to be exchanged. Each bank is represented by two clerks, a settling and a delivery clerk. The settling-clerk furnishes the manager of the clearing-house with a credit ticket which shows the amount of exchange which his bank has brought, which exchanges are noted down by the proof-clerk of the clearing-house. The settling-clerk takes his seat at his desk, and has before him a settling-sheet, upon which is entered against the name of each bank the amount brought in exchanges against it. The delivery clerk has a similar list, and takes his place beside his bank's desk, and has the exchanges themselves in a receptacle, arranged in order, so that at the sound of the gong he advances to the desk ahead of him, delivering the exchanges which should be there delivered, obtaining upon his list a receipt from the settling-clerk seated there. Every desk is thus visited. While the delivery clerk of one bank has been making his rounds, the settling-clerk of his own bank has been similarly visited by the delivery clerks of the other banks, giving each settling-receipts. About ten minutes is sufficient to complete this part of the business. Each delivery clerk has receipts for all the exchanges that he has brought, and each settling-clerk has a record of the amount brought for, and the amount received from, each bank. The delivery clerk takes the latter amount to his bank's desk, where the settling-clerk adds up the total amount and gives the proof-clerk of the clearing-house a debit-slip stating the amount, as well as the amounts brought, and the resulting balance due to the bank from the clearing-house or to the latter from the bank, according to the results of the transactions of the previous day at the bank itself. About half an hour is generally required to accomplish this. Each bank owing a balance to the clearing-house has settled with the latter before 1:30 p.m. The credit banks receive immediately thereupon the balance due from the clearing-house. Provision is made for the detection and prevention, as far as possible, of errors in calculations. The amount of clearances done in New York does not strictly represent the amount of local business, for that clearing-house acts in a great measure for the banks of a considerable portion of the whole country. All the other important cities have clearing-houses conducted similarly to the one in New York. The grand total of clearances for the United States, so far as could be accurately ascertained, in millions of dollars, were, for 1893, 49,791; for 1894, 40,912; for 1895, 47,808; and for Canada, for the same respective years, 897; 837; 893.

A STOCK EXCHANGE CLEARING-HOUSE was established in New York City, May, 1892, by means

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of which stock exchange business is settled by a combination of stock and cash balances; both remarkably small in proportion to the enormous aggregate of business transacted. See BANKING, Vol. III, p. 283.

CLEARING-HOUSE CERTIFICATES, certain evidences of value, or of credit, taking the place of money for the time being, and especially used by the Clearing-House Association of Banks. It is one of the developments in banking procedure, whereby the clearing-house combination, or association of banks constituting the clearing-house, is pledged to maintain the credit of every member of the association. Its beneficial effects will be readily comprehended by stating that if a bank is threatened with a run on its funds, and cannot convert its securities into ready cash to meet the contingency without heavy loss, owing either to the temporary or other depreciation in the value of the securities, or the inability at the moment to convert them into cash because of a possible stringency of the money market, the other banks in or of the association come to the rescue, by the issuance of certificates from the clearing-house, which certificates are good at any bank in the association for their face value, and have the immediate effect of restoring confidence in the minds of depositors. For example, suppose, in the event of a "run" on a given bank, the demand for a million and a half of dollars is made; it would require three tons of gold coin to meet it, involving an immense expense as well as risk; whereas under the system of clearing-house certificates there is a guaranty given that a sum sufficient to satisfy all demands has been deposited, subject to the return on demand, and the entire body composing the Clearing-House Association is pledged to maintain the integrity of the certificate.

The totals of the general proof being daily transferred to the ledger, reference to this is alone necessary to ascertain the dealings of each individual bank, day by day, month by month, and year by year, since it became a member of the association. There is a constant check upon irregularities, as all the banks are under the scrutinizing eye of the clearing-house. Each one of the body fully realizes how greatly expulsion would jeopardize its credit. This latter feature has done much to prevent the undue extension of loans which would inevitably produce weakness and possible disaster. The system originated with F. W. Edmonds, formerly cashier of the Mechanics' Bank, New York City. He planned the issue of clearing-house certificates in 1852, and paved the way for the smooth and successful business management subsequently developed in the banking world.

CLEARING-NUT, (*Strychnos potatorum*), a small tree which grows abundantly in the forests of India. The seeds when rubbed on the inside of a vessel clears muddy water of all impurities and are highly prized by travelers. W.R.B.

CLEAR LAKE, the name of a village and two lakes in California. The village lies on the shore of Clear Lake, in Modoc County, in the northeastern corner of the state. That lake is about 12 miles long by 6 miles wide. Another much larger lake of the same name lies in Lake County, about 80 miles north of San Francisco, and is a popular health and pleasure resort, mineral and other springs abounding in that region. W.F.J.

CLEAVAGE. See CRYSTALLOGRAPHY, Vol. VI, p. 594.

CLEAVELAND, MOSES, an American soldier and pioneer; born in Canterbury, Conn., in 1754. He graduated at Yale in 1777. He joined the Revolutionary army, and as captain of a company of sappers and miners distinguished himself at the recapture of Stony Point by Gen. Anthony Wayne, July 16, 1779. After the conclusion of the war he took up the practice of law, and served several terms in the Connecticut legislature. He was also brigadier-general in the State militia. In 1795 the Connecticut Land Company was formed to develop the lands in the Western Reserve which now form part of the State of Ohio, and Gen. Cleaveland, as its agent, led a party of about 50 settlers to this region; chose a site for a town at the mouth of the Cuyahoga River on Lake Erie; surveyed the land into town lots; and made the first map of the present city of Cleveland (the *a* in the founder's name having been dropped from that of the city). Gen. Cleaveland died in Canterbury, Conn., in 1806. E.E.T.

CLEAVELAND, PARKER, an American scientist; born in Rowley, Mass., Jan 15, 1780. He graduated at Harvard in 1799, and in 1805 was chosen professor of mathematics and natural philosophy, and lecturer on chemistry and mineralogy in Bowdoin College, an office he held with slight changes until his death. He was a member of many learned societies, and published *Mineralogy and Geology* (1816). He died in Brunswick, Me., Oct. 15, 1858. E.E.T.

CLEBURNE, a town and the county seat of Johnson County, Texas, in the north-central part of the state. It lies in an agricultural and grazing country, near the Brazos River, 28 miles from Fort Worth and 44 miles from Dallas, and is reached by the Gulf, Colorado and Santa Fé railroad. Its population was 3,278 in 1890, and 7,493 in 1900. W F.J.

CLEBURNE, PATRICK RONAYNE, soldier, was born in Ireland on March 17, 1828, studied to be an apothecary, but failed in his examinations and therefore entered the army. In 1849 he came to America and was employed by a druggist in Cincinnati, studied law, and was admitted to the bar in 1855. In the Civil War he enlisted in the Confederate service, under General Hardee. In March, 1862, he was made a brigadier-general, and as such distinguished himself at Shiloh. At Richmond, Ky., and at Perryville, also, he displayed great valor, in each battle being severely wounded. In December, 1862, he was made a major-general, and as such was in the thick of the fighting at Murfreesboro and at Chickamauga.

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After Chickamauga his army was reorganized, and thereafter he participated conspicuously in the battles of Missionary Ridge, Ringgold's Gap, Resaca, New Hope Church, Kenesaw Mountain, and the struggles around Atlanta and Jonesboro. He retired with General Hood from Georgia into Tennessee, and met his fate there in the desperate battle of Franklin, on Nov. 30, 1864. Cleburne's troops led the advance and broke the first line of the Federal army, but just as they were striking at the main line Cleburne was shot and killed. His death was an irreparable loss to the Confederate army. He had been likened to "Stonewall" Jackson, for his intrepidity and combination of stubbornness in defense and audacity in attack. He was the founder of the "Order of the Southern Cross," an order of military chivalry, and was the chief Confederate advocate of the use of negro troops in the war. W.F.J.

CLEEF, JOHANN or JAN VAN, a Flemish painter; was born at Venloo about 1646, and was a pupil of Gaspar de Crayer, whose work for the tapestries of Louis XIV he completed. He executed many large paintings of a decorative type for churches in Flanders, and was a master hand in the portrayal of figures and draperies. He died in 1716. W.F.J.

CLEG, a name given to some insects of the dipterous family *Tabanidæ*. The females are extremely troublesome to horses and cattle.

CLEISTOGAMY, a name applied to the habit of certain plants in producing flowers differing from the normal showy ones, in being inconspicuous, seldom opening, and capable of self-pollination. These cleistogamous flowers seem to be a device to insure the production of seed in case the more showy flowers fail of cross-pollination. Notable examples are the species of violet, although the list of known cleistogamous plants is becoming quite a long one.

CLEMATIS (Gr., *clima*, the shoot of a vine), a genus of plants of the natural order *Ranunculaceæ*, with long climbing stems and beautiful flowers. One species, *C. vitalba*, is fancifully called "the traveler's joy" on account of its ornamental appearance. It rapidly covers walls and unsightly objects. *C. virginiana* has white flowers and is known as the virgin's bower. Many varieties and hybrids are cultivated, having large variously-colored flowers. W.R.B.

CLÉMENCEAU, EUGÈNE, a French politician; born Sept. 28, 1841, at Mouilleron-en-Pareds, in the department of Vendée, studied medicine at Paris, where he also practiced as a physician for a while. In 1870 he was elected mayor of the 18th arrondissement, and in February, 1871, to the Chamber of Deputies, where he voted against the negotiation of peace preliminaries. During the reign of the Commune he tried to functionate as mediator between the Paris Hotel-de-Ville and the Versaillists, but failed to save Generals Lécomte and Clément Thomas from being shot by the Communists on March 18, 1871. Having resigned as mayor and deputy he devoted his whole energy to the Paris municipal council of which body he became president in 1875. In February, 1876, he was re-elected to the Chamber, and ranged with the Extreme Left in which he was conspicuous for his eminent eloquence, and of which he was the acknowledged leader down to 1893. In March, 1879, he moved for the impeachment of the Fourtou-Broglie Ministry, and advocated a general amnesty for the Communists, and on March 6, 1883, a revision of the constitution. A bitter opponent of Ferry's colonial policy, he effected his down fall, and likewise that of Freycinet's Cabinet in 1886 by a combination with the Right. In spite of his growing influence on the Radicals, on whose good will the government had to depend, he refused the offer to form a new cabinet, made to him by Grévy on the demission of Rouvier in 1887. By the split of the party into Radicals and Boulangists, and by the defeat of the latter in the elections of 1889, he lost much of his former prestige, which became still more undermined by personal attacks made on his character during the Panama scandal. Defeated in 1893, he retired from public life, and became editor-in-chief of the newspaper *Justice*. G.A.S.

CLEMENS, JEREMIAH, soldier, lawyer and author; was born at Huntsville, Alabama, on December 28, 1815, was educated at the Alabama State University, and became a lawyer. In 1838 he was United States marshal for northern Alabama, and for five years thereafter was a member of the legislature. He served as an officer in the Mexican War and remained in the army for some time thereafter. He was a United States Senator from Alabama from 1849 to 1853, and in 1856 was a Presidential elector. He wrote two novels, *Bernard Lile* and *Mustang Grey*, in 1853 and 1857 respectively, and some others of less importance at later dates. In 1859 he became editor of the *Eagle and Inquirer* at Memphis, Tenn., and early in the Civil War joined his neighbors in the secession movement. In 1864, however, he became a supporter of the Union cause. He returned to his home at Huntsville, Alabama, and died there on May 21, 1865. W.F.J.

CLEMENS, SAMUEL LANGHORNE ("Mark Twain"), humorist, romancer and moralist, was born at Florida, Mo., Nov. 30, 1835; his family moved to Hannibal, Mo., three years later. While thirteen years of age he entered a newspaper office as an apprentice, and after three years of service he worked at his trade in St. Louis and other cities. In 1857 he began to study piloting on the Mississippi River and became a licensed pilot shortly before the Civil War temporarily closed the river to commercial navigation. For a few weeks in 1861 he served in the Confederate army, but in the same year became secretary to his brother, who had been appointed secretary of

SAMUEL L. CLEMENS.

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Nevada Territory. In the following five years he was an editor and reporter in Nevada and California, and made some attempts at mining. In 1866 he visited the Sandwich Islands, as Hawaii was then called, and contributed to the San Francisco *Union* some humorous letters on that peculiar little kingdom.

In 1867 appeared his first book, a thin volume entitled *The Jumping Frog of Calaveras and Other Sketches*, being a collection of droll contributions he had made to various newspapers with which he had been connected. It was the literary "hit" of the year, for, like all its author's subsequent books, it was humorous, full of the unexpected, and utterly unlike anything by any other writer. In the same year he accompanied America's first steamer-load of excursionists to Europe and the Holy Land; the literary result of this trip was a large book, *The Innocents Abroad*, of which more than a hundred thousand copies were sold, and which made its author the most popular humorist of his generation of English-speaking people—a position which his many subsequent books have strengthened.

In 1872 appeared his *Roughing It*—a large volume of recollections of his life in Nevada and California; it was quite as amusing and successful as *Innocents Abroad*. He had already been editor of the Buffalo *Express* for two years, but the success of *Roughing It* justified him in giving up editorial work. He was called to the lecture platform, and permanently remained its most popular figure, for his manner was as mirth-provoking and inimitable as his matter. In 1874, in co-operation with Charles Dudley Warner, he wrote a novel, *The Gilded Age*, which contains his best known adult "character," Col. Mulberry Sellers. In 1876 appeared *The Adventures of Tom Sawyer*, a story of boy life, which raised its author to the level of the literary artist.

In 1884 Mr. Clemens organized the publishing firm of C. L. Webster & Co. which issued, as its first book, Mark Twain's *The Adventures of Huckleberry Finn*, which has been in steady demand ever since, and is regarded as its author's greatest book, for it abounds in fact, fancy, humor, pathos, vivid description and covert history and criticism, although its leading characters are two humble runaways—a drunkard's son and a southern slave. The same firm published, Mr. Clemens having secured it, as well as stimulated its author to its completion, General Grant's *Recollections*, which yielded about a third of a million dollars to the general's family. In 1889 he made many unconventional additions to the mass of Arthurian legends by publishing *A Yankee at King Arthur's Court*, in which much sound philosophy was presented in humorous dress. His most unexpected literary effort was *Joan of Arc*, published anonymously, yet acquiring distinction from the beginning by its sympathetic portraiture and its well-maintained medieval atmosphere. Other notable, yet dissimilar books, were *The Prince and the Pauper*, *Tom Sawyer Abroad*, *Puddin'head Wilson*, and *The Man Who Corrupted Hadleyburg*, the latter being a masterly study of fairly good human nature under the influence of greed. Still other books, most of them containing sketches which their author had contributed to periodicals, are *Sketches Old and New; Punch, Brothers, Punch; A Tramp Abroad; The Stolen White Elephant*, and *The American Claimant*. Several of his books have been dramatized successfully.

According to some of his admirers, Mr. Clemens' greatest work was a lecturing tour of the civilized world in 1895–6, with the purpose, which succeeded, of earning money to pay all the debts of his publishing house, which had failed in business. J.H.

CLEMENS, Will Montgomery, an American author; born in Paris, Ohio, January 16, 1860. He was educated at Buchtel College, entered journalism in 1878 and has published *Famous Funny Fellows* (1881); *Life of Mark Twain* (1887); *Sixty and Six* (1898); *Depew Story Book* (1898); *Life of Theodore Roosevelt* (1899); *A Ken of Kipling* (1899); *Life of George Dewey* (1899); *Hasty Pudding Poems* (1901), and *The Gilded Lady* (1903). F.C.G.

CLEOMBROTUS, son of King Anaxandrides, of Sparta, and brother of Leonidas, the defender of Thermopylæ. He became regent after the battle of Thermopylæ, B. C. 480, for Plistarchus, the infant son of Leonidas, but died in the same year and was succeeded in the regency by his own son, Pausanias. He commanded the army that gathered after the defeat at Thermopylæ to repulse the Persians. R.W.C.

CLEOMBROTUS I, king of Sparta, son of Pausanias, victor of Platæa, fell in 371 B. C. at Leuctra, defeated by the Thebans under Epaminondas.—Cleombrotus II, king of Sparta, 242 B. C., was expelled in 240 by Leonidas II. G.A.S.

CLEOMEDES, a Greek philosopher, mathematician and astronomer; flourished in the second century A. C. In his work named *Trochilics of the Heavenly Bodies*, treating on the circular motion of the stars, he demonstrated the theory of the world's system, so ably expounded by the Stoic philosophers, especially by Posidonius. See Light, Vol. XIV, p. 581. An edition of his work appeared in Leyden in 1820. G.A.S.

CLEOPATRA'S NEEDLES. See Alexandria, Vol. I, p. 437; Architecture, Vol. II, p. 342; Obelisk, Vol. XVII, p. 723.

CLERC, Laurent, educator; was born in France on Dec. 26, 1785. In infancy he accidentally fell into a fire, and thus lost the senses of smell and hearing. He was carefully educated, and became a teacher of the deaf and dumb. In 1816, at the urging of Dr. T. H. Gallaudet (q.v.), he came to America and helped to organize the Connecticut Asylum for the Education of the Deaf and Dumb. He was the father of several children, all of whom were able to speak and hear perfectly. He devoted himself for 50 years to teaching, and died on July 18, 1869, at Hartford, Conn. W.F.J.

CLERK, John, naval expert; was born in

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Scotland in 1728, and in 1773 settled on an estate at Eldin. He proposed in 1779 a new plan for breaking the enemy's line in a naval battle, and laid it before some officers in London, among whom is said to have been Sir Charles Douglas, who was Rodney's captain of the fleet in the great battle of April 12, 1782, in which battle Clerk's plan was tried with signal success. Clerk was the author of an *Essay on Naval Tactics*. He died on May 10, 1812. W.F.J.

CLERK, JOHN, JR., son of the preceding; was born in Scotland in 1757, became a lawyer; was made a judge of the Scottish bench in 1823, assuming the judicial title of Lord Eldin, and died in 1832. W.F.J.

CLERMONT-DE-LODÈVE, France, a town in the department of Hérault, 10 miles S.E. of Lodève. It manufactures military clothing, etc. Pop., 6,000. C.L.S.

CLETHRA (*Clethra alnifolia*), the sweet pepper bush, or white alder, a shrub native to North America inhabiting swamps and sometimes dry soil from Maine to Florida, mostly near the coast. W.R.B.

CLEVELAND, a wild mountainous district, with some picturesque fertile valleys, forming the east part of the North Riding of Yorkshire, England. In the south the hills rise 1,300 to 1,850 feet. An extraordinary change has been wrought in the aspect of the country by a rich discovery of ironstone in the Cleveland hills; since 1851 lonely hamlets have become populous towns. See YORK, Vol. XXIV, p. 784.

CLEVELAND, a city of Ohio. (See Vol. V, p. 724.) The population of the city was 160,146 in 1880, 261,546 in 1890, and 381,768 in 1900 (12th Census). Area of city 33⅜ sq. miles. Jan. 1, 1890, the assessed valuation of property in the city was $95,000,000; in 1903, $203,215,230. The debt of the city was, in 1890, $8,156,200; in 1903, $15,044,575. The rate of taxation in 1890 was 2.83 per cent, and in 1904, 2.98 per cent. There were, in 1900, 2,927 manufacturing establishments, with a direct investment of $98,303,682, employing 64,220 persons, whose annual wages amounted to $33,624,834, and with an annual production of $139,849,806. The city contains eight shipyards, two of them of immense proportions, for building iron and steel vessels. Its ship-building and iron-ore industries, and docks are the most important of any on the lakes. The Standard Oil Company formerly had its headquarters in the city and did a large petroleum business. The proportions of the leading manufactures, by the census of 1900, based on direct investment was: Iron and steel, $14,616,917; iron and steel bolts, nuts, washers and rivets, $712,045; iron and steel forgings, $1,906,496; ironwork, architectural and ornamental, $467,528; foundries and machine-shops, $11,688,326; petroleum, $5,983,718; electrical supplies, $3,884,076; liquors (malt), $3,788,202; chemicals, lumber, paints and printing, including publishing, over $1,000,000 each. A harbor of refuge was constructed by the United States government and cost nearly $2,000,000; and the great viaduct, extending from the lake on the east side to the top of the hill on the west side, was completed at a cost of $2,225,000. The chief educational institutions include Adelbert College, established in 1826, at Hudson, as the Western Reserve College, and removed to Cleveland in 1882; the Cleveland Medical College, founded in 1834, and possessing a fine museum. These are considered parts of the Western Reserve University. The Case School of Applied Science is an important well-endowed technological institution. The medical department of Wooster University is also located in the city. A feature worthy of mention in this connection is the "Educational Bureau," organized by prominent citizens, and designed to provide instruction and recreation for workingmen and women by means of lectures, concerts, and the free distribution of digested material on special subjects. The public libraries contain a total of over 157,000 volumes.

The city is perhaps best known abroad in connection with Euclid Avenue, which is regarded by many as the finest avenue in the United States. It is lined with beautiful private residences, with handsome grounds most tastefully laid out. About four miles out from the public square called Monumental Park, where a monument to Moses Cleaveland (Vol. XXVI) is erected, is Wade Park, on the north side of Euclid Avenue, consisting of 73 acres. It occupies a deep ravine and uplands, and is a favorite resort. Up to 1882 it was the private park of Jeptha H. Wade, a prominent citizen, who presented it to the city. Lake View Park, on the lake-front in the city portion, is much frequented. Lake View Cemetery contains the remains of President Garfield, to whom a fine monument has been there erected. Outside the city limits, to the northeast, lies the suburb of Glenville, where the famous trotting-track of that name is located. Cleveland celebrated its centenary July 22, 1896, on which occasion John D. Rockefeller presented the city with $600,000, to be used for park purposes.

CLEVELAND, a railroad junction and the capital of Bradley County, southeastern Tennessee, on the Southern railroad, 29 miles E.N.E. of Chattanooga. It is an educational town and contains an academy, an institute for women, and the largest Southern college for women. Population, 1890, 2,863; 1900, 3,858.

CLEVELAND, CHARLES DEXTER, an American educator and author; born in Salem, Massachusetts, December 3, 1802. He was graduated from Dartmouth College in 1827 and in 1830 became an instructor at Dickinson College. Later he was professor of Latin and Greek at the New York University. In 1861 he was appointed United States Consul at Cardiff, Wales. He prepared a concordance to Milton's *Poems* and was the author of numerous school and college text-books. He died in Philadelphia, Pennsylvania, August 18, 1869. W.M.C.

CLEVELAND, GROVER, 22d and 24th President of the United States, was born at Caldwell, New Jersey, March 18, 1837. In his third year his father, who was a Presbyterian minister, was called to Fayetteville, New York, and afterwards to Clinton, New York, where at the age of six-

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teen years, while Grover was clerk in a village store and preparing for college, the elder Cleveland died. In 1855 young Cleveland started westward with the intention of beginning his adult life at Cleveland, O., but a visit to an uncle at Buffalo, N. Y., led to his entering a law office in that city. In 1859 he was admitted to the bar, and four years later was appointed Assistant District Attorney at Buffalo.

GROVER CLEVELAND.

His first elective office was gained in 1870, when he became Sheriff of Erie County, which includes Buffalo. At the end of his three-year term he resumed the practice of law, at which he was very successful; his temperament being judicial, his arguments were distinguished by clearness of statement and by lucid exposition of the legal principles affecting his cases. Already and always insisting that "public office is a public trust," his criticisms of the city administration commanded general attention, and in 1881 he was elected Mayor, as a Democrat, by a majority of about 3,500 votes, although Buffalo was a Republican stronghold. He compelled so many reforms that before he had been in office a year he was elected Governor of the State by the unprecedented majority of 192,000 over his Republican opponent. He soon became known as a "reform" Governor, and his State's most prominent presidential possibility. In 1884 Mr. Blaine's nomination for the Presidency was unsatisfactory to the "Independent Republicans," who now constituted a strong faction in many Northern States; Mr. Cleveland, nominated by the Democrats, was elected, receiving most of the Independent votes.

As President he was unable to secure legislative approval of the announced purposes of his party, one of which was a reduction of the tariff, for there was a Republican majority in one or both Houses of Congress throughout his term. But he enlarged the scope of civil service reform by executive orders and by making fewer removals from office than any of his Republican predecessors had made. He disheartened the office-seeking faction of his own party, which had expected a general substitution of Democrats for Republicans in public office. He made enemies in his own party, as well as in the opposition by insisting on rigid economy in appropriation bills. His principal suggestions on which Congress acted favorably provided for the Presidential succession in case of death of both President and Vice-President, and an amicable arrangement with Great Britain regarding commercial fisheries in Canadian waters. Renominated in 1888, he was defeated by Benjamin Harrison, although he received a majority of the popular vote.

In 1892 he was again nominated, although against the unanimous protest of his own State delegates to the Convention, and he defeated Mr. Harrison, the Republican nominee. His second term was an exciting one throughout. He withdrew the preceding administration's treaty for the annexation of Hawaii. The tariff reform act of his Democratic Congress was so unsatisfactory to him that, while he did not veto it, it became a law without his signature. For some years the government had been purchasing and coining most of the silver yield of the United States; meanwhile the price of the metal in the world's markets had fallen to almost one-half of the nominal value of the silver dollar, and American bankers had become apprehensive of serious disturbance of the currency values. Mr. Cleveland succeeded in having the Silver Purchase Act repealed against the will of many members of his own party in Congress. Many Democrats also disapproved of his suppression of a great railway strike in Chicago by sending U. S. troops to that city after he had waited in vain for the Governor of Illinois to act; the President gave as his reason that the strikers interfered with a function of the national government by preventing transmission of the mails.

But the most exciting incident of his second term was his upholding (in 1895) of the Monroe Doctrine with a special message declaring that the United States should protest, by force if necessary, against Great Britain's apparent intention to absorb a large portion of Venezuela by changing the border line between that republic and British Guiana. Great disturbance and depression of business followed, yet the President's course was approved by the mass of the people and by Congress. Conciliatory action by Great Britain followed, and conflict was averted.

In 1904 Mr. Cleveland published a book, *Presidential Problems*, consisting of essays on the independence of the executive in making appointments, the enforcement of the Monroe Doctrine, the maintenance of the integrity of our finances and currency, and the right of the general government to overcome all obstacles to the exercise of its functions throughout the national domain. In effect, the book is an explanation of his most notable acts in his two terms of office. J.H.

CLEVELAND, ROSE ELIZABETH, author, sister of Grover Cleveland (q. v.); was born at Fayetteville, N. Y., in 1846, was educated at Houghton Seminary, and became a teacher, lecturer and writer. In 1885–86 she was mistress of the White House during her brother's Presidency until his marriage. She has written *George Eliot's Poetry and other Studies; The Long Run* (a novel), and many magazine articles. She now lives chiefly in Vienna, Austria.

W.F.J.

CLEVENGER, SHOBAL VAIL, sculptor; was born in Ohio on October 22, 1812, and was apprenticed to a stone-cutter. He soon showed much artistic skill, and adopted the profession of a sculptor. He opened a studio in New York City, and there made portrait busts of Henry Clay, Daniel Webster, and other eminent men. He went to Rome in 1840, and there executed some

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of his best works, including his *North American Indian*, which ranks among the masterpieces of American art. He died at sea, near Gibraltar, on September 23, 1843. W.F.J.

CLEVENGER, SHOBAL VAIL, JR., physician, son of the sculptor of the same name; was born in Florence, Italy, on March 24, 1843, and served in the Civil War. He studied at the Chicago Medical College, and became a specialist in nervous and mental diseases, and is settled in that profession in Chicago. W.F.J.

CLEW BAY, Ireland, in County Mayo, on the west coast, extends inland for about 15 miles with an average breadth of 8 miles. On its shores are the towns of Newport, Westport, and Louisburgh. Clare Island is at the entrance and 300 cultivated islets at the upper end. C.L.S.

CLICHE, the impression made by a die in melted tins or other fusible metals. It is the proof of a die-sinker's work, by which he judges of the effect and ascertains the stage of progress as reached before the die is hardened. The same term is applied by the French to stereotype casts from woodcuts.

CLICK-BEETLE OR SPRING-BEETLE, the popular name given to many coleopterous insects of the family *Elateridæ*. They are so called from springing into the air with an audible click when placed on the back. The click is caused by striking the wing-covers against the supporting surface, The well-known wire-worms are larvæ of certain species. See COLEOPTERA, Vol. VI, p. 119.

CLIDASTES, a genus of reptiles found in the Cretaceous formation of North America. They reached a length of from 12 to 40 feet.

CLIFF-DWELLINGS. See METEORA, Vol. XVI, p. 119; and INDIANS, AMERICAN, Vol. XII, pp. 862–874.

CLIFF LIMESTONE. A formation of rock strata belonging to both the Silurian and Devonian ages, found in and west of Ohio.

CLIFFORD, FREDERICK, an English lawyer and author; born in 1828, practiced at the Parliamentary bar and served as assistant boundary commissioner under the Reform Act of 1867. He was the author of several important treatises on parliamentary law, his great work in this connection being his *History of Private Bill Legislation*, which is of great historical interest to students, on account of the light it throws on the social progress of Great Britain. He was also the author of interesting reports upon agricultural topics, in connection with the land and legal phases.

CLIFFORD, NATHAN, an American jurist; born in Rumney, N. H., Aug. 18, 1803. His early opportunities were limited, but he secured an education by his own exertions, studied law, and commenced practice in York County, Me., in 1827. He was a member of the State House of Representatives, 1830–34 (the last two years serving as Speaker); Attorney-General of Maine, 1834–38; member of the National House of Representatives, 1839–43; Attorney-General of the United States, 1846–48; and envoy to Mexico, 1848–49. He was appointed associate justice of the Supreme Court of the United States by Pres. Buchanan in 1858. Between that year and 1880 he compiled four volumes of circuit court reports. His decisions have been valuable contributions to commercial, copyright, and patent law. He died in Cornish, Me., July 25, 1881. E.E.T.

CLIFFORD, MRS. LUCY, English novelist and relict of the late Prof. W. K. Clifford, one of the most brilliant mathematicians of the century. She comes of a family once notable in Barbados, where her grandfather, John Brandford Lane, was sometime speaker of the house of assembly. At the age of 15 Mrs. Clifford began to write stories, which in time gradually found their way into print in various magazines, and exhibited considerable talent. In 1875 she married, and four years later lost her eminent husband, when she turned her thoughts to literary work again, and published three volumes for children. She first became known to fame, in 1885, as the author of *Mrs. Keith's Crime*, a novel much talked of in its day, but since eclipsed by the popularity of her *Aunt Anne*. Besides these two powerful character-stories, and a third novel, entitled *A Flash of Summer*, which first appeared in the *Illustrated London News*, she has written a number of stories of slighter bulk, notably *A Wild Proxy; Love Letters of a Wordly Woman; The Last Touches*, and *Mere Stories*. "The main themes of her ablest writing, Mrs. Clifford always finds in her hatred of dowdyism, especially in mind of ugly prosperity, of smugness, and of injustice."

CLIFFORD, WILLIAM KINGDON, mathematician; was born at Exeter, England, on May 4, 1845, and was educated at King's College, London, and at Cambridge. He was equally noted in college as an athlete and a mathematical genius. He became a fellow of Trinity College, Cambridge, and in 1871 was appointed professor of mathematics and mechanics at University College, London, which place he filled until his death. He wrote much for the *Proceedings* of the London Mathematical Society, and was the author of *Elements of Dynamics* (1878), and *Common Sense of the Exact Sciences*, both of which he left unfinished. He dealt also with mental science, and made a memorable discourse on *Some of the Conditions of Mental Derangement*. Nor did he avoid theology, but, beginning as an orthodox churchman, entered into independent discussions of the philosophy of religion, with entire freedom of dogmatic restraint. He died in Madeira on March 3, 1879. W.F.J.

CLIFTON, ROBERT BELLAMY, an English mathematician and physicist; born at Gedney, Lincolnshire, March 13, 1836; studied at University College, London, and at St. John's College, Cambridge, and graduated in 1859. In 1860 he was elected to a fellowship in St. John's College, and became professor of experimental philosophy in Owens College, which he held until appointed professor in Oxford in 1865. In 1868 he was elected a fellow of the Royal Society. He

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designed and organized the Clarendon Laboratory in Oxford, the first of the kind in England. He was a member of the Royal Commission on Accidents in Mines (1879–86), and president of the Physical Society (1882–84).

CLIFTON, a town of Southern Ontario, and a port of entry, on the Niagara River, two miles below the Falls. Population about 1,200.

CLIFTON SPRINGS, New York, a village in Phelps and Manchester townships, Ontario Co., 10 miles N. E. of Canandaigua, on the Auburn branch of the New York Central and Hudson, and the Buffalo division of the Lehigh Valley railroads. Its sulphur springs made it a health resort from early times. Pop., 1,617. C.L.S.

CLIMACTERIC YEAR, the name given in classic times to what was supposed to be a critical period in life, in which a change was believed to occur in the intellectual and physical functions. The Pythagoreans regarded as climacteric years those whose numbers were multiples of seven. Others gave the distinction to the multiples of nine, and all united in regarding the multiple of seven and nine, to wit, 63, as "the grand climacteric." The Roman emperor, Augustus, regarded the approach of that year in his life with great fear. W.F.J.

CLIMAX, a Greek word meaning a stair, and derived from a root which conveys the idea of "sloping." In English it indicates the highest point of an ascent, or the point of greatest intensity; the climax of an oration or argument being its most impressive portion. Climax, in rhetoric, is the figure by which the speaker, in a well-arranged series of propositions, each of greater force than the preceding, gradually leads the minds of his hearers to a full appreciation of the supreme point of his discourse.

CLIMBERS, the birds of the order *Scansores*, so called from their climbing habits. See SCANSORES, in these Supplements.

CLIMBING-FERN, a name applied to a species of *Lygodium*, a genus of twining and climbing ferns growing in the tropics of both hemispheres. It belongs to the family *Schizæaceæ*, characterized by its peculiar sporangia, which are sessile, and open by a longitudinal slit, the annulus cells forming a cap. The only species of temperate regions is the slender and graceful *L. palmatum* of the eastern United States, growing in low, shady woods, and entangled among herbs. The leaflets are roundish and palmately five to seven lobed, the upper ones more compounded and bearing the sporangia on their margins. It is much prized in house-decoration.

CLIMBING-PERCH, a name applied to the small fish *Anabas scandens* inhabiting the ponds and rivers of the East Indies. By means of its pectoral fins it can travel long distances overland, and is said even to be able to climb trees by the use of its gill covers and anal fin. Its respiratory organs are so constructed that it can live out of water for several days. R.W.C.

CLIMBING-PLANTS OR CLIMBERS, plants which seek external support to facilitate their upward growth. Some climb by means of small root-like processes growing from the stem, some by means of tendrils, some by adhering disks, and others by twining their stems around the objects to which they cling.

CLINCH RIVER, an affluent of the Tennessee River, which rises in the Blue Ridge Mountains in southwestern Virginia and entering Hancock County, Tennessee, flows west southwest to the Tennessee River, joining it at Kingston, Roane County, after a course of 200 miles. C.L.S.

CLINEDINST, BENJAMIN WEST, artist, was born at Woodstock, Virginia, in 1860, and was educated at the Virginia Military Institute. He became an illustrator of books and magazines, and a painter of portraits and genre pictures. He is a member of the National Academy of Design, the Society of American Artists, and the American Water-Color Society. He won the Evans prize of the American Water-Color Society in 1900. W.F.J.

CLINGMAN, THOMAS LANIER, soldier and scientist, was born at Huntsville, N. C., on July 27, 1812, and was graduated from the University of North Carolina in 1832. He became a lawyer, and a Whig member of the state legislature. From 1843 to 1858, with the exception of two years, he was a representative in Congress, and in 1858 became a United States Senator. He withdrew from the Senate with other Southerners in 1861, and became an officer in the Confederate army, serving with distinguished valor and efficiency at Charleston, Newbern, Cold Harbor, Petersburg, and elsewhere. Both before and after the war he devoted much attention to scientific researches, especially in geology. He surveyed the Appalachian Mountains in North Carolina, discovered and opened mines of mica, corundum, zircon, and rubies; gave his name to the loftiest mountain peak in his native state — Clingman's Dome, in the Great Smoky Mountains, 6,660 feet high, scaled by him in 1858 — and to the mineral Clingmanite, of which he was the discoverer, and made important observations of meteors, the speed of sound, etc. He wrote much for the scientific press, and also published several volumes, including one of "speeches," and on *Follies of Positive Philosophers*. General Clingman retained his physical and intellectual powers almost unimpaired to the end of his long life, and continued to take a keen interest in scientific and political affairs. He was an occasional and much prized contributor to the press during the last year or two of his life. He died on November 4, 1897. W.F.J.

CLINKSTONE. See GEOLOGY, Vol. X, p. 209.

CLINOMETER, an instrument for taking the dip and strike of a stratum, the grade of a railway track, or the like. It consists of a compass provided with a small spirit-level and having on the lid a small graduated arc and a plumb-line. The name is applied, also, to several devices operating on a similar principle, and used for determining angular elevation or depression. One form, having a bar with sliding points, is used

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in craniometrical determination of the facial angles.

CLINTON, a town, capital of Van Buren County, north-central Arkansas, is situated on Little Red River, 60 miles N.W. from Little Rock Population 1900, 297.

CLINTON, Ontario, a town and railroad junction of Huron County, on the Grand Trunk railway, 10 miles S.E. of the county seat and port of Goderich on Lake Huron. The salt from its extensive brine wells is largely exported throughout Canada and the United States. There are also several minor domestic industries and manufactures. Pop., 1901, 2,547. C.L.S.

CLINTON, a village, capital of Jones County, central Georgia. Estimated population of the village, 250; population of the militia district in 1890, 536 Pop. 1900, 658.

CLINTON, a city, capital of Clinton County, eastern Iowa (see CLINTON, Vol. VI, p. 8), has had a large growth, and is an important point for the distribution and manufacture of lumber. It has eight daily and weekly newspapers, and is equipped liberally with banks, schools, public library, etc., besides saw-mills, paper-mills, iron foundries, chair factories, railway repair-shops, flour-mills, canning-works, and asphaltum-works. An iron railroad bridge four thousand feet in length spans the Mississippi at this point, and the facilities for rail and river transportation are abundant. Pop. 1890, 13,619; 1900, 22,698.

CLINTON, a city, capital of Hickman County, southwestern Kentucky; a station of the Illinois Central railroad; has a bank, several churches, and flour and lumber industries. Population 1890, 1,347; 1900, 1,462.

CLINTON, Louisiana, the seat of East Feliciana Parish, ten miles by rail northeast of Ethel. It is a cotton raising center and the seat of the Southern Military Academy. Population, 1900, 960. C.L.S.

CLINTON, Massachusetts, the industrial and trade center of the eastern part of Worcester County, twelve miles northwest of Worcester, entered by several railroads. (See CLINTON, Vol. VI, p. 8.) Pop., 1890, 10,424; 1900, 13,667. C.L.S.

CLINTON, a town of Hinds County, south central Mississippi, about 10 miles W.N.W of Jackson; is the seat of Mississippi College and of the Central Female Institute. Population 1900, 354.

CLINTON, a city, capital of Henry County, west-central Missouri, is situated on the Missouri, Kansas and Texas railroad, about 75 miles S.E. from Kansas City. It has two colleges, a pottery, tile-works, rolling-mills, etc. Population 1890, 4,737; 1900, 5,061.

CLINTON, a village of Oneida County, central New York, about nine miles S.W. of Utica; is chiefly known on account of its educational institutions, which include Hamilton College, two seminaries for girls, and an academy. Quarries of flag and building stone are in the vicinity. Population 1890, 1,269; 1900, 1,340.

CLINTON, a town, capital of Anderson County, eastern Tennessee, situated at the crossing of the Clinch River by the Southern railroad. It is in a productive cotton, grain, and peanut raising region, and it has flour and sawmills, a foundry and a tool-handle factory. It has steamboat connections with points farther down the river. Population 1900, 1,111.

CLINTON, CHARLES, an American colonist; born in Longford County, Ireland, in 1690. With several friends he chartered a ship and sailed for Philadelphia, May 20, 1729, but the party landed on Cape Cod, Oct. 4, in the same year. In 1731 a settlement was founded in Ulster County, N.Y. There Mr. Clinton engaged in farming and land-surveying, and was elected judge of the county court. In 1756 he was appointed lieutenant-colonel of militia, and, with two of his sons, served against Fort Frontenac. He was the American ancestor of the celebrated family of Clinton in New York State. He died in Ulster County, Nov. 19, 1773. E.E.T.

CLINTON, GEORGE, naval commander, was a member of a family intimately connected with the history of America. He was the second son of the sixth Earl of Lincoln, and father of Sir Henry Clinton the elder. He was governor of Newfoundland from 1732 to 1741, and of New York from 1741 to 1751, and rose to be admiral of the fleet in the British navy. W.F.J.

CLINTON, GEORGE, an American statesman; youngest son of Charles Clinton (q. v.); born in Ulster County, N. Y., July 26, 1739. He served on board a privateer in the French War, and soon afterward, as lieutenant of militia, took part in the expedition against Fort Frontenac. He practised law, and in 1768 was elected to the Colonial Assembly, in which he became the Whig leader. In 1775 he was elected to the Continental Congress; in 1776 voted for the Declaration of Independence; and in 1777 was appointed brigadier-general of the United States army and elected first constitutional governor of New York. This office he held, by six successive elections, for 18 years, then declining a re-election. He took part in the defense of Forts Montgomery and Clinton, on the Hudson. In 1787 he was instrumental in suppressing Shays's rebellion in Massachusetts. In 1788, in the Poughkeepsie convention, he opposed the adoption of the federal Constitution on the ground of its infringement of State sovereignty. In 1792 he received 50 electoral votes for the Vice-Presidency. In 1801 he was again elected governor of New York, and in 1804 was chosen Vice-President of the United States. In 1808 he received six electoral votes for the Presidency in opposition to Madison, but was continued as Vice-President. It was due to his casting-vote that the charter of the United States Bank was not renewed. He died in Washington, D.C., April 20, 1812. E.E.T.

CLINTON, SIR HENRY, soldier; was born in England in 1738, the son of George Clinton, the British admiral who was colonial governor of New York and also of Newfoundland, and the

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grandson of Francis Clinton, sixth earl of Lincoln. He spent some of his early life in America, and performed his first military services in the colonial militia of New York. On returning to England he was enrolled in the Guards, and presently was sent to the Continent of Europe, where he distinguished himself and won promotion in the Hanoverian War. For his gallant services he was made a colonel in 1762, and a major-general in 1772. In the latter year he entered Parliament, in the interest of his cousin, the Duke of Newcastle. Upon the outbreak of the American Revolution he was sent to the scene, with the rank of major-general, as second to Howe in command. He was first stationed at Boston, where he participated in the battle of Bunker Hill. He made an unsuccessful attack upon the American position at Charleston, and another equally unsuccessful upon Fort Moultrie, South Carolina. Next he proceeded to New York, fought the battle of Long Island, and compelled the wreck of the American army to retreat across New Jersey, for which services he was made a Knight of the Bath. Leaving Cornwallis and others to follow Washington, he set out up the Hudson, for the relief of Burgoyne, and, captured Fort Clinton and Fort Montgomery. He was unable to save Burgoyne from defeat and surrender, but after that catastrophe to the British arms he was appointed to succeed Howe as commander-in-chief of the British army in North America. He established headquarters at New York, later occupied Philadelphia, and on being compelled by Washington to retire thence, he swept down the southern coast, captured Charleston, S. C., and made havoc and ruin of the American army in that region. Then he returned to New York, leaving Cornwallis in charge in the south. The latter failed to maintain the advantage Clinton had won, and was ultimately driven to his fate at Yorktown. Clinton meanwhile remained at New York, acting as a potent check upon many of the American and French plans. He sailed from New York with 7,000 men to relieve Cornwallis on the very day of the latter's capitulation. Clinton resigned his command in 1781 and returned to England, where he wrote, in 1783, a personal narrative of his conduct in America, and also a reply to Cornwallis's strictures upon it. He was appointed governor of Gibraltar in 1794, and died on December 23, 1795. W.F.J.

CLINTON, JAMES, an American soldier, fourth son of Charles Clinton; born in Ulster County, N. Y., Aug. 9, 1736. He entered the army and rose to the rank of lieutenant-colonel before the outbreak of the Revolution. He took part in the capture of Fort Frontenac during the French War of 1756, and in the capture of a sloop of war on Lake Ontario. In 1763 he commanded four regiments engaged in protecting the port of New York against the Indians. With his brother, he shared in the defense of Fort Clinton, on the Hudson, and in 1779 co-operated with Gen. Sullivan in his expedition against the Iroquois. Subsequently he commanded at Albany, and was present at the siege of Yorktown, the surrender of Cornwallis, and the evacuation of New York by the British. After the war he retired to his estate, but rendered civic service to his country as commissioner on the boundary question between New York and Pennsylvania, as member of the Federal constitutional convention at Poughkeepsie, and of the convention of 1801 for amending it; also serving as member of the Assembly and Senate of his state. He died in Little Britain, N. Y., Dec. 22, 1812. E.E.T.

CLINTON GROUP, a geological term derived from the hematitic strata in the neighborhood of Clinton, a town of Oneida County, New York, and generally applied by scientists to similar deposits of the Upper Silurian rocks. C.L.S.

CLINTONITE, a reddish-brown mineral found at Warwick, New York. See MINERALOGY, Vol. XVI, p. 431.

CLINTON ORES. See IRON AND STEEL, in these Supplements.

CLIO, in Grecian mythology, the fabled daughter of Jupiter and Mnemosyne. She was the Muse of history and epic poetry, and was represented as bearing a half-opened roll. See also MUSES, Vol. XVII, p. 81.

CLIO OR CLIONE, a genus of shell-less pteropodous mollusks, family *Clionidæ*, of which one species, *C. borealis*, is extremely abundant in the arctic seas, and constitutes a principal part of the food of whales. See illustrations under MOLLUSCA, Vol. XVI, p. 692.

CLISTHENES, an Athenian statesman and reformer. See GREECE, Vol. XI, p. 88.

CLITUS, Macedonian commander, friend and foster-brother of Alexander the Great (*q. v.*, Vol. I, p. 483). R.C.A.

CLITZ, HENRY BOYNTON, soldier, was born at Sackett's Harbor, N. Y., on July 4, 1824, and was graduated from West Point in 1845. He served in the Mexican War and on the frontier, and for ten years as assistant instructor in infantry tactics at West Point. In the Civil War he served at Fort Pickens, in McClellan's Peninsular campaign, and at Gaines's Mill, where he was wounded and captured. Later he was commandant at West Point. He was brevetted brigadier-general in 1865, and died on October 30, 1888. W.F.J.

CLIVE, KITTY, a comedy actress; was born in London in 1711, the daughter of William Raftor, a Jacobite lawyer from Kilkenny, Ireland. She became prominent at the Drury Lane Theater in 1728, and played there until 1769, when she retired from the stage and went to live at Twickenham. She married George Clive, a lawyer, in 1731, but soon parted from him. She was a woman of admirable character and unsullied reputation, and was an esteemed friend of Johnson, Handel, Garrick, and Horace Walpole. Johnson said of her to Boswell, that in the sprightliness of her humor he had never seen her equaled; while she in return said of Johnson, that she loved to sit by him, for he always entertained her. She died at Twicken-

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ham on December 6, 1785. Her life was written by Percy Fitzgerald in 1888. W.F.J.

CLOACA, a term used in anatomy to designate the common chamber into which the intestine, the urinal and the genital ducts open, and which in turn communicates with the exterior. Such is the condition in all vertebrate embryos, and the cloaca persists during adult life in some fishes all amphibia, reptiles, birds, and the lowest mammals (*Monotremata*). In other vertebrates the urino-genital openings become separated from that of the alimentary canal.

CLOACA MAXIMA (see ROME, Vol. XX, p. 832), the most important sewer of ancient Rome, constructed in the time of the Tarquins to drain the Velabra swamp, which lay between the Palatine and Capitoline hills. It was flushed by an unceasing stream from the aqueducts. Large portions of it still remain.

CLOCK, ELECTRIC. Electrically controlled clocks are popularly known by this name. Alexander Bain of Scotland is credited with being the first to construct such clocks, about 1840. R. L. Jones of Chester, England, improved them materially, and built a number. The principle involved is, that one accurate clock is connected by wires with other clocks which it is desired to control and keep in exact time with the first. The pendulum of the principal clock is arranged then to make and break a circuit at each stroke, or at stated intervals, so that the subsidiary clocks beat in the same time. C. V. Walker of Great Britain introduced a form of these clocks in many of the larger telegraph-offices of England. A cheaper and simpler form of electrically controlled clock is now manufactured, being constructed on the principle of periodic synchronization. The clock to be controlled is made to run slightly fast, or at least so that in its variations it will never run slow. A device of levers is arranged then in connection with the second-hand, and at intervals, say of one hour, an electric impulse is sent from the controlling clock, so as to cause an electro-magnet to operate an armature and pull a lever adjusting the second-hand back to the correct point, should it have gained any during the hour. Another system consists of a master clock and a number of clock faces electrically connected. At the expiration of each minute an electric impulse is sent out from the master clock through the different circuits, and the hands of the controlled clocks advance one minute at a stroke. C. H. COCHRANE.

CLODIUS, PUBLIUS, also called PULCHER, a son of Appius Claudius, who changed his name to Clodius to curry favor with the people, by whom the Claudian family had long been unfavorably regarded. His life was a monument of debauchery, and during his career in Rome he caused many scandals. It was he who, disguised as a woman, had an intrigue with the wife of Julius Cæsar, which led to her being divorced, on the ground that "the wife of Cæsar must be above suspicion." Clodius was tried for violating the sacred mysteries of the Bona Dea, and was testified against by Cicero, but was acquitted through bribery of the judge. He got himself elected tribune in 58 B. C., and drove Cicero into exile, and then aimed to become dictator. But Cicero returned in spite of him, and he was presently killed in an affray with his political foe, Milo, in whose defence Cicero delivered one of his greatest orations. Clodius was killed in 52 B. C. W.F.J.

CLOGHEEN, a town in the southwest part of Tipperary County, Munster, Ireland; situated on the River Tar, 13 miles S.W. from Clonmel; is in the midst of a wheat-producing locality, and has extensive flour-mills. The famous limestone caves of Mitchellstown are six miles northwest. Population, 1,317.

CLONES, a town of Monaghan County, Ulster, Ireland, is situated on the Ulster canal, 11 miles S.W. from Monaghan. It contains the ruins of an ancient monastery and of a round tower, and has manufactories of linen, and corn-mills. Population, 2,170. See MONAGHAN, Vol. XVI, p. 744.

CLONFERT, an ancient episcopal city of Ireland, in the extreme east of County Galway. Population, 2,200. The bishopric was founded in the sixth century. There is another Clonfert, a parish in County Cork.

CLONTARF, a town in the county of Dublin, about three miles N.E. of Dublin city. Clontarf is celebrated in history as the place where, in 1014, Brian Boroihme won a great victory over the Danes, a battle forming the subject of Gray's ode, *The Fatal Sisters*. Spear-heads and other parts of ancient weapons are still occasionally dug up, many such being preserved at Trinity College. It is now a resort and bathing-place. Population, about 4,000.

CLOSE is a technical legal term meaning land or an interest in land. Strictly speaking, it means an inclosed parcel of land, but if no actual inclosure exists, the boundary line is a sufficient inclosure to make it a close within the meaning of the law. In every case where one person has the right to exclude another from his land, he is entitled to compensation for the damages sustained on account of the passing of another upon his land without his permission, which act of trespassing upon the land of another is termed a breach of the close.

CLOSSON, WILLIAM BAXTER PALMER, artist, was born at Thetford, Vermont, on October 13, 1848, and became a railroad clerk. He studied art privately, devoting himself chiefly to wood engraving, and in 1880 began making illustrations for magazines. Ten years later he began painting in oils. His wood engravings have been widely exhibited and have won medals and prizes in many galleries. W.F.J.

CLOSURE, the power, in certain circumstances, of terminating a debate in a legislative body, although there are members anxious to carry it on for an indefinite period. The British House of Commons is the model on which all similar deliberative assemblies have been formed; yet sooner or later every one of these finds it impos-

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sible to carry on the business brought before it unless it assumes the power of deciding when a debate has lasted long enough, and should terminate. Many years went by, and still the good sense of the successively defeated minorities in the British House of Commons rendered it unnecessary to take any steps for the curtailment of superfluous debate. Not until nearly four fifths of the nineteenth century had run its course was any serious desire felt on either side of the House to alter this happy state of things. Shortly before that time, however, the device of obstructing, simply for obstruction's sake, began to be cultivated as an art, and was brought, in a brief period, to high perfection. Day by day, time was intentionally wasted by small minorities of the House, and oftener than once, when the members wished to go home, a section of the Irish representatives forced upon them "an all-night sitting." In these circumstances William E. Gladstone, then Prime Minister, took steps to grapple with the difficulty, and commenced the Parliamentary session of 1882 with new rules for the conduct of business, which he believed would preserve the rights both of majorities and minorities, while materially diminishing obstruction. The first rule gave permission to the Speaker, or to the chairman of a committee of the whole House, to close a debate and go on to vote on a question, if, when a motion to that effect was carried by a majority, its supporters appeared to amount to two hundred, or in the event of the minority being less than forty, to amount to more than one hundred. The proposed system was at first called the cloture, but was afterward exchanged for its equivalent, closure.

In the Congress of the United States the practice has been to allow unlimited debate, and it is for this reason that we have so many instances of obstructionary tactics being resorted to by a minority to delay the passage of a measure. These tactics have been given the general name of "filibustering," and include almost every expedient known to parliamentary tacticians, not even omitting serious breaches of decorum. The rule of closure adopted by the British Parliament finds a simile in America in the movement of the previous question.

CLOTHAIR I OR HLOTHAR I, a Merovingian king of the Franks, born A.D. 497; was the youngest of the four sons among whom Clovis divided his dominions. See FRANCE, Vol. IX, p. 468.

CLOTHAIR II OR HLOTHAR II, king of the Franks, son of Chilperic and grandson of Clothair I; inherited the kingdom of Soissons, A.D. 584, and by A.D. 613 had united again in one dominion the scattered kingdoms of his ancestor Clovis. See FRANCE, Vol. IX. pp. 468, 469.

CLOTHES-MOTHS (*Tenecina*), the smallest of the *Lepidoptera*. See BUTTERFLIES, Vol. IV, p. 531.

CLOUDBERRY (*Rubus Chamæmorus*), a plant related to the bramble, although of very different appearance, having an herbaceous single-flowered stem destitute of prickles. The plant is eight to ten inches in height; the leaves few, large, lobed, and kidney-shaped; the flowers large and white; the fruit orange-red, equal in size to a bramble-berry and of an agreeable flavor. It is a native of the northern parts of Europe, Asia and America. The fruit is valued highly.

CLOVE-BARK, a commercial bark which is formed of several pieces of thin and hard bark, rolled up one over the other. It has a deep brown color, and a taste similar to that of cloves. It possesses properties analogous to those of cinnamon.

CLOVER OR TRIFOLIUM. See AGRICULTURE, Vol. I, pp. 333, 334.

CLOVIS (the name is the old form of LOUIS) was born in 465 A.D., the son of Childeric, of the Merovingian dynasty, and became king of the Franks in 481. He vanquished the Gallo-Romans near Soissons, and made himself lord of the whole country between the Somme and the Loire rivers. He married Clotilda, daughter of a Burgundian prince, who was a Christian, and he himself became a Christian, the first Frankish king to accept that faith. He defeated the Germans, slew the Visigoth Alaric II, and established his government at Paris, where he died in 511. He was the first prince who aimed at the union of all the Frankish peoples, and was the first to be saluted by the Pope as "Most Christian King." W.F.J.

CLOWES, WILLIAM C. (1540–1604), an English surgeon who served with Leicester in the Low Countries, and also on board the fleet that defeated the Spanish armada. He became surgeon to the queen, and after a prosperous practice in London retired to a country house in Essex, where he died in 1604. He was the author of several books, two of which were long popular: *A Prooved Practice for All Young Chirurgians* (1591) and *A Treatise on the Struma* (1602).

CLUB. (For origin, early history, and European character see CLUB, Vol. VI, pp. 38 et seq). The many varieties of clubs, with the increased opportunities and advantages of club-life, have been multiplied so in American and European cities within the past generation that the social influence and results of these popular adjuncts to our modern civilization have become matters for serious consideration. It cannot be denied that clubs form a useful supplement to the home-life of many persons in every community who do not belong to the leisure class; but it is not so certain that the leisure class itself, whose members are the chief patrons of the fashionable clubs in large cities, receives benefits therefrom which outweigh the attendant disadvantages.

It was in England, after the termination of the Napoleonic war, that the modern club as a factor in city life began its career. London suddenly became the abode of numerous unemployed army officers, whose slender means, social tastes and love of good cheer compelled economy. Clubs were formed among them, which were not merely "assemblies of good fellows meeting under certain conditions," as described by Dr. Johnson,

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but which combined a "union of forces with a division of expenses" in an effort to pursue the art of living. Such an origin had the "United Service," one of the oldest of the great London clubs of to-day.

Twenty years later the taste for club-life found its way to America, the Union Club of New York and the Somerset Club of Boston being among the first established. Increase of wealth and growth of population have produced a large class of persons to whom club-life seems most attractive and advantageous, and the social club, as ordinarily understood, has been multiplied accordingly. The club idea is, however, no other than the co-operative idea which is familiar to all classes of every English-speaking community; and it has been utilized freely, not only in establishing clubs of the grade already mentioned, but town and country clubs and athletic clubs, having houses and grounds where both both out-door and in-door sports may be pursued in connection with the usual refinements and adornments of city life. Clubs for lessening the expense of living at the seaside, mountains, lakes and summer resorts are but another and very natural development of the same idea; and so, also, are the better class of bicycle clubs, with their fine houses and luxurious appointments, which abound in our chief cities. A list of the various kinds of clubs now in vogue might be extended indefinitely. Every city and considerable town has its club, wherein the social idea is uppermost; and clubs for political, religious, educational or other special purposes, and those in which the social idea is subordinate, are quite as familiar. Should the old-fashioned home-life disappear under such social conditions, it may yet be hoped that many of its attractive features may be transferred to the artificial home, or club.

CLUBBING, in cabbages, turnips and other plants of the genus *Brassica*, a diseased growth of tubercular excrescences in the upper part of the root or lower part of the stem, caused by the larvæ of the cabbage-fly and of the other insects, by which the vigorous growth of plant is prevented and crops are often much injured.

CLUB-MOSSES. See LYCOPODIUM, Vol. XV, p. 96.

*CLUBS, WOMEN'S. The most remarkable development in modern civilization has been achieved through associations. Men long ago discovered the benefit of organization in finance and in all the trades and professions. Women, however, having lived a more or less solitary or individual life, are awakening to the power of union within a few years. The church had organized women as early as the second and third century, and most of the practical charity of the Greek and Roman Catholic churches was carried on exclusively by women. The Roman Catholic Church has made of practical charity a career for women, and always has rewarded the women who showed executive ability by committing great interests to their charge, by covering them with honors and conferring on them great authority. No more interesting chapter in the history of woman's development could be written than that treating of the work of women and the honors they have achieved in the Roman Catholic Church, where they have been distinguished especially for executive ability and sound financial management. The Protestant communities followed the example of Mother Church, and to-day the practical charity of all Christian communities is in the hands of women. The deaconesses of the Methodist, the sisterhoods of the Anglican Church, the home and missionary societies of all the churches, the orphan asylums supported by denominations, are controlled by them. The Salvation Army, the most democratic and latest phase of religious organization, depends mainly for its success on the labors of the sisters, and Mrs. Ballington Booth, in speaking of the position of women in that organization, says that "no church organization will ever succeed in the future that does not give to women not only the spiritual but the material reward of their labors. So much for the organization of women in the religious world. The spirit of association distinguishes to-day non-sectarian as well as sectarian philanthropy. Conventions are being held all over the country for prison reform, the reform of penal institutions, union missionary meetings, temperance societies—in a word, all the great philanthropic movements depend largely for their success on association, and in most of these associations women are the leaders.

In the educational world the same tendency is noted. Teachers' conventions are held not only in every state, but there is a national and international educational association. Women are members of all these associations. That they appreciate what unity can accomplish is shown by the fact that, no matter how small the salary of a teacher, she is usually willing to spend a good part of it to attend these great conventions. Teachers' clubs are being formed all over the country, many of these clubs joining state federations, thus bringing the teacher in communion with the intelligent women of the community. The great summer schools are another phase of the association idea. Those at Chautauqua, Bay View, Mt. Eagle, and hundreds of others, meet regularly every year with an ever-increasing number of students in attendance, the larger number of whom are women. University Extension is another phase—the effort of the university to bring itself into communion with the laity. The number of women far exceeds that of men in attendance on the courses of University Extension.

While women excel in religious, educational and philanthropic associations, they are very backward in industrial organization, and in England trades-unionism has made far greater advance than it has in this country. The only unions of any great importance in America among women are those of the shirt-makers and garment-makers of Troy and Rochester, New York, and the laundry-workers of Cleveland, Ohio. The

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bindery-girls of Chicago are organized fairly well, but the timidity of women in uniting for industrial advantages is one of the dangers which threatens their position in their economic independence. Even when well organized, they seldom take the initiative, and are never aggressive. The policy of men's trades-unions is extremely liberal toward women, but the women appear to distrust them, and hold aloof. During several strikes in this country the women have gone out with the men, and have overcome their constitutional timidity to the extent of standing courageously to the law of the union, but these cases are few and far between. Woman's hope in this line of organization must come through the working-girls' clubs, hundreds of which are formed and being formed all over the country. They are becoming a wonderful factor in broadening the social and industrial consciousness of their members. When the working-girls' clubs of New York were organized, trades-unionism was tabooed, even discussion was not allowed. At the last convention held in Boston in 1894 this subject was very prominent, and when several of the older women objected to the discussion of trades-unionism, the younger and more liberal members were so indignant that it was with difficulty that the convention continued in harmony. Many of the working-girls' clubs are assuming the character of benefit associations, and one of the most radical, the Aloha Club of Chicago, is not only a benefit association, but has purchased a summer home in which each club member is privileged to pass four weeks during the summer season. The members have paid for their home, and have in contemplation building a new and improved clubhouse.

During the last twenty years several great organizations of a social and educational trend have been inaugurated in this country. The Ladies of the Maccabees is an enormous association, numbering about seventy thousand women. It has several features of a benefit association connected with it, and is a secret organization. It is said to be very well conducted, on a sound financial basis, and has a large capital. Of patriotic associations, the Women's Relief Corps and the Daughters of the American Revolution are good examples. The mother association was the Society for the Advancement of Women, of which Mrs. Julia Ward Howe was for many years the president. This association came into being about twenty-five years ago, and has held meetings all over the country, being a sort of school to teach association. The National Council of Women is an as sociation meeting every three years in Washington. Only national associates are eligible to membership. Among the prominent associations in membership are the Women's Christian Temperance Union, The Women's Relief Corps, the Suffrage Association, the National Council of Jewish Women, and the Federation of Afro-American Women.

The most recent organization is the General Federation of Women's Clubs. This organization, which was founded in 1892 at a meeting held in New York on the invitation of Sorosis, now numbers over 490 clubs, and 20 state federations with 947 clubs. It is estimated that nearly a million women are thus members of the general federation. These clubs can be classed as literary, educational, philanthropic, social, economic, and many have departments on the home and finance. Some of the clubs are very large, the membership numbering many hundreds. Others are small, the membership not exceeding thirty or forty. The meetings of the general federation are biennial, while the meetings of the state federations are annual. Many of the state federations have adopted a specified line of work. Maine has the visitation of the public schools to establish kindergartens and school libraries a duty; Michigan has adopted the study of household economics; New York, public education; Ohio and Iowa, establishing public libraries; Minnesota, township and village improvement associations; Colorado, civic clubs; the District of Columbia, the reform of laws affecting women and children in the district, and the public-school system. The aim of the federation is distinctly educational and philanthropic. The most recent phase of its development is city federation. These federations are divided into departments which cover the whole interests of a city. Among the most progressive federations are those of Beloit, Detroit, Cincinnati, Jackson (Michigan), Minneapolis, and the Civic Club of Philadelphia. These clubs virtually take charge of all the interests of the cities in which they are found, the beautifying and improvement of a city being the chief aim. Denver has a federation of the civic clubs which institutes all manner of reform, especially in connection with education.

The aim of the federation idea is to raise the average standard of life and to broaden the social aims of the community, and it is pledged to accomplish this, not through prohibitory or arbitrary means, but by non-aggressive and educational methods. To these methods it stands pledged by its motto, "Unity in diversity."

From this brief summary of organization the conclusions may be drawn that women are more prone to organize along the lines of philanthropy and education than on those of industrial and material benefit. Following out the instinct of the sex, which is the altruistic instinct, it has its foundation in her province of the mother to protect the weak. To put into practical action the doctrines of Christianity is her *rôle* in modern civilization. These altruistic organizations have a great economic value. The modern woman is capable and restless, and is determined to have a field for her energies. Did not these organizations exist, which claim so much of her time and energy, she would invariably enter into the competitive struggle for existence, and the world would thus lose the benefit of the intelligent action of the highly developed modern woman. Nothing could be worse for society than to have women take an entirely materialistic view of their

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position, and every effort should be made to encourage, rather than discourage, those organizations which turn her thoughts and energy toward the bettering of humanity, and away from the purely financial and materialistic point of view of her life and its duties.

ELLEN M. HENROTIN.

CLUNES, a borough of Victoria, Australia, 119 miles N.W. of Melbourne. Gold-mining and grazing are the chief industries. Population, 3,574.

CLUNIACS OR THE CONGREGATION OF CLUGNY, one of the most important of the many religious orders into which the widespread order of St. Benedict was divided ultimately. It was founded early in the tenth century, and took its name from the town in France in which its abbey was located. The monastic rule of St. Benedict, based on the cardinal principles of labor and obedience, had fallen into scandalous neglect, although that order had increased in power and numbers so as to overspread the whole of Europe, when, in A.D. 910, William of Aquitaine founded and endowed the monastery of Clugny, which he designed should present an example of strict and conscientious religious observance. The times were so ripe for reform, and the benefit of rigorous discipline so apparent, that numerous other monasteries, drawn to imitate the virtue of Clugny, affiliated themselves therewith, until its jurisdiction penetrated Britain, France, Germany, Spain, Italy, and even the East. In A.D. 946 the pope exempted Clugny from diocesan jurisdiction, and subjected it to the immediate supervision of the Holy See. But lapse of time and change of leaders again and again brought relaxation of discipline, which in turn gave way before a renewed spirit of reform. Such a movement in the seventeenth century, instigated by Cardinal Richelieu, resulted in rules, known as the "Strict Observance of Clugny," which impressed their beneficial influence upon monastic life even outside the order. For over eight hundred years did this religious body receive favor and emoluments from princes and popes, and intermittently cast the light of its example upon the religious world, and dispensed its benefits to the poor and suffering, down to the outbreak of the French Revolution, when its doors were closed, its property confiscated, and its life destroyed by "the people of France." The Cluniacs afford the first instance of an order which was founded within the limits of one already existing, and of which it continued to form a part. Their palmiest days were in the twelfth century, when the order was very brilliant and powerful. Among their great men were the popes Gregory VII, Urban II and Paschal II. See ABBEY, Vol. I, pp. 20, 21; and CLUNY, Vol. VI, p. 42.

CLUPEIDÆ, a formerly recognized family of fishes, nearly allied to the *Salmonidæ*. In this family the herring, pilchard, anchovy, sardine, etc., were included, but it is now subdivided into several families.

CLUSERET, GUSTAVE PAUL, a French officer and Communist; born in Paris, June 13, 1823, entered the army in 1843, and resigned in 1858. In the latter year he, as a colonel, participated in the expedition of Garibaldi to Sicily and Naples. With the same rank he, in 1861, entered the army of the United States of America during the War of the Rebellion and was promoted a brigadier-general in 1862. After the war he published in New York *The New Nation*, a weekly newspaper, advocating the election of General Frémont to the Presidency. On his return to France he contributed to socialistic papers and associated with Bakunin. The republic declared in September, 1870, he tried to establish a confederation of the southern French provinces at Lyons. The insurrection, however, was subdued by the National Guard, and he escaped to Marseilles, and thence to Geneva, returning in 1871 to Paris. On the Commune's rise to power, March 18, 1871, Cluseret was appointed chief of military government, in which capacity he endeavored to raise the standard of the Mobile Guard. Accused of having been bribed by the Versaillists, he was arrested, but freed by the government troops. He fled to England and thence to Mexico. He was sentenced to death on default by the Tribunal of Versailles in 1872, but pardoned in 1880, and was on his return to Paris elected several times to the Chamber of Deputies. He died near Toulon, Aug. 21, 1900.

G.A.S.

CLUSIA, a tropical American genus of shrubs and trees of the family *Guttiferæ*. *C. rosea* yields an abundant resin, which is used as an external application in veterinary medicine, and for covering boats, instead of pitch. *C. insignis*, the wax-flower of Demerara, is used to make a stimulating and soothing plaster. Several of the species are epiphytes, growing upon the larger trees.

CLUSONÉ, a town of Lombardy, northern Italy, situated near the left bank of the Serio. It has manufactories of linen, a trade in corn and iron, and in the vicinity are copper foundries and vitriol-works. Population, 3,878.

CLYDE, a village, capital of Bryan County, southeastern Georgia, about 18 miles W. from Savannah.

CLYDE, a village of Wayne County, north-central New York, is situated on the Clyde River, 38 miles W. of Syracuse, and has manufactures of glass, steam-engines and farming implements. Two railway lines and the Erie canal give ready access to markets for its products. Population 1890, 2,638; 1900, 2,507.

CLYDE, a town of Sandusky County, northern Ohio, is situated on the Erie and Lake Shore railways, 17 miles S.W. from Sandusky. It has many manufactures. It is in the center of a rich agricultural region, and has water-works supplied by an artesian well. Pop. 1900, 3,515.

CLYMER, GEORGE, an American statesman; born in Philadelphia in 1739. He entered mercantile life, but devoted much time to studying. He was elected to Congress in 1776, 1777, and 1780, and was one of the signers of the Declaration of Independence. In 1780 he organized the

Bank of North America. In 1784 he was elected to the Pennsylvania legislature, in which he opposed the severity of the criminal code. He was a member of the convention that framed the federal Constitution, and in 1788 was elected to Congress thereunder. He died in Morrisville, Pa., Jan. 23, 1813. E.E.T.

COAHUILA OR COAHUILA DE SARAGOZA, Mexico, a northern state separated from Texas by the Rio Bravo or Rio Grande del Norte and bounded W., S., and E. respectively, by the states of Nuevo Leon, San Luis, Durango, and Chihuahua. The surface of the northern part is mountainous, with fertile valleys; the southern part is level, and fitted for agriculture and pasturage. Stock-raising is the chief agricultural industry and live cattle, hides and horns, are largely exported across the border into Texas. Silver, iron, gold and lead occur principally in the Sierra Mojada, and extensive beds of good coal are found near the United States boundary. Mining is actively carried on, exports being facilitated by railroads which traverse the state. Saltillo, the capital, has 27,000 inhabitants; Coahuila and Santa Rosa are other large towns. Area, 63,570 square miles; pop., 1900, 280,899. C.L.S.

COAHUILTECAN INDIANS are the remains of a once numerous and important native nation, occupying territories on both sides of the Rio Grande, in what are now the state of Texas and the Mexican state of Coahuila, the latter long one of the least known and least improved regions of Mexico. In former times they comprised about 25 tribes, but have dwindled down to the remnants of three tribes, and are apparently doomed to extinction. They are now scattered in other parts of Mexico. W.F.J.

COAKLEY, CORNELIUS GODFREY, physician, was born in Brooklyn, N. Y., on August 14, 1862, and was graduated from the College of the City of New York in 1884 and from New York University Medical College in 1887. He is professor of laryngology in the New York University and Bellevue Hospital Medical College, and is author of a work on *Diseases of the Nose and Throat*. W.F.J.

COALE, ROBERT DORSEY, educator, was born in Baltimore, Md., on September 13, 1857, and was graduated from Johns Hopkins University in 1881. He has been professor of chemistry at the University of Maryland since 1884, and is dean of its faculty of medicine. W.F.J.

COALFISH (*Mertangus carbonarius*), a fish allied to the cod, found in arctic waters. The skin contains a black pigment which is easily rubbed off when the fish is handled. The liver of the fish furnishes an oil which is used for many purposes. The pollock belongs to the same genus.

COALITION, in politics, a term applied to the union of two parties, or, as usually happens, portions of parties, who agree to sink their differences and act in common. The English ministry known as the Great Coalition was formed in 1782, when Fox, the leader of the reformers, took the office with Lord North, the leader of the opposite party. The term is also used of alliances between separate states. Of these, the coalitions formed at different times by other European nations against France are among the most famous in history.

*COAL-MINING IN THE UNITED STATES. For the general subject, see COAL, Vol. VI, pp. 43–75.

Of the 50 states and territories, including Alaska, of the American Union, 35 are underlaid, in part, by coal-measures. Of this number, 29 are producing coal in commercial quantities. Massachusetts, Rhode Island, Nebraska, South Dakota, Arizona and Nevada have coal-beds, though, either from their poor quality or remoteness from lines of transportation, little or no coal is mined therefrom.

The area of the coal-fields has not been determined positively, and in many individual cases no approximations as to these areas have been attempted. In the older states, however, where geological surveys have been made and are in progress, these areas have been determined.

For convenience of reference, the coal-fields have been classified. This classification, together with the determined areas, the annual production and number of employees in 1894, is given in the following table, compiled from the reports of the United States Geological Survey.

CLASSIFICATION OF THE COAL-FIELDS OF THE UNITED STATES.

	Area. Sq. Miles.	Production. Short Tons.	No. Employees.
Anthracite.			
New England (Rhode Island and Massachusetts)	500		
Pennsylvania	480	51,921,121	131,603
Colorado and New Mexico	15	71,550	
	995	51,992,671	
Bituminous (a).			
Triassic:			
Virginia	180	52,079	
North Carolina	2,700	16,900	95
	2,880	68,979	
Appalachian:			
Pennsylvania	9,000	39,912,463	75,016
Ohio	10,000	11,909,856	27,105
Maryland	550	3,501,428	3,974
*Virginia	2,000	1,177,004	1,635
West Virginia	16,000	11,627,757	17,824
*Kentucky	10,000	1,218 072	8,083
Tennessee	5,100	2,180,879	5,542
Georgia	200	354,111	729
Alabama	8,660	4,397,178	10,859
	61,510	76,278,748	
Northern Michigan	6,700	70,022	223
Central:			
Indiana	6,450	3,423,921	8,603
Kentucky	4,000	1,893,120	
Illinois	36,800	17,113,576	38,477
	47,250	22,430,617	

(a) Including lignite, brown coal and scattering lots of anthracite.
* Total employed.

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CLASSIFICATION OF THE COAL-FIELDS OF THE UNITED STATES.—*Continued.*

	Area. Sq. Miles.	Production. Short Tons.	No. Employees.
Bituminous (a)			
Western:			
Iowa	18,000	3,967,253	9,995
Missouri	26,700	2,245,039	7,523
Nebraska	3,200		
Kansas	17,000	3,388,251	7,339
Arkansas	9,100	512,626	1,493
Indian Territory	20,000	969,606	3,101
Texas	4,500	420,848	1,062
	98,500	11,503,623	
Rocky Mountains, etc.:			
North Dakota		42,015	77
Montana		927,395	1,782
Idaho			
Wyoming		2,417,463	3,032
Utah		431,550	671
*Colorado		2,776,817	6,507
*New Mexico		580,238	985
Nevada		150	2
		7,175,628	
Pacific Coast:			
Washington		1,106,470	2,662
Oregon		47,521	88
California		67,247	125
		1,221,238	
Total product, including colliery consumption		170,741,526	
Total number employed			376,206

(*a*) Including lignite, brown coal and scattering lots of anthracite.
* Total employed.

The coal produced in the country in 1894 exceeded in value the combined values of the following metallic products for the same period: Pig-iron, gold, silver, lead, zinc, quicksilver, aluminium, antimony, nickel and platinum by over $1,000,000, or in other words, the spot value of the coal product, both anthracite and bituminous, was $186,141,564, while the spot value of the combined products, enumerated above, was $185,027,646, or $1,113,918 less than the coal product.

The number of persons employed in the coal-mines of the United States in 1900 was 401,221; the total coal output being 250 million tons.

Anthracite Mining Methods. As might be expected from their dissimilarity in physical character and structural conditions, mining methods in the anthracite and bituminous coal-fields differ widely.

In the anthracite region, coal is mined from beds whose angles of inclination vary from 0° to 90°, hence the methods of opening and subsequent mining vary materially. The method of developing a colliery is dependent upon certain conditions, and these may be topographical or geological, or both. The several methods are: 1. Drift or adit; 2. Tunnel; 3. Slope; 4. Shaft; 5. Stripping.

A *drift* is an opening in the coal-bed, driven horozontally above water-level in the direction of the strike. This method is used where the outcrop is found in gaps and ravines. Tunnels are sometimes driven from day at right angles to the strike of the measures to cut the coal-beds. These methods are, of course, cheaper than slopes and shafts, since they drain themselves, and no pumping or hoisting engines are required.

A *slope* is an opening upon a bed at right angles to its strike, and in the direction of the dip, or inclination.

A *shaft* is an opening sunk vertically through the measures to the desired bed or beds.

A *stripping* is, as its name implies, an area of a coal-bed from which the soil and loose rock have been stripped and the coal-bed laid bare.

The slopes now being sunk are divided into three compartments. Two of these are used for hoisting-ways, while in the third are laid the water-column pipe and pipes conveying steam or compressed air to the pumps below. The shafts are rectangular in form and have from two to six compartments.

The slope having been sunk to the required depth (generally 100 yards for each lift), gangways or galleries are turned to both the right and left in the bed, and are driven in the direction of the *strike* on a grade of four to six inches to the 100 feet. A gutter or ditch is cut along the low side of the gangway, and through this the water passes to the sump, from which it is pumped to the surface. As the gangways must be kept upon until the final robbing of the lift is completed, it is required that they be timbered securely. Several forms of timbering are in use: 1. Single timber, i.e., where a single prop is set at right angles to the dip on the high or upper side of the gangway; 2. Post and bar, consisting of two pieces, one longer than the other, the shorter resting on the longer, forming an angle, the point of which extends up the pitch; 3. A single prop and collar, one end of the collar being notched into the top rock; 4. Double timber, consisting of two props and a collar of cross-piece. Lagging or pieces of small timber reaching from prop to prop, and collar to collar, serve to support the intervening material. The gangways are driven continuously to the lines or boundary pillars of the tract.

Where a larger supply of coal is required than can be had from one lift, two or more lifts are worked at the same time.

In the anthracite region, where the beds are tilted, tunnels are driven from one bed to the other, and all are worked simultaneously.

The change in angles of inclination sometimes requires the sinking of underground slopes and the driving of counter-gangways to win the coal in the areas so affected.

The several systems of mining now in use in the anthracite region may be summed up briefly as follows:

1. Pillar and breast; 2. Longwall; 3. Panel; 4. Veith boundary; 5. Rock-chute.

In the pillar-and-breast system, which is the one almost exclusively used, the working-places are rectangular chambers, varying in width and length. Generally speaking, these are from 6 to 12 yards in width, dependent upon the character of the top-rock and the character of the coal-bed

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itself. The length of these rooms, except where the beds are tilted but slightly, seldom exceed eighty to ninety yards. As all timber, etc., must be carried to the face of the breast from the gangway by hand, the time and labor required to perform this makes the coal won too expensive when the breasts exceed these distances. In this system, pillars of coal are left on both sides of the breasts to support the roof. For the purpose of ventilation, however, small headings are driven through them as required.

The longwall system has not been introduced in the anthracite region, as its adaptability to working highly plicated beds is not admitted; but in the bituminous regions of several of the states this system is used to great advantage.

The system, as its name indicates, contemplates the removal of the coal in longwalls, or faces. There are two methods, known as longwall-advancing and longwall-retreating. In longwall-advancing, the coal is removed as the work progresses, the haulage-ways being supported by the gob, or refuse, being tightly packed.

In longwall-retreating, the haulage-ways are driven first to the limit of the property. Mining is then begun and carried toward the outlet, no attempt being made to support the roof after the coal has been removed. It much resembles the method of robbing in the pillar-and-breast system.

The panel system, invented by Col. D. P. Brown of the Lehigh Valley Coal Company, is a modification of the pillar-and-breast system. Colonel Brown's description of the system is as follows:

"When the mammoth seam is pitching from 15° to 45° and has its usual thickness, in the middle coal-field, of from 30 to 50 feet, the panel system may be commenced by driving the gangway and airway as in ordinary pillar-and-breast workings; but instead of opening breasts by driving up a shute every eight or ten yards along the course of the gangway, a shute is driven up through the seam to the gangway above, at a distance from the slope, shaft or airway sufficient to leave a thick pillar of coal to protect the main opening.

"At a distance of thirty or forty yards from this shute, a shute is opened, and at about thirteen yards from it a second shute is opened. These two shutes are driven up and opened out into two twin breasts, about eight yards wide, separated by a pillar of coal about five yards thick. A second pair of twin breasts is opened fifty or sixty yards from the first pair, and a third pair at an equal distance from the second, and so on. Midway between each pair of breasts a shute similar to the first is driven up to the gangway on the overlying lift.

"These shutes are constructed so that the coal may run freely, and are provided with a traveling-way on one side, giving the miners free access to the workings.

"Small headings, or gangways, are driven in the bottom bench of coal, at right angles to these shutes, and about ten to twenty yards apart, the lowest heading being within six or eight yards of the gangway.

"After the twin breasts are exhausted, the pillar between them is robbed out; but when the roof is poor, only a small portion of this pillar can be obtained.

"To begin mining the coal in the panel (after the breasts are robbed out and abandoned), work is commenced in the upper heading, or gangway, by widening out the end like a breast, and extending the working up to the outcrop or to the next lift above, making the opening wide enough to bring down the top when a skip is taken off the solid. The coal thus falls down on the slope to a point under cover, where the laborer can load it in safety. A small mine-car or buggy is used in the panel-gangways or headings to transport the coal to the shute, down which it is thrown, to be loaded in mine-cars standing in the gangway below.

"When the upper panel-gangway has been worked back a short distance, the next gangway below it is started, and this process is continued until the panel is exhausted, the miner always having a safe retreat into the panel-gangway when a fall of coal or roof is imminent."

The Philadelphia and Reading Coal and Iron Company is now using what is known as the Veith boundary plan with excellent results. It was suggested by John Veith, general mining superintendent of that company. In this plan the coal is worked by the pillar-and-breast system, but the gangway stumps are made much larger than ordinarily, and at the place of every tenth or twelfth breast a block of coal fifty to sixty yards is left solid.

By this method a greater percentage of the pillar of coal can be won, while in case of a squeeze or crush it extends only over the set of breasts between these barriers. The coal thus left remains until the limit or land line has been reached and robbing back begun.

Rock Chute System. By this system, which is applicable on pitching beds not too far distant from each other, all gangways and airways are driven in the underlying or smaller bed, and by means of chutes driven through the intervening rock the coal in the upper or larger bed is mined, the workings being opened out from these chutes on the ordinary pillar-and-breast plan. At some of the collieries, by the use of this system immense bodies of coal which formerly were considered lost, owing to squeezes in the larger bed closing the gangways, etc., have been recovered.

The Slushing Process. One of the most important advances made in the mining of anthracite is the process of slushing.

By slushing is meant the filling in of all worked portions of the mine with the refuse material from the breaker.

Briefly, the process is as follows:

Bore-holes are drilled from the surface to a worked-out breast. Batteries at the bottom of the breasts and at such other places where the material would be likely to escape are erected to

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hold the material. The refuse is then, by scraper-lines or other contrivances, run to the mouth of the hole, where it is mixed with water, only sufficient water being used to make the slush flow freely. The slush then is run into the bore-hole, filling up the breasts or cavities. One bore-hole is sufficient for a number of breasts, as the slush flows through the heading between them. Another method is to carry the slush in pipes and deposit it at the desired points. The water passes off through the small cracks and crevices in the batteries, finds its way to the sump, and is pumped to the surface.

The deposited material packs tightly; in fact, so tightly as to require the use of picks if it is desired to remove any of it at any time. With the breasts thus tightly packed, it is possible to remove the coal left in the pillar, the slush serving even better than the pillar to sustain the roof and prevent any serious crush.

The town of Shenandoah, Pennsylvania, from beneath which much coal was removed, was saved from subsidence by this method.

Up to the present time this method has not been used where the pitch of the bed exceeded 35°.

Breasts are of three kinds, known as,—1. Wagon-breasts; 2. Buggy-breasts; and 3. Chute-breasts. The angle of inclination of the bed determines the kind of breast to be used.

Wagon-breasts are those in which the mine-wagon to be loaded is taken directiy from the gangway to the face of the breast. These are used where the dip is slight (0°–7°).

Buggy-breasts are used where the dip is too great to take the wagon to the face, and yet not sufficiently great for the coal to run down the chutes by its own weight (7°–12°). In these, small cars, called buggies, are used to carry the coal from the face to the chute leading to the platform at the mouth of the breast, from which it is shoveled into the regular mine-wagon.

Chute-breasts are used where the pitch is sufficiently strong to carry the coal by gravity from the face to the mine-wagon on the gangway (12° to 90°). In chute-breasts, instead of opening up the breast to its full width from the gangway, a chute four to six feet wide is driven to a heading ten yards above the gangway and running parallel to it, and from this point the breast is opened the full width determined upon. The chute thus made is timbered securely. Near the head of the chute a plank battery is erected to prevent the intake air-current escaping through the chute to the return airway. These have a door for ingress and egress, while a space sufficiently large for the coal to pass into the chute is left to one side, and on the bottom of the battery. This opening being generally filled up with coal, but little air escapes.

On either side the breast, props, or "jugglers," are notched into the pillars, forming triangular openings, called manways. On the upper side of these, planks are nailed, thus forming a receptacle into which the slate, etc., is thrown, instead of being taken to the surface. The manways are floored with sheet-iron, and through them the coal is run to the chute below.

Breasts are also driven with two chutes, and in some cases two chutes and a manway, cutting the stump between the breast. Several modifications of these plans are used, as required by circumstances. In steep-pitching breasts the surplus coal, which cannot be loaded out as soon as mined, is retained, and is drawn as required.

Ventilation. The several methods of ventilations are: 1. Furnace; 2. Fans.

While sinking slopes and shafts, the ventilation is accomplished by means of steam-jets, the exhaust from the drills using compressed air, or by a small suction-fan from which a pipe leads to the working-place. This pipe is extended as the work progresses. Since the passage of the Mine Law in Pennsylvania, furnace-ventilation is no longer in use in the anthracite region. Fans, either suction or blowing, have entirely taken the places of the furnaces. Fan-ventilation is rapidly superseding furnaces in the bituminous regions also.

In mines developed by a shaft, a second shaft is generally sunk. (The Mine Law requires two openings.) The second shaft is generally used as an air-shaft.

In slope-workings, an airway is sunk parallel to the slope, a strong pillar of coal being left between them. Parallel with the gangways, headings are driven from eight to fifteen yards up the pitch, which serve as return-airways. Headings are cut through the pillars between the breast every twenty yards, so that the air may pass from one breast to the other without being brought down to the stump or main heading.

When the bed is thick, airways may be driven in the coal over the gangway, or in the coal on the same level as the gangway. The first method is used where the bed is on a steep pitch, and the latter where the dip is very slight. Cross-headings are driven from these to the working-places and the gangways as required.

By means of doors, overcasts, stoppings and brattices, the air is conveyed to the desired points. The Mine Law requires mines to be divided into sections, and that each section shall have its separate current of air. The reason of this is obvious.

Haulage. In this direction but little change is noticed in the anthracite region, except at a comparatively few collieries. In these the mule has given place to electric motors, steam and compressed-air locomotives, and tail-rope and endless-rope haulage.

Steam mine-locomotives are objected to,—1. Because of the noxious fumes thrown off; and 2. In gassy mines, because of the danger of explosions. The second objection, also, is urged against the use of electric motors.

At a few anthracite mines compressed-air locomotives are in use, and seem to give most satisfactory service.

Rope-haulage, however, is being introduced into a number of mines, and the results have been in most instances entirely satisfactory.

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At some of the mines electric motors are in use, notably at the collieries of the Hillside Coal and Iron Company, in the northern anthracite field, and at the Bear Run colliery, near Blossburg, Tioga County. At the Helvetia mine, in Clearfield County, Pennsylvania, electricity was used exclusively as the motive power. Hoisting-engines, pumps, mining-machines, and haulage-motors were run by it. The results, however, were disappointing and the electric plant was removed.

A large plant, erected by the Youghiogheny Coal Company at their Scott Haven mines, is said to give the greatest satisfaction. At these operations the fans, pumps, haulage-motors and coal-cutting machines are run entirely by electricity. Large air-compressor plants have been erected at the Nottingham shaft and at the Glen Lyon mines, near Wilkesbarre. Haulage, pumping and rock-drilling are accomplished by this power in a most satisfactory manner.

In the anthracite region no mining-machines are used, the work being done with the pick and drill. The coal is won by blasting. The drills used in making the shot-holes are of endless variety. They are both of the rotary and percussion type.

In the bituminous region, however, where the conditions are more favorable for machine-work, machines of numerous patterns have been introduced, and these perform the laborious work of making the "undercuts" in rooms, headings and entries at a cost far less and with greater celerity than can be done by hand. For these machines compressed air and electricity furnish the power. Heading-machines have been introduced at several of the mines, and the results obtained are said to be excellent.

More improvements have been made in the direction of the mechanical branch than in the actual mining branch. Hoisting-engines, pumps and mechanical contrivances of all kinds used in and about the mines are abreast of the times. In deep shafts the use of water-hoisting tanks is found cheaper than pumping, and this method is now being introduced. Pneumatic culm-conveyors have in a number of instances taken the place of the "dumper" and dirt-plane for the removal of refuse matter from the breaker.

The colliery buildings, formerly frame, are now being constructed of corrugated iron. Wrought-iron casings for ventilating-fans are replacing those made of wood.

The poor condition of the coal trade, from a financial standpoint, during the past few years has no doubt retarded much work in the way of improvements. The cost of producing anthracite must be reduced, and by some means other than in any reduction of wages.

Unlike bituminous coal, which receives little or no preparation for market, other than screening, anthracite must undergo a thorough course of preparation, and for this purpose it is run through a "breaker." All slate and other impurities must be removed from it, and it must be separated into the several sizes. Hence as much care and skill are required to prepare it as to mine it.

During the past 15 years certain sizes which formerly were considered unmarketable have come into demand, to the detriment of some of the larger.

The demand for the size known as lump has steadily been decreasing since 1880. To illustrate this decline, it may be said that at the collieries on the lands of the Girard estate, which may be taken as an example of the rest, the shipment of lump size in 1880 was over fifteen per cent of the whole, while that of buckwheat size was less than one per cent. In 1895 these same collieries shipped of the buckwheat size nearly seventeen per cent, while the shipment of lump was less than four per cent. This change can be ascribed to two principal causes: 1. Furnaces, iron-mills and steam-vessels have largely abandoned the use of anthracite for bituminous coal; 2. The invention of automatic stokers and forced draft by means of steam-jets, etc., which are used in industrial establishments, and the increased use of base-burning stoves for domestic purposes.

The demand for the smaller sizes, viz., buckwheat and rice coal, necessitated numerous changes in former modes of preparation. The slate and other impurities, which formerly were removed by hand, now are removed by mechanical appliances, known as coal-jigs and slate-separators. Both these contrivances work on the principle of the difference of specific gravity between the coal and slate. Both perform the work required better than can be done by hand, and at much less expense. The slate-picker boy is disappearing from many of the collieries.

Perforated plates are rapidly taking the place of the wire segments in the screens. The coal is now fed to the screens by elevator-buckets, and by their use a regular and steady flow is obtained, and overcrowding, so prevalent at one time, is avoided now, and more regularity in sizing is obtained.

Much of the coal going to market is washed either in the jigs or in passing over the lip-screen while being loaded into railroad cars.

In stripping the soil and loose rock from the beds, steam-shovels are employed, while in a number of operations immense cableways have been erected to transport this material to its place of deposition. By this method of stripping, much coal has been won which would otherwise have been lost through inability to support its cover while being mined under the regular method.

Bituminous Mining Methods. Mr. Selwyn Taylor, in writing on *General Mining Methods of the Pittsburg Coal Region*, says:

In opening mines in this district, complete surveys are usually made of the tract of coal to be mined, locating all outcropping, and showing the difference of level between all points at which the coal is to be found. With this data it is determined, then, in what place to open the mine, and in what direction to drive the main gang-

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ways, or entries. If possible, the mouth of the drift is located so that the main entries will be driven on the rise of the coal, thus making the mines self-draining; this, however, is not always, or even often, possible, as the coal very frequently dips directly away from the railroad or river, as near which as possible the mine must be opened.

The working of the coal to the dip is not usually a matter of very great disadvantage, as the dip is so slight that it does not materially increase the hauling expenses, and so many openings for drainage may easily be had to the outcrop.

If possible, all entries are driven on the "butt" (N. 65° W., or S. 65° E.) or "face" (N. 25° E., or S. 25° W.) cleavage. The main entries, generally, are driven as near the "face" cleavage as possible, while the entries from which the rooms, or working-places, are turned always are driven on the "butt" cleavage.

Almost all the mines in this district are opened by drifts; the main entries usually are driven double, and sometimes treble,—that is, two or three entries are driven parallel with each other; a wall of coal 25 to 45 feet wide, called entry pillar, is left between these parallel entries; also, on either side of these entries, pillars of from 18 to 30 feet in thickness are left for protection of traveling-ways.

The main entries usually are driven from 8 to 9 feet in width, except at the front,—that is, the end of the engine-plane,—where the entry used is made from 12 to 15 wide, in order that two tracks may be laid in it.

"Break-throughs" are made every thirty yards between these parallel entries. At the mouth of the drift the entries are well-timbered, as the shallow nature of the hill at the outcrop would cause them to continually fall in.

In driving the entries, a wooden rail is laid first. This is replaced, from time to time, by permanent road-rail. Iron lasts well in the mines, as the roads are generally kept dry, and the rolling stock used is light. Ties are placed about every two feet and are made of 3-by-4-inch timber.

Entries. There are two systems of entries in use in the Pittsburg district mines. The first, which is the older system, is that of driving the butt-entries 160 yards apart, the usual distance, and face entries, or air-courses between the butt entries, the same distance apart from each other, thus laying off the whole mine into blocks 165 yards square. This is styled the single-entry system.

All the mines now being opened are developed on the double-entry system. Under this plan no air-courses are driven, two butt-entries instead of one being driven parallel with each other, thirty to forty feet apart, leaving a solid pillar of coal between them, and turning-rooms off on but one side of the entry. The same amount of entry-driving is required under both of these methods, while 25 per cent less entry-stumps are required under the double-entry system. Much better ventilation is acquired under the double-entry system, as the air can be kept constantly circulating to the heads of the entries by means of "break-throughs" between the two entries. Under the double-entry system it is possible to take out all the entry-stumps or pillars, while from 25 to 50 per cent of the entry-stumps are lost under the single-entry system.

The rooms, or working-places, are turned off the butt-entries about thirty feet apart; they are worked in, for the first 15 to 21 feet, only seven feet wide; then they are widened on one side to a width of 21 feet, leaving a coal-pillar, called a "rib," 12 feet thick. The track is laid straight up the side of the room, from the opening off the entry. All of the room as it is worked up, except the portion on which the track is laid (about seven feet wide), is filled with the refuse of the coal and the slate, called "gob," posts being first set in rows six feet apart, three in a row, to support the roof. If the roof is bad, posts are of from 4 to 8 inches in diameter, 5 to 5½ feet in length. "Break-throughs" are made in the ribs, about every thirty yards, into the next room.

The track laid up the side of the room is made of wooden rails 2 by 4 inches. The road in the mouth of the room, however, and the turn-off on the track in the entry, are made of T-iron. The miner working in a room works much the same as in an entry, save that where the coal is blasted the cut at the side of the room is not made.

BAIRD HALBERSTADT.

COAL-OIL. See PETROLEUM, Vol. XVIII, pp. 726 et seq.

COAL-TAR. See TAR, Vol. XXIII, pp. 62–65.

COAL TRAFFIC POOLS. See RAILROADS, in these Supplements.

COALVILLE, a town and the capital of Summit County, northeastern Utah; situated on the Weber River, at the base of the Wahsatch Mountains, on the Union Pacific railroad, about 35 miles E. of Salt Lake City. Its inhabitants are engaged chiefly in the mining of coal for railroad and manufacturing purposes. Population 1900, 808.

COAMINGS, in a ship, small frameworks on the deck, to prevent sea and rain water from running down the hatchways, ladderways and scuttles.

COAN, TITUS, missionary, was born at Killingworth, Connecticut, on February 1, 1801, and was educated for the ministry at Auburn, New York, Theological Seminary. In 1833–34 he went on a missionary and exploring voyage to the Straits of Magellan. In the summer of 1835 he went to Hawaii, and there spent most of his life, as one of the foremost of the missionaries who converted and civilized the natives of those islands. For forty-seven years he was in charge of the missionary station at Hilo, where he received more than 14,000 converts into the church. He mastered the Hawaiian language and wrote and spoke as fluently in it as in his native tongue. He only once revisited the United States, for a few months in 1870, and then returned to Hawaii, where he spent the rest of his life and died on December 1, 1882. He was the author of *Adventures in Pat*

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agonia and *Life in Hawaii*, published respectively in 1880 and 1881. W.F.J.

COAN, TITUS MUNSON, author, son of Titus Coan (q. v.), was born at Hilo, Hawaiian Islands, on September 27, 1836, and was graduated from Williams College in 1859 and from the College of Physicians and Surgeons, New York, in 1861. He served in various hospitals and with Admiral Farragut's squadron in the Civil War as a surgeon, and since the war has been engaged in medical practice and literary work. He has written *Ounces of Prevention*, *Hawaiian Ethnography*, and other works. W.F.J.

*COAST DEFENSES OF THE UNITED STATES. The coast of the United States may, for convenience, be divided into four regions: 1. The Lake coast, having 37 cities, with an aggregate population of 2,525,893 and an aggregate wealth of $2,624,408,022; 2. The Atlantic coast, with 75 cities, population 6,640,532, and wealth $6,899,512,748; 3. The Gulf coast, with 8 cities, population 354,182, wealth $367,995,098; 4. The Pacific coast, 11 cities, population 527,223, wealth $547,784,698—a total of 131 cities, with a population of over 10,000,000 and aggregate wealth exceeding in value $10,000,000,000.

The principal seaport cities have had for many years no adequate means of defense. In 1886 the Board of Fortifications reported 2,020 sea-coast guns on hand, available for use, exclusive of sea-coast mortars, all of which were essential for the protection of torpedo-lines and the defense of the major and minor ports. The number of men necessary to arm them in time of war was estimated at 52,236, or about 2,500 in time of peace. But many of these guns were obsolete and of little value, and many of the batteries could not stop a single first-class ship-of-war, much less a fleet equipped with the modern appliances of war.

The facts that the entire system of warfare had changed within a generation; that European countries had increased their navies in recent years; that the ports of the United States were no longer able to resist the invasion of a foreign foe; and that in case of attack great loss of life and property would result, to say nothing of possible occupancy by the enemy, the consequent destruction of commercial interests and the payment of an indemnity—all these aroused the nation to a sense of its insecurity and to the necessity of multiplying and strengthening its coast defenses.

Accordingly, in 1885, induced by urgent representations on the condition of the coast defenses by civilians and military and naval officers, Congress directed President Cleveland to appoint a board to investigate and report measures to place the seaboard in a state of defense. This board—known as the Endicott or Fortifications Board—reported in 1886. The report covered thoroughly the ground of inquiry, and its recommendations named the ports requiring fortifications, the nature of the needed works, the number and character of the guns and mortars required, and the probable cost of all. The estimates submitted covered 27 principal ports, and called for permanent works, to be armed with 677 high-powered guns and 824 modern mortars. The amount of money absolutely demanded was placed at $97,782,800, exclusive of $28,595,000 for floating batteries; $21,500,000 was to be made available in 1886, and thereafter the annual appropriations should be $9,000,000. This report still stands as the projected system of the coast defenses of the United States.

The original plan contemplated the completion of the work in 1896. But the actual appropriations for armaments and emplacements since the report of the board up to 1896 were but $10,631,000. The average annual appropriation for guns and emplacements has been less than $1,500,000, instead of $9,000,000, as called for in the report. The work has thus been conducted at about one seventh the rate proposed. "If future appropriations for the manufacture of guns, mortars and carriages be no larger than the average authorized for the purpose since 1888, it will require 22 years more to supply the armament of the 18 important ports for which the projects complete are approved. If the appropriations for the engineer work are to continue at the rate of the annual appropriations since 1890, it will require seventy years to complete the emplacements and platforms for armament for the ports referred to."—*Report of Secretary of War.*

The Endicott board reported as needed, in addition to the 2,020 guns then on hand, 1,305 guns of modern construction. But the last report of the Secretary of War shows that partial provision has been made for 42 gun-emplacements out of 448 needed, and 64 mortar-emplacements out of 952 required. The report expects that in July, 1896, there will be 1371 8 and 12 inch guns and 55 gun-carriages and 24 emplacements ready for use, and that 24 guns out of 448 required will be in position and available for defense.

Since the organization of the Endicott board the United States has appropriated over one hundred and ten million dollars for the building of its navy and a little more than ten million dollars for its coast defense. The recent port-defense vessels are: The *Amphitrite*, 3,990 tons, with 4 10-inch, 2 4-inch and 2 6-pounder quick-firing guns; the *Miantonomoh*, 3,990 tons, and the *Terror*, 3,900 tons, each with 4 10-inch and 2 6-pounder quick-firing guns; the *Puritan*, 6,160 tons, with 4 12-inch, 6 4-inch and 2 6-pounder quick-firing guns; the ram *Katahdin*, 2,183 tons, with 4 6-pounder quick-firing guns. To which may be added the *Monadnock*, 3,900 tons, with 4 10-inch, 2 4-inch and 2 6-pounder quick-firing guns; and the *Monterey*, 4,048 tons, with 2 12-inch, 2 10-inch and 6 6-pounder quick-firing guns. In 1896 there were a total of 19 ships for coast defense.

The settled policy of the United States is evidently to make its ports and harbors impregnable and its naval power most effective. The boundless capital in property that would be destroyed by bombardment, with its attendant loss of life, the material interests of the whole nation, and the patriotism of its people, urge the completion of the work as early as practicable.

NELSON A. MILES.

COAST GUARD, in Great Britain, was originally a revenue police, to guard against

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smuggling, but in later years has been so enlarged and organized as to form a material part of the military defensive force of the kingdom. Since 1856 it has been under the direction and control of the admiralty, and may be raised to a force not exceeding 10,000 men. The coasts of the United Kingdom are divided into 11 districts, each of which is under the command of a captain, who has a warship at some port in the district to which all the revenue cutters and defence gunboats are attached as tenders. The men of the coast guard are well paid, and are carefully trained in both land and sea warfare. There is no corresponding organization in the United States, but its coasts are patrolled by the men of the LIFE-SAVING SERVICE, which see, Vol. XXVII. W.F.J.

COAST RANGE, the name given to several ridges parallel with the coast line in various countries. (1) The range of mountains extending from north to south in California parallel to the Pacific coast, and reaching a maximum altitude of 11,072 feet in the southern peak of San Bernardino; (2) the range of mountains in British Columbia extending southward from Mounts Logan and Elias along the boundary of the Alaskan panhandle to the Cascade Range; (3) a range in Venezuela parallel to the Caribbean coast in the states of Miranda and Bermudez; (4) a range in Australia, south of the Gulf of Carpentaria. C.L.S.

COAST SURVEY, now known as the COAST AND GEODETIC SURVEY, is an important scientific bureau of the United States government, established by President Jefferson in 1807. Upon recommendation of the President, Congress in that year authorized an official survey of the coasts of the country, and the Secretary of the Treasury, Albert Gallatin, to whom the project was committed, invited proposals for the execution of the work. The plan accepted was that offered by Gallatin's friend, Ferdinand Rudolph Hassler, a Swiss mathematician and scientist of high attainments, who had assisted in a trigonometrical survey of Switzerland before coming to America to become acting professor of mathematics at West Point. Hassler was sent to Europe to study methods of work and to obtain instruments, and finally, in 1817, began the great undertaking with a survey of the harbor of New York. Before the results of his first year's work were published, however, the undertaking was indefinitely suspended for want of funds, and it was not resumed until 1832. At the latter date Professor Hassler was again made superintendent of the work, and he remained in charge of it until his death in 1843. The bureau also remained under the Treasury Department for many years, but has now been appropriately assigned to the Department of Commerce and Labor. In 1843, at the recommendation of Professor Hassler, a board of civil. naval and military officers was convened by the President, under an act of Congress, to devise plans for the reorganization of the survey and the extension of its work. It adopted plans suggested by Professor Hassler, and these form to this day the foundation of the survey system. Hassler was succeeded as superintendent by A. D. Bache, of Philadelphia, and he by Benjamin Peirce. Since the resignation of Professor Peirce in 1874, the superintendents have been Carlisle P. Patterson, J. E. Hilgard, Frank M. Thorne, Thomas C. Mendenhall, William W. Duffield, and O. H. Tittman.

The Coast and Geodetic Survey is charged with the survey of the coasts of the United States, and coasts of all lands under jurisdiction of the United States, and the publication of charts thereof. These charts are invaluable to navigators. The work includes base measure, triangulation, topography and hydrography along the coasts, the survey of rivers to the head of tide-water or ship navigation, deep sea soundings, temperature and current observations along the coasts and throughout the Gulf Stream and the Japan current, magnetic observations and researches, the publication of maps showing the variations of terrestrial magnetism, gravity research, determination of heights of land, and the determination of geographic positions by astronomic observations for latitude, longitude and azimuth, and by triangulation, to serve as reference points for state surveys. The results obtained in all these branches of work are published in yearly reports, together with many professional papers, charts upon various scales, including sailing charts, coast charts, and harbor charts, tide table, issued yearly in advance, coast pilots with sailing directions covering all navigable waters, notices to mariners issued monthly, and containing current information of lights, buoys, shoals, etc., and such other publications as may be necessary.

The original scope of the survey has thus been enormously extended, and the work has become a permanent part of the public service. The entire stretch of American coast has practically been surveyed and chartered, but the geodetic survey of the land is little more than well begun. The constant changes which are taking place in currents, channels, shoals, etc., make it necessary, also, for a constant survey work to be maintained and for the charts to be frequently revised. There is close co-operation between the Coast and Geodetic Survey and the state surveys of various states. W.F.J.

COATESVILLE is an important manufacturing town and railroad center of Chester County, Pennsylvania, on the Pennsylvania railroad, about 40 miles west of Philadelphia. It lies on Brandywine Creek in a most picturesque and fertile valley. Its population was 5,721 in 1900. W.F.J.

COATI OR COATI-MONDI, a small carnivorous animal ranging from Texas to Paraguay. There are two species, the more common one being *Nasua rufa*—family, *Procynidæ*. The nose is produced into a long and very mobile snout with which it plows up the ground in search of worms and larvæ. It is about the size of a cat, and preys upon small quadrupeds. R.W.C.

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COAT OF ARMS, in the middle ages, a coat worn by princes and great barons over their armor, and descending to the knee. It was made of cloth of gold or silver, of fur or of velvet, and bore armorial insignia. The coat of arms in heraldry is a relic of the ancient armorial insignia, divested of the coat on which it used to be embroidered. See HERALDRY, Vol. XI, p. 608.

COAT OF MAIL, in the armor of the middle ages, a suit made of metal scales or rings, linked one within another. See ARMS AND ARMOR, Vol. II, p. 487.

COATZACOALCOS, a river of the Isthmus of Tehuantepec, in Mexico. It rises in the Sierra Madre, and falls into the Gulf of Mexico 130 miles S.E. of Vera Cruz. It is navigable for large vessels for 30 miles, and is interesting as part of a route which has been surveyed for an interoceanic canal. Its harbor is being fitted for large vessels.

COBB, COLLIER, educator, was born in Wayne County, North Carolina, on March 21, 1862, and was educated at Wake Forest College, the University of North Carolina, and Harvard University, being graduated from Harvard in 1889. He became a teacher in the public schools and lecturer, was an assistant on the U. S. Geological Survey at Harvard, and an instructor at the Massachusetts Institute of Technology. He accompanied the Union Pacific R. R. expedition to the fossil fields of Wyoming in 1899. Since 1892 he has been professor of geology at the University of North Carolina. He has published a map of North Carolina, and has done much literary and editorial work. W.F.J.

COBB, CYRUS, lawyer, sculptor, poet and musician, was born at Malden, Massachusetts, on August 6, 1834. He was the twin brother of Darius Cobb, younger brother of Sylvanus Cobb, Jr., the well-known author, and son of Sylvanus Cobb, the eminent Universalist clergyman. He was educated in Boston and studied art in America, declining to go to Europe for the purpose lest he should thus lose sympathy with American ideals. He studied law in Boston University, and practiced it for six years. In 1879 he devoted himself to sculpture, and produced a number of important works, both portrait busts and monumental statuary. Among them were a heroic statue of Abbott Lawrence and a bust of Theodore Parker. He also painted several pictures. He was an accomplished musician and was frequently heard at concerts, and he wrote a series of sonnets on the *Masters of Art*, which have been published. He served in the Union army in the Civil War, and afterward wrote a book entitled, *The Veteran of the Grand Army*, in vindication of the Grand Army of the Republic, of which he was a devoted member. The Soldiers' Monument at Cambridge, Massachusetts, was executed by him in 1869, largely as a labor of love, and it ranks among his best works of that class. His best-known painting is *Warren at the Old South*, painted in 1880, though his portraits of Dr. A. P. Peabody and John Appleton are much esteemed. He died at Allston, Massachusetts, on January 29, 1903. W.F.J.

COBB, DARIUS, artist, twin brother of Cyrus Cobb (q. v.), was born at Malden, Mass., on August 6, 1834, and was educated in the public schools. He served through the Civil War as a member of the 44th Massachusetts regiment, and afterward devoted himself to art and art criticism. He has painted many portraits and landscapes, with marked success, but is best known for his large paintings of historical and scriptural scenes. He was for some years art critic of the Boston *Traveler*, and has delivered many lectures on art topics. W.F.J.

COBB, HENRY IVES, an American architect; born in Brookline, Massachusetts, Aug. 19, 1859; descended on both sides from old New England colonial settlers; received his education in private schools, the Brookline High School, the Boston Institute of Technology and the Lawrence Scientific School of Harvard University. After spending some months with the architectural firm of Peabody and Stearns in Boston, he entered competitive drawings for the Union League Club House in Chicago, won the appointment, and at the request of the directors removed to Chicago to superintend its building, and thus became established there as an architect in 1882. Mr. Cobb has built many private residences, both city and suburban; those of Potter Palmer, R. R. Cable and Dr. McGill in Chicago being conspicuous among the former, and the Studebaker mansion at South Bend, Indiana, and the Country Club House at Lake Forest, Illinois, among the latter. The greater part of his time, however, has been devoted to public buildings, the Newberry Library, Yerkes Observatory, Chicago Historical Society, the Owings and Venetian office buildings, Kinzie Apartment House, the Chicago Athletic Association Building, Durand Art Institute at Northwestern University, Lake Forest, and several churches being among the number.

His most important work has been the building and construction of the Chicago University, upon a plan more extensive and complete than any similar group in the world. It consists of 46 buildings, composing four large quadrangles and covering four large city squares, and includes not only ranges of dormitories, but a gymnasium, library, chemical laboratory, observatories, chapel, administrative and recitation buildings, and all the other accessories of a liberally equipped university.

At the time of the Columbian Exposition Mr. Cobb designed the Fisheries Building, with its myriad unique details, the East India and Indiana buildings, and Cairo Street. The *Revue des Deux Mondes* pronounced the Fisheries Building as being "the most artistic, architecturally perfect, original design of the century."

He was selected by the United States government as architect of the new Federal building in Chicago.

COBB, HOWELL, an American statesman; born in Jefferson County, Ga., Sept. 7, 1815. He graduated at Franklin College, Athens, Ga., in

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1834, and was admitted to the bar in 1836. From 1837 to 1840 he was solicitor-general of the western circuit. In 1843 he was elected to the House of Representatives in Washington, in which, by three successive elections, he sat until 1850. While a Jacksonian regarding the federal union, he was also a firm believer in the guaranteed rights of the several States. In 1849 he was elected Speaker of the House in the Thirty-First Congress. He was influential in securing the Compromise of 1850, and was elected governor of Georgia by the Union party. In 1855 he was again sent to Congress, and in 1856 actively supported Buchanan, who, on his election, appointed him Secretary of the Treasury. He resigned this office, Dec. 10, 1860, and on Feb. 4, 1861, was chosen chairman of the Confederate Congress which met at Montgomery, Ala. He took little active part in the affairs of the Civil War, and died in New York city, Oct. 9, 1868. E.E.T.

COBB, Sylvanus, clergyman, was born at Norway, Maine, in July, 1799, and was educated for the ministry. He identified himself with the Universalist Church, and for many years was one of its foremost members, having several important pastoral charges in Massachusetts. He was the editor of the *Christian Freeman* for twenty years, and was one of the leaders in the temperance and anti-slavery movements of his time. He was the author of several books, including explanatory notes to the New Testament. He died on October 31, 1866. W.F.J.

COBB, Sylvanus, Jr., author, son of Sylvanus Cobb and brother of Cyrus and Darius Cobb, was born at Waterville, Maine, in 1823. He became the editor of various periodicals, including *The Rechabite* and *The New England Washingtonian*, but is best known for his stories, published in the *New York Ledger* and in book form. He wrote a memoir of his father, published with the latter's autobiography. He died on July 20, 1887. W.F.J.

COBBE, Frances Power, an English writer and leader in reform movements, daughter of Charles Cobbe, a lieutenant in the Nineteenth Light Dragoons, who fought at Assaye, was born at Newbridge House, County Dublin, Ireland, Dec. 4, 1822; and was educated at Brighton. Miss Cobbe was attracted by the radical Unitarian and rationalistic views of Theodore Parker during the brilliant career of that clergyman in the closing years of his life and labor, and adopted his views in a great measure, so much so that all her writings will be found to be tinged with that minister's views of matters pertaining to the mental and spiritual part of man. A general trend of thought, which took its rise from the writings and public utterances of Theodore Parker, may be discovered running through nearly all her publications, which include the following: *An Essay on Intuitive Morals* (1855); *Religious Duty* (1857); *Pursuits of Women* (1863); *Cities of the Past* (1863); *Broken Lights* (1864); *Italics* (1864); *Studies, Ethical and Social* (1865); *Hours of Work and Play* (1867); *Drawing Lights* (1868); *Alone, to the Alone* (1871); *Darwinism in Morals* (1872); *Hopes of the Human Race* (1874–80); *Re-Echoes* (1876); *False Beasts and True* (1875); *Duties of Women* (1880); *The Peak in Darien* (1881); *A Faithless World* (1885); *The Scientific Spirit of the Age* (1888); *The Modern Rack* (1889); *The Friend of Man* (1890).

FRANCES POWER COBBE.

In addition to these, Miss Cobbe wrote and issued a great number of less pretentious works in the form of pamphlets, in the interest of various reforms to which she was devoting herself, among which may be mentioned *The Workhouse as a Hospital* (1861); *Friendless Girls, and How to Help Them* (1861), which was an account of the original Preventive Mission at Bristol; *Female Education* (1862), a plea for the granting of university degrees to women; and a large number of pamphlets and leaflets opposed to vivisection, against which practice she was opposed strongly and uttered some of her strongest protests.

To further her work in the line of reform, Miss Cobbe originated a scheme of labor in ragged schools, and afterward a system for befriending young servants, the latter since being worked by the Metropolitan Association, founded for that purpose. She also did much work for the relief of destitute incurables.

Miss Cobbe traveled extensively in Egypt, Palestine, Greece and Italy, and afterward settled down to hard work in London again, and did editorial writing on *The Echo* and later on *The Standard*, and afterward contributed largely to *The Quarterly Review*, *Fraser's Magazine*, and a number of newspapers and other periodicals. During this time she was engaged in promoting the Aggravated Assaults Act of 1878 whereby wives whose husbands have been convicted of violent assaults upon them are enabled to obtain separation orders.

In 1880–81 she delivered a course of lectures on *The Duties of Women*, which were published and circulated largely in America as well as Great Britain, and, in addition, have been translated into Danish, French and Italian. In the latter year she founded the Victoria Street Society for the Protection of Animals from Vivisection, of which she was the secretary for 15 years, and the late Lord Shaftesbury was the president. Died April 5, 1904.

COBBOLD, Thomas Spencer, an English authority on parasitic worms; born at Ipswich, England, in 1828; died March 20, 1886. He studied medicine at Edinburgh and lectured in London on botany, zoölogy, comparative anatomy, geology and helminthology, in connection with various hospitals and colleges. He wrote *Entozoa* (1864); *Tapeworms* (1866); and *Parasites* (1879); besides numerous other works on kindred subjects.

COBET, Carl Gabriel, a Dutch philologist; born in 1813, in Paris; died at Leyden, Oct. 26, 1889. In 1847 he became professor of Greek at the University of Leyden and in 1876 was made foreign

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associate of the French Academy of Inscriptions and Belles-Lettres. Among his principal works are *Oratio de Arte Interpretandi*, editions of the Greek classics, and writings on the comic poet Plato, and on Dionysius of Halicarnassus and Xenophon.

COBLESKILL, a village of Schoharie County, central-eastern New York, on the Delaware and Hudson railroad and on Cobleskill Creek, 45 miles W. of Albany. It contains a variety of manufactories. In the near vicinity are extensive quarries of building-stone, and three miles to the east are mineral springs. Population 1900, 2,327.

COB-NUT, the name of some of the largest and finest cultivated varieties of the hazel-nut. Also the name of the fruit of the tree *Omphalea triandra* of the West Indies. The fruit, when the embryo is extracted, is pleasant and wholesome. See HAZEL, Vol. XI, p. 490. W.R.B.

COBOURG, Ontario, the seat of Northumberland County, a port of entry on Lake Ontario, and on the Grand Trunk railway, 72 miles E. of Toronto. It has an active lake trade and some manufactures. Victoria (Methodist) University was founded here in 1842. Pop., 4,239. C.L.S.

COBURG. See SAXE-COBURG AND GOTHA, Vol. XXIX, p. 13.

COBURG PENINSULA, the most northerly part of South Australia, west of the Gulf of Carpentaria. It runs northwest toward Melville Island, from which it is divided by Dundas Strait.

COCAINE, a vegetable alkaloid ($C^{17}H^{21}NO^4$) obtained from the leaves of the coca (or cuca, for which see CUCA, Vol. VI, p. 605), a small shrub growing in the mountains of Peru and Bolivia, but cultivated, after its wonderful properties became known, in other parts of South America. The principal source of the drug as a commercial product, at the present day, is the province of Yuncas, in Bolivia. The leaves from which the drug is obtained are green, about two inches long, the blossoms white and the berries red. The annual product is estimated at forty million pounds. The leaves, when macerated and treated with pure wine, produce one of the finest stimulants ever tried by persons exhausted by excessive mental work or emotional excitement. Many attempts have been made in times past, by chemists, to extract the medicinal and chemical properties of the plant, but no success was reached until within late years, when an alkaloid was isolated which proved a thorough local anæsthetic, and to which was given the name *cocaine*. The drug of commerce forms colorless transparent prisms, is odorless and has a bitter taste. It is only sparingly soluble in water, but freely soluble in ether, and is used as a local anæsthetic. As such it has proved especially valuable in operations on the more delicate organs of the body, as the eye, etc. Two percentage of cocaine added to ordinary cacao butter-pencils converts the latter into a remedy which gives almost instant relief to a chafed or irritated skin, to insect-bites, etc. In 1889 cocaine was made artificially from benzoil-ecgonin by introducing into it the methyl group. Whether the new production possesses special therapeutic properties has not been ascertained, at least not announced.

The history of cocaine is a short one, but its strength as a drug and a poison places it in the front rank of drugs as the most deadly. So benign is its influence that few who begin its use suspect its power until the "cocaine habit" is formed and the victim is rapidly becoming a wreck. Its distinctive feature is due to hyperæmia of the nerve-centers; but as the effect is transient, reaction sets in with ever-increasing power, until the habit is fully formed, and the victim is in the clutches of a terrible adversary, with very little chance of hope for safety. As a stimulant it is regarded justly as far more powerful, rapid and baneful in its effects than any other known drug.

Beginning with 1885, when crude cocaine was first made in Peru, vast quantities were sent to the United States and to Europe. The advantages of exporting the crude alkaloid rather than the leaves proved many and important. The principal source of supply for the United States is by the way of Hamburg.

COCANADA, a seaport and headquarters of Godavari district, Madras, southern India, 315 miles N. of Madras. It exports cotton, oil-seeds, sugar, rice and cigars. Population, 28,856.

COCCEJI, HEINRICH FREIHERR VON, German jurist; born at Bremen in 1644; died in 1719. He studied jurisprudence and philosophy in Leyden, and in 1672 was made professor of the law of nations at Heidelberg, and the following year was appointed to a similar office at Frankfort-on-the-Oder. His work on German civil law, *Juris Publici Prudentia* (1695), was almost universally used as an academical text-book for this branch of jurisprudence.

COCCEJI, SAMUEL VON, German jurist, and chancellor of Prussia under Frederick the Great; a son of the preceding; born at Heidelberg in 1679; died in 1755. His code of laws, *Codex Fridericianus*, was prepared by direction of Frederick and adopted for the kingdom. He died while chancellor.

COCCO, COCCOA ROOT OR EDDOES, the corms (underground stems) of plants of the genera *Colocasia* and *Caladium*, of the family *Araceæ*, natives of the West Indies and tropical America. The corm forms the principal food of many of the inhabitants, its taste being very much like that of potatoes.

COCCOMILLA OR COCOMILLA (*Prunus coccomilia*), a deciduous shrub of the plum family *Drupaceæ*, a native of Calabria. The bark is used as a cure in intermittent fevers. W.R.B.

COCCOSTEUS, a genus of fossil fishes, peculiar to the Devonian measures, of the suborder *Placodermi*, order *Ganoidei*. About seven species have been described. See ICHTHYOLOGY, Vol. XII, p. 724.

COCCULUS INDICUS, the very poisonous fruit of *Anamirta cocculus*, of the tropical family *Menispermaceæ*, a family of climbing plants, rich in bitter and poisonous properties. *A. cocculus* is a native of the East Indies; the poisonous principle of the fruits (also called "grains of paradise") is called *picrotoxin*. It is used largely in medicine, in certain ointments, and sometimes in malt liquors, to

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which it gives bitter and intoxicating but very dangerous properties. See ADULTERATION, Vol. I, p. 152.

COCCUS, a genus of insects of the order *Hemiptera*, suborder *Homoptera*, the type of a family, *Coccidæ*, allied to the *Aphis*. They are very numerous, and are attached to particular plants, on the juices of which they feed, often producing much mischief by the flow and loss of sap which their punctures occasion. This family contains some species which are of great value, particularly for the beautiful dyes which they yield. Among them are COCHINEAL (Vol. VI, p. 89) and KERMES (Vol. XIV, p. 51).

COCCYX. See ANATOMY, Vol. I, p. 720.

COCHABAMBA, a central department of Bolivia, containing extensive plateaus. The climate is equable and healthful, and its fertile valleys render it the richest and most picturesque district of the republic. It was formerly known as the granary of Peru. Agriculture and cattle-raising are the chief occupations. Area, 21,430 square miles; population, about 360,220. The capital, Cochabamba, has a population variously estimated, as no official census has been taken of recent years, from 25,000 to 30,000.

COCHIN-CHINA, the most southern province of French Indo-China, bordered northeast by the territory of Moïs, northwest by Cambodia, south and east by the Chinese Sea, and by the Gulf of Siam in the west. (See COCHIN-CHINA, Vol. VI, pp. 85–89.) The area is 23,160 square miles, and the population is estimated at (1899) 2,323,499, of whom 4,451 are Europeans, 2,054,831 Annamites, 183,000 Cambodians, 65,000 Chinese, and the remainder Malays and Malabrians. French Cochin-China was incorporated with French Indo-China in 1887, and the whole divided into 21 arrondissements and 4 provinces; viz., Saïgon, Vinh-Long, Mytho and Bassac. There are 5,660 French troops in Cochin-China, besides about 2,800 Annamite soldiers. The imports (1899) amounted to 66,234,008 francs, and the exports to 109,178,828 francs, of which 70 per cent was rice. The annual revenue and expenditure are balanced at about 4½ million piastres. Railroads and telegraph lines have been introduced especially in the province of Saigon. There were, in 1892, 51 miles of railroad and 1,840 miles of telegraph line.

COCHITUATE LAKE is a small body of water in Natick township, Middlesex County, Massachusetts, about 18 miles west of Boston. It was the source of the first municipal water supply of Boston, but, covering an area of less than 70 acres, long ago proved inadequate. W.F.J.

COCHRANE, ALEXANDER DUNDAS ROSS WISHART BAILLIE, a British author; born in November, 1816; died in London, Feb. 15, 1890. He was a member of Parliament in 1841–46, in 1847–52, in 1859–68, and in 1870–80. He succeeded to the peerage as first Baron Lamington in 1880. He was long known to society as Baillie-Cochrane, a writer of poetry, and author of *Young Italy*. He recently published in *Blackwood's Magazine*, *In the Days of the Dandies*.

COCHRANE, ALEXANDER THOMAS, ADMIRAL, LORD, AND THOMAS, distinguished naval officers. See DUNDONALD, Vol. VII, pp. 465 et seq.

COCKBURN, SIR ALEXANDER JAMES EDMUND, an English jurist; born Dec. 24, 1802; died in London, Nov. 20, 1880. He was graduated at Trinity Hall, Cambridge, in 1829; was called to the bar and became queen's counsel in 1831. He first attracted public attention by his brilliant pleadings before Parliamentary committees. He was elected to Parliament as a Liberal from Southampton in 1847; was appointed solicitor-general in 1851, retaining the position until 1856; chief justice of the Court of Common Pleas in 1856, and England's Lord Chief Justice in 1859, holding office until his death. He was knighted in 1850, and was the British representative at the "*Alabama* case" arbitration at Geneva in 1871–72. He dissented from the award of the arbitrators for legal reasons, holding that in the case of the *Florida* and that of the *Shenandoah* the responsibility of the government had not been proved. As a barrister he conducted many famous cases. He prosecuted Palmer, the Rugeley poisoner, and as a judge presided over the trial of the Wainwright murder case and the trial of Arthur Orton for perjury. His charge in this last occupied twenty days in delivery, and was a model of lucid statement of evidence.

COCKCHAFER (*Melolontha vulgaris*). See COLEOPTERA, Vol. VI, p. 119.

COCKER, a species of spaniel, small in size, with a heavy and generally wavy or curly coat, used for starting up game. See *Spaniel*, under DOG, Vol. VII, p. 285. W.F.J.

COCKERILL, JOHN, an English manufacturer, and one of the greatest influences in commerce; born in Lancashire, England, Aug. 3, 1790; died at Warsaw, June 19, 1840. He was the son of William Cockerill, an inventor and machinist, who, in 1807, settled at Liège, in Belgium. John, with an elder brother, succeeded to his father's business in 1812; established a woolen factory in Berlin in 1815; in 1817 founded the famous works at Seraing, and invested heavily in various enterprises in all parts of Europe. His statue was erected at Seraing in 1871.

COCKERILL, JOHN A., an American journalist; born in Locustgrove, O., Dec. 5, 1845; died at Cairo, Egypt, April 10, 1896. He served in the Union army during the Civil War as a drummer. After the war he engaged in newspaper-work at Dayton, Hamilton and Cincinnati, Ohio; went to the scene of the Russo-Turkish war as special correspondent for the Cincinnati *Enquirer*. Upon his return to America in 1870, he, with Silas Hutchins, started the *Washington Post;* took the editorship of the St. Louis *Post-Dispatch* in 1879; became managing editor of the New York *World;* in 1891 purchased the *Commercial Advertiser*; and in 1894 became a member of the editorial staff of the New York *Herald*. He was on foreign duty for the *Herald* at the time of his death.

COCK-FIGHTING, a barbarous sport common among both the Greeks and Romans, as it still is common in India, the Malay countries and Spanish America. It flourished for fully six centuries in England, the cockpit at Whitehall having been erected and patronized by royalty. It is now pro-

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hibited by statute both in England and the United States. The game-fowl is the favorite breed of fighting-cocks, and much art is displayed in the training of cocks and in trimming and preparing the cock for the combat. Young cocks are called stags, and are considered at their best when two years of age and from 3½ to 4½ pounds in weight. When prepared for battle their natural spurs are usually reinforced by steel spurs from two to three inches in length. Strange to say, cock-fighting was a specially sanctioned sport of some English public schools, the schoolmaster receiving a regular tax from the boys on the occasion, which was on Shrove Tuesday. It was so in the days of King Henry II; and Roger Ascham, in his *Schoolmaster* (1570), announced his intention, never fulfilled, of writing a *Book of the Cock-Pitte*, as "a kinde of pastime fitte for a gentleman."

COCKNEY, originally a child delicately nurtured, and hence applied to the citizens of luxurious towns, as opposed to the hardier inhabitants of the country. Strictly and popularly speaking, the term is applied to such natives of London, England, as are "born within the sound of Bow bells," that is, in the East End of London. These are popularly supposed to be unable to apply the aspirate properly.

COCK OF THE PLAINS (*Centrocercus urophasianus*), the largest American grouse. It lives on the Western plains among the wild sage (*Artemesia*), which forms its principal food and gives a bitter flavor to the flesh. It is often called sage-cock.

COCK OF THE ROCK, a beautiful South-American bird of the genus *Rupicola* and family of chatterers (*Cotingidæ*). The bird is orange-yellow in color and has a curious crest on the head. It lives in the interior mountainous regions. It is about the size of a common pigeon.

COCK OF THE WOODS, a species of grouse. See CAPERCALLY, Vol. V, pp. 48, 49.

COCKRAN, WILLIAM BOURKE, an Irish-American politician; born in Ireland, February 28, 1854. Emigrating to America in 1871, he taught school in Westchester County, New York, and in 1876 was admitted to the bar. He became a prominent member of Tammany Hall and made noted speeches at the national and state Democratic conventions. He was one of the committee appointed to revise the State Constitution. In 1901 he was elected to Congress. In 1896 he became an advocate of the gold standard and made campaign speeches for McKinley, the Republican presidential candidate. He is an eloquent and forceful orator. W.M.C.

COCKSCOMB, an annual plant of the family *Amarantaceæ*, a native of the East Indies. By gardeners the name is confined to *Celosia cristata*. It grows with an upright stem, which becomes flattened upward, expands and forms a wavy crest. The colors are various and often very brilliant.

COCKSFOOT-GRASS (*Dactylis*), a genus of grasses called cock's foot from the dense branches of the one-sided panicles. *D. glomerata* is a native of Europe, and has been introduced extensively into North America and elsewhere. It is valuable for hay, and forms an important part in almost all the best pastures, as it is much relished by cattle. It thrives on most kinds of soil and in situations too shady for many other grasses. It is cultivated extensively in America, where it is known as "orchard-grass."

COCOA-PLUM, the fruit of the West Indian tree *Chrysobalanus icaco*. Also the tree itself. It grows to the height of 7 or 8 feet, the fruit being like our American plum. W.R.B.

COCOA POWDER. See GUNPOWDERS, in these Supplements.

COCOON, the silken sheath spun by the larvæ of many insects in passing into the pupa, or resting-stage. The arrangement of the threads and the completeness of the covering vary widely. The most typical and perfect cocoons are those of many moths, especially those of the silkworm. The delicacy, neatness and labor exhibited by these last make them as marvelous as they are useful. See also BUTTERFLIES, Vol. IV, pp. 528, 530.

COCO RIVER, also called, in parts, Wauks and Segovia, a river of Nicaragua, which rises in western Segovia, in the northern part of the country, and takes a tortuous northeasterly course through the valley formed by the Teluca and the Tompocenté mountains, and enters the Caribbean Sea at Cape Gracias à Dios. It is three hundred miles in length, flows through a narrow valley, and though it receives the waters of many tributaries, it does not carry a body of water at all proportionate to its length.

COCOS ISLANDS. See KEELING ISLANDS, Vol. XIV, p. 28.

CODAZZI, AUGUSTIN, an Italian soldier and explorer; born in Lugo, in 1792. He was a private in the army under Napoleon, and in 1817 emigrated to North America. He participated in the revolution in Venezuela, and for several years was a colonel of engineers of the Colombian army. From 1832 to 1843 he was an engineer in the employ of the Venezuelan government and made numerous explorations and surveys. He died in Colombia, June 7, 1859. W.M.C.

COD, CAPE, a peninsula of the coast of Massachusetts. See MASSACHUSETTS, Vol. XV, pp. 619, 621.

CODEINE, an opium alkaloid obtained from poppy-heads. It is a white crystalline substance, similar to morphin, but much feebler in its action. See OPIUM, Vol. XVII, p. 815.

CODEX, a name applied to ancient manuscripts, especially of the classics or of the Scriptures. Of the latter class the principal are the *Codex Sinaiticus*, discovered in 1844 and 1859 in the monastery of Mount Sinai by Tischendorf, and the *Codex Vaticanus*, both of the fourth century; and the *Codex Alexandrinus* and the *Codex Ephraemi* of the fifth century. See PALÆOGRAPHY, Vol. XVIII, pp. 148, 149.

CODEX ALEXANDRINUS. See ALEXANDRIAN MS., Vol. I, p. 438.

CODICIL, a postscript or supplement to a will, made by the maker of the will as an addition

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to the original document, to alter it, explain it, to add to or to take from its former dispositions of property, to alter the quantity or the proportions of the legacies, or for some other purpose. It is regarded as an integral part of the will, and is subject to the same rules and conditions of validity, and is acted upon as a part of the will by the court of probate. There may be many codicils to a single will, actually surpassing in volume the will itself. Each successive codicil generally revokes in terms all preceding bequests which may in any way conflict with it. See WILL, Vol. XXIV, p. 601. W.F.J.

CODLING-MOTH (*Carpocapsa pomonella*), a small moth which occurs wherever apples are grown. The perfect insect flies at night and deposits its eggs in the young fruit. The larva feeds on the core of the fruit, arresting its growth and causing it to fall prematurely.

CODY, WILLIAM FREDERICK, popularly known as "Buffalo Bill," scout, soldier, ranchman and showman; was born in Scott County, Iowa, on February 26, 1846, the son of a settler, who was killed a dozen years later in the "Border War" in Kansas. He became a pony express rider at the age of 14, and a year later entered the United States army in the Seventh Kansas regiment, as a scout and guide. After the war he engaged in the furnishing of buffalo meat to the Kansas Pacific Railroad Company, for the men employed in constructing its lines, and thus won his popular name of "Buffalo Bill." In a year and a half he killed 4,280 buffaloes. Later he had many conflicts with Indians, and served as a government scout in campaigns against the Sioux and Cheyennes, and personally killed the Cheyenne chief, Yellow Hand, at Indian Creek, in a hand-to-hand fight. He became known to juvenile America in the stories of Western adventure written by E. Z. C. Judson ("Ned Buntline"), and, with the advance of civilization, finding his occupation as a scout gone, Cody took for a while to the stage. He left the boards on the slightest Indian alarm, and on one occasion rode to the front in the gaudy trappings of the sensational drama in which he had been appearing. Associating himself with Nate Saulsbury, and observing with considerable business instinct the rapid extinction of the frontiersman who won the West, Cody collected a band of Indians, cowboys, rough-riders, unbroken bronchos and a small herd of buffaloes and commenced a series of exhibitions in the principal towns of the American continent. His "Wild West," as he called it, rapidly grew in popular favor. As recreation for the youth and reminiscence for the elders, he played to huge audiences in almost every town in the Union, and undertook a series of tours through the principal cities of Europe. Here his fame as a scout brought him in contact with the crowned heads of the world, and his trip well sustained his reputation. At the World's Columbian Exposition of 1893 he met with considerable success. At this period one of his associates, John M. Burke ("Arizona John"), published a biography of his leader, under the title of *Buffalo Bill, from Prairie to Palace*, while at the same time his first employer, the veteran Alexander Majors, also dealt eulogistically with Cody in a book entitled *Seventy Years on the Frontier*. Eliminating the glare of the footlights and the advertising devices of an aspirant for popular favor, Cody must still be considered as a considerable factor with others in the winning of the West and as a typical instance of the fearless rider of the plains. W.F.J.

WILLIAM F. CODY.

COE COLLEGE, an institution of learning, founded at Cedar Rapids, Iowa, in 1881, and conducted under the auspices of the Presbyterian Church. In 1902 there were 18 instructors and 326 students in attendance. The library contains 3,500 volumes. The total productive funds of the institution amount to $61,000. Its income is $15,000 per annum. Dr. James Marshall was succeeded in the presidency by S. B. McCormick, D.D.

COE, GEORGE SIMMONS, an American financier; born in Newport, Rhode Island, March 27, 1817. At the age of 17 he began his commercial career as a bank clerk, and in 1854 removed to New York city, where he became vice-president of the American Exchange National Bank. He was then promoted to president and for nearly a quarter of a century was at the head of the institution. He was one of the organizers of the New York Clearing House, and in 1881 was elected president of the National Banking Association. For nearly 40 years he was one of the leading financiers of New York city. He died in Englewood, Bergen County, N. J., May 3, 1896. W.M.C.

CŒLESYRIA. See LEBANON, Vol. XIV, pp. 393–94.

COELHO, FRANCISCO ADOLPHO, Portuguese philologist; born, 1847, in Coimbra; since 1878 professor of comparative philology at Lisbon. He published *Lingua Portugueza* (1868); *Dictionaria Manual Stimologicode Lingua Portugueza* (1890); *Contos Populares Portuguezes*, and with Braga *Bibliotheka d' Educacão Nacional*. G.A.S.

COELHO, GONZALO, explorer, was a Portuguese captain, contemporary with Columbus. He was engaged in trade on the West African coast, and after the discovery of America sought a passage to the East Indies to the south of this continent, but succeeded only in exploring the coast of Brazil, as far as Rio de Janeiro. The dates of his birth and death and the details of his career are not known. W.F.J.

CŒLIAC AXIS, the great branch of the abdominal aorta, which subdivides into branches for the stomach, liver and spleen. W.F.J.

CŒLIUS OR CÆLIUS ANTIPATER, a Roman historian, the author of the *Annales*, which were edited by Brutus. He lived about 123 B.C. The *Annales* contain an account of the second Punic war, of great value. See also LIVY, Vol. XIV, p. 735.

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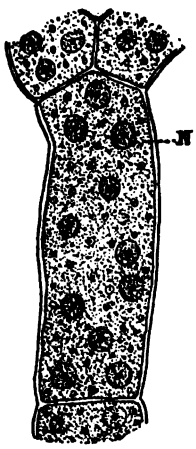
CŒLOM. See EMBRYOLOGY, Vol. VIII, pp. 154, 155.

CŒNOCYTE, a name applied to a plant-body or part of a body in which nuclear division has occurred, but has not been accompanied by the formation of cell-walls. The body or part is accordingly unseptate, that is, without partition-walls, although it may be composed of numbers of protoplasmic units which in other plants are separated from one another by cell-walls. Such a plant or such a part is a "cœnocyte," or is said to be "cœnocytic." Notable illustrations of a cœnocyte body are found among the phycomycete fungi and siphonaceous algæ; of cœnocyte parts in *Cladophora*, *Hydrodictyon*, etc., other algæ; although the cœnocytic condition is not wanting in even the highest plants.



A cell of *Cladophora*, showing cœnocytic character, containing 11 nuclei (N). (Original.)

COERCION AND COERCION ACTS. See HOME RULE, in the Supplements.

CŒREBIDÆ, a family of oscine passerine birds found in the warmer parts of America, popularly known as the honey-creepers. They are so closely related to the American warblers that many ornithologists dispute the division into separate families.

COEYMAN, New York, a town of Albany County on the west bank of the Hudson River, reached from Ravena, a town and junction on the West Shore railroad to the north, 13 miles, south of Albany. It has manufactures of ice, machinery, tools, brooms and brick. Population, 1891, 3,669; 1901, 3,952. C.L.S.

COFFEE-BUG (*Lecanium caffeæ*), an insect of the Coccus family, which lives on the coffee-tree and is extremely destructive to coffee plantations.

COFFEE-TREE OR KENTUCKY COFFEE, a leguminous tree of the United States, often growing to a large size, the seeds of which have been sometimes used as a substitute for coffee. The single species is *Gymnocladus Canadensis*, found chiefly in the Mississippi basin, east of the prairie region. Although closely related to the "honey-locust," it is a tall, thornless tree, with large twice-pinnate leaves, small, greenish flowers in narrow racemes, and large, tough linear pods five to ten inches long. It is a fine ornamental and timber tree.

COFFER-FISH, a fish of the family *Ostraciontidæ*, often known as trunk-fishes. These fishes have all the body except the tail incased in a coat of mail, composed of large hexagonal plates, which are firmly interlocked. They are often used as food.

COFFEYVILLE, a railway city of Kansas, on the line of the Santa Fé and Missouri Pacific railroads, and a shipping-point for the Indian Territory. It is in Montgomery County. Coal and natural gas are found here. Population 1900, 4,953.

COFFIN, CHARLES CARLETON, author; was born at Boscawen, N. H., on July 26, 1823, and became a railroad engineer and telegrapher. In 1850 he became a journalist in Boston. He traveled widely, writing for the press, and wrote many books, for both children and adults, over the pen-name of "Carleton," which attained wide and well deserved popularity. He died on March 2, 1896. W.F.J.

COFFIN, ROBERT BARRY, journalist and author; was born at Hudson, N. Y., on July 21, 1826. He was a member of the staff of the *Home Journal* and art critic of the *Evening Post*, in New York, and wrote many sketches over the pen-name of "Barry Gray." Among his books are *My Married Life at Hillside* (1865); *Cakes and Ale at Woodbine* (1868), and *The Home of Cooper* (1872). His miscellaneous writings appeared in many periodicals. He died in New York city on June 10, 1886. W.F.J.

COFFIN, SIR ISAAC, an English naval officer; born in Massachusetts Colony, May 16, 1759. He joined the British navy in 1772, was promoted to captain in 1787, commodore in 1795, vice-admiral in 1808 and admiral in 1814. During the Revolution he fought against the American colonists. In 1802 he revisited the United States and founded a school at Nantucket, Massachusetts. He died in London, July 23, 1839. W.M.C.

COFFIN, WILLIAM ANDERSON, an American artist; born in Allegheny, Pennsylvania, January 31, 1855. He studied art in New York and became well known as a landscape painter. In 1901 he was director of Fine Arts at the Pan-American Exposition. Among his best known pictures are *The Rain; An Examination; The Close of Day*, and *The Hayfield*. W.M.C.

COGALNICEANU, MICHEL, a Roumanian statesman; born in 1806; died in Paris, July 5, 1891. At an early age he became professor of national history at Jassy. A leader in the Jassy revolution of 1848, he was exiled for a number of years. He was largely instrumental in the union of the provinces of the Danube. In 1864 he was president of the Cabinet, and from 1868 to 1870 was again a member of the Cabinet, as Minister of Internal Affairs. In 1876 he was made Minister of Foreign Affairs; later, ambassador to France, and in 1879 he became Senator. During the whole of his career he was a Liberal, and to his fearlessness are due many of the political and religious reforms of Roumania. He wrote some valuable histories, the most important being his *Histoire de la Valachie et de la Moldavie*, and his books on the gipsies, their origin, language, etc.

COGGESHALL, a market town in the county of Essex, England, situated on the river Blackwater, 44 miles N.E. of London. The town consists of Great and Little Coggeshall, connected by a bridge across the river, and contains a beautiful church, St. Peter's, restored in 1868, a grammar school endowed by Sir Robert Hitcham, a mechanic's institute and a public library. Its manufactures are chiefly silk, velvets, patent isinglass and gelatine. In 1142 King Stephen here founded a Cistercian abbey, part of the ground plan of which was excavated and examined in 1865. Population, 3,109.

COGNOVIT, a legal term signifying a written

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confession of the plaintiff's cause of action, authorizing him to take judgment for an amount named. It is usually signed by the defendant, after a suit has been commenced against him, or by an attorney authorized by warrant of attorney to act for him. A warrant of attorney authorizing some attorney therein named, or any attorney of record, to enter the appearance of the defendant in any suit brought on account of the cause of action set forth in the instrument, and to confess judgment against the defendant at any time, or at a specified time in case he fails to meet the obligation, is frequently executed as a part of a note or other evidence of indebtedness. Such warrant of attorney gives the attorney named, or if none is named, any attorney, the right to execute a *cognovit* authorizing the entry of judgment against the debtor. This form of warrant of attorney is of frequent use in recent times throughout the United States, in order to give the creditor greater security, and to avoid delay in case he shall deem it necessary to obtain judgment.

COGSWELL, Joseph Green, an American bibliographer and librarian; born in Ipswich, Massachusetts, September 27, 1786. He was graduated from Harvard in 1806 and began the practice of law at Belfast, Maine. From 1812 to 1815 he was an instructor at Harvard, and in 1819 made professor of geology and mineralogy and librarian at Harvard. In 1823 with George Bancroft, he founded the Round Hill School at Northampton, Massachusetts. He was editor of the New York *Review*, and with John Jacob Astor, Fitz-Greene Halleck, and Washington Irving, founded the Astor Library. He was appointed librarian in 1848. He died at Cambridge, Massachusetts, November 26, 1871. W.M.C.

COGSWELL, William, clergyman and educator, was born at Atkinson, N. H., on June 5, 1789, and was graduated from Dartmouth College in 1811. He studied theology and became for fourteen years pastor of the South Congregational Church at Dedham, Mass. He was for three years agent of the American Education Society, and from 1832 to 1841 its secretary. From 1841 to 1844 he was professor of history at Dartmouth College, and thereafter president of Gilmanton, N. H., Theological Seminary. He edited *The New England Historical and Genealogical Register* and *The American Quarterly Register*, and was the author of several books. He died on April 18, 1850. W.F.J.

COHN, Ferdinand Julius, a German botanist; born in Breslau, Jan. 24, 1828. In 1850 he became private tutor and in 1870 professor of botany in the Breslau University. He belonged to the school of Schleiden, which endeavored to trace back to the development of the vegetable cell the origin of life in plants, and he devoted himself to the study of the line of demarcation between vegetable and animal life. His researches on fermentation, on the active agents of putrefaction, on miasmas, and on microbes in contagious diseases, have attracted wide attention. Among his monographs the best known are *Untersuchungen über die Entwickelung der Mikroskopischen Algen und Pilze* (1854); *Kleine Untersuchungen über Bacteria* (1872–75). He founded (1875) and edited in Breslau a special periodical entitled *Beiträge zur Biologie der Planzen*.

COHNHEIM, Julius Friedrich, was born at Demmin, Prussia, in 1839, studied at Würzburg and Berlin, and was successively professor of pathology at Kiel, at Breslau, and at Leipsic. He made important investigations into inflammations and suppurations, and first demonstrated the nature of pus. He also made a profound study of tuberculosis and its infectiousness. His works include several standard treatises on inflammations, on tuberculosis, and on general pathology, and he ranked among the foremost pathologists. He died in 1884. W.F.J.

COHOES, a rising city in New York State, 8 miles north of Albany, given to manufacturing, and deriving its motive power from the Cohoes Falls; Its trade in hosiery and knit goods, in 1900, exceeded in value $5,000,000. It has other growing industries. Pop. 1890, 22,509; 1900, 23,910.

COHUNE OIL, a fixed oil obtained from the kernel of the fruit *Attalea cohune*, a palm abundant in Central America. The oil is of very fine quality and is said to burn twice as long as the finest cocoa-nut oil. The tree, although only forty feet in height, has leaves thirty feet long. The sap yields palm wine. W.R.B.

*COINAGE LAWS. The first coinage laws of the United States government were enacted in 1792. It provided two standards of value, one of gold, the other of silver,—the latter, of equal face value, to be 15 times greater in weight than the former. Under it, depositors of either metal could obtain at the mint, on equal terms, either gold or silver coins in payment therefor. This plan is known as free coinage. Under the ratio fixed by the act mentioned, an owner of silver could generally get more for his metal at the mint than in the market, and, consequently, silver came in for coinage pretty freely. At that time a Mexican Spanish dollar, containing about two per cent more silver than the United States standard dollar, was freely received in circulation, and astute brokers quietly changed the latter for these foreign pieces at home and abroad, exporting the inferior coin in great numbers for purpose of such exchange. The foreign pieces received were then deposited for coinage, yielding to the owner a profit of two per cent, but the process drove the United States dollar out of home-circulation. To prevent this abuse, President Jefferson, in 1805, stopped the coinage of the silver dollar pieces. Since that time no silver dollars have been coined for circulation under a free coinage law, those manufactured having been exclusively for exportation. The legalizing of foreign coins, as provided by Congress, and the undervaluation of gold pieces in comparison with silver, effectually kept the gold coin from circulation. To change this, and avowedly to bring gold into circulation, Congress, in 1834, reduced the weight of gold coins about seven per cent. The measure, which met with but little opposition in either house, was championed in the Senate as an administration measure by Senator Thomas H. Benton, and was approved by President Andrew

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Jackson, June 28, 1834. The law had the desired effect. Gold at once became the standard of value, and coins of that metal entered freely into circulation, to the exclusion of silver. Later, in 1853, authority was given the Secretary of the Treasury to purchase silver and coin it into fractional parts of a dollar, reduced in weight in order to keep them from being melted down. No opposition to this measure was developed, and it furnished the country, for the first time, with its own so-called subsidiary silver pieces, which would remain in circulation as long as the circulation was continued upon a gold basis.

The introduction of the demand notes of 1861 and the United States notes (greenbacks) of 1862 drove gold from circulation, except that enough remained for payment of duties, as required by law, at our ports of entry, for payment of coin interest on the public debt, and for general circulation in the Pacific states, where public sentiment would not permit the greenbacks to be used as money. Silver coins also disappeared from circulation.

The passage of the act of March 19, 1869, "to strengthen the public credit," by pledging the payment of public obligations in coin, would evidently, in a short time, require a largely increased coinage by the mints. The coinage laws as they then existed were scattered through the several volumes of United States statutes from 1792 to 1853, and in many respects were imperfect and conflicting. It was deemed advisable by the Treasury Department to revise and codify these laws, that the coinage of gold and silver, essential to carrying out the act of 1869, might be promptly executed. On April 25, 1870, a bill for the purpose was sent to Congress by the Secretary of the Treasury, from which the authority to coin the silver dollar was omitted, but provision was made for subsidiary silver coins. This bill, pending in Congress for three years, was the subject of much discussion, and on Feb. 12, 1873, became a law, practically with no opposition. In lieu of the silver dollar, authority was given to coin a trade dollar of 420 grains' weight, at the expense of the depositor. This coin, as its name indicates, was intended only for exportation. The depreciation in silver which followed enabled the depositor to put this coin into home circulation at a profit. The coin was made a legal tender to the amount of five dollars, but by an act approved July 22, 1876, Congress took from it its legal-tender quality, and at the same time authorized the Secretary of the Treasury to limit its coinage to its demand for exportation. The coinage of this dollar practically ceased in 1878, and its further issue was prohibited by law in 1887

The fall in the value of silver, in its relation with gold, could not be foreseen. Had the measure of 1873 not been enacted, the silver dollar would have become the standard of value in 1874, and would have remained so ever since, to the exclusion of gold. The further coinage of the silver dollar, however, on government account, as in the case of minor coins, has been carried on under the acts of Feb. 28, 1878, and July 12, 1890, to the extent of about $423,000,000. The entire amount coined previous to 1873 was only $8,031,238, and that mainly for exportation. No silver of any kind was in circulation when the act of 1873 was passed.

The average price, in gold, of the bullion in a silver dollar for the last two years has been about a half-dollar, and the change to a silver standard which would unquestionably ensue from the free coinage of both metals at a ratio of 16 to 1 would enable the debtor class to satisfy their obligations under a new standard having a purchasing power of about one half of the present (1896) one. The result of the experiment already made, of purchasing, for more than three years, the domestic product of silver, and burying it in the public vaults with a view to enhance the price of that metal, should warn men against hoping that any legislation will be likely to effect any considerable increase in its price. The average price of the silver in a dollar fell from $0.806 in 1890 to $0.603 in 1893, or about 25 per cent, though the government was absorbing in its vaults nearly all the domestic production, leaving the supply for the arts and manufactures to importation. No different result could be expected from free coinage. See also FINANCES OF THE UNITED STATES, in these Supplements. JOHN SHERMAN.

*COINS OF THE UNITED STATES. The first coinage in the American colonies was in 1652, when the general court of Massachusetts established a mint in Boston, and John Hull, mint-master, struck silver shillings, sixpences and threepences. All of these coins bore the device of the pine-tree. They were of the same fineness as the English coins of like denomination, but of less weight. This mint continued in operation for 36 years. After a while the "royal oak" was substituted for the pine-tree, in order to conciliate King Charles II, who disliked this minting by a colony. All the above-named coins bore the date of 1652. But twopenny pieces were added with the date of 1662. No other colony had a mint until 1659, when Lord Baltimore caused shillings, sixpences and groats to be coined for use in Maryland. James II issued ten coins for circulation in America, though few of these found their way hither. In 1722, 1723 and 1733 copper coins were minted in England with the legend "Rosa Americana." There were also copper halfpence issued in 1773 for circulation in Virginia, and in 1774 silver shillings were added. Florida and Louisiana had colonial coins of their own before they became parts of the United States.

After the Revolutionary War the Continental Congress passed an act, in 1786, which established a mint and regulated the value and alloy of the national coin. The government prescribed the device for copper coin the next year. Under this authority the so-called "Franklin penny," with the legend, "Mind your business," was made dy contract. By the Federal constitution, ratified in 1789, the right of coining money was transferreb from the states to the United States. Under this constitution the United States mint was established at Philadelphia in 1792, and the regular coinage began in the following year. Congress had, by an act of Aug. 8, 1786, and a resolution of July 6, 1787, established the dollar as the monetary unit.

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The following table gives the weight and fineness of all the denominations used in the United States. It also shows the dates of the various acts of Congress which authorized their issue; what length of time each issue continued, when it was discontinued, when, as in certain instances, the issue was resumed, as well as the metals of which they are composed:

Coins.	Date of Law.	Weight, Grains.	Fineness.
GOLD.			
Double eagle	Mar. 3, 1849	516	900
Eagle	April 2, 1792	270	916⅔
	June 28, 1834	258	899.225
	Jan. 18, 1837		900
Half-eagle	April 2, 1792	135	916⅔
	June 28, 1834	129	899.225
	Jan. 18, 1837		900
Quarter-eagle	April 2, 1792	67.5	916⅔
	June 28, 1834	64.5	899.925
	Jan. 18, 1837		900
3-dollar piece	Feb. 21, 1853	77.4	900
Dollar	March 3, 1849	25.8	900
SILVER.			
Dollar	April 2, 1792	416	892.4
	Jan. 18, 1837	412½	900
Discontinued	Feb. 12, 1873		
Reauthorized	Feb. 28, 1878		
Discontinued	Nov. 1, 1893		
Trade dollar	Feb. 12, 1873	420	900
Discontinued	1883		
Demonetized	July 22, 1876		
Half-dollar	April 2, 1792	208	892.4
	Jan. 18, 1837	206¼	900
	Feb. 21, 1853	192	
	Feb. 12, 1873	192.9	
Quarter-dollar	April 12, 1792	104	892.4
	Jan. 18, 1837	103⅛	900
	Feb. 21, 1853	96	
	Feb. 12, 1876	96.45	
20-cent	March 3, 1875	77.16	900
Discontinued	May 2, 1878		
Dime	April 2, 1792	41.6	892.4
	Jan. 18, 1837	41.25	900
	Feb. 21, 1853	38.4	
	Feb. 12, 1873	38.58	
Half-dime	April 2, 1792	20.8	892.4
	Jan. 18, 1837	20⅝	900
	Feb. 21, 1853	19.2	
Discontinued	Feb. 12, 1873		
3-cent	Mar. 3, 1851	12⅜	750
	Mar. 3, 1853	11.52	900
Discontinued	Feb. 12, 1873		
MINOR COINS.			
5-cent (nickel)	May 16, 1866	77.16	75% copper; 25% nickel.
3-cent (nickel)	March 3, 1865	30	75% copper; 25% nickel.
2-cent (bronze)	April 22, 1792	96	95% copper; 5% tin and zinc.
Discontinued	Feb. 12, 1873		
Cent (copper)	April 2, 1792	264	
	Jan. 14, 1793	208	
	March 3, 1795	168	
Discontinued	Feb. 21, 1857		
Cent (nickel)	Feb. 21, 1857	72	88% copper; 12% nickel.
Discontinued	April 22, 1864		
Cent (bronze)	April 22, 1864	48	95% copper; 5% tin and zinc.
Half-cent (copper)	April 2, 1792	132	
	Jan. 14, 1793	104	
	March 3, 1795	84	
Discontinued	Feb. 21, 1857		

The etymology of the word *dollar* is the English form of the German word *thaler*, which is itself a contracted form or equivalent for Joachimsthal (Joachim's dale), at which place the silver used in the mintage was mined, toward the end of the fifteenth century. The name is applied to the German silver dollar (thaler); also to similar coins in the Netherlands and Norway and Sweden; to the large silver coin of Spain (the Spanish dollar, or peso); and to the silver coin which superseded the Spanish dollar in Spanish America. The dollar is the monetary unit of the United States and Canada,—in the former being represented by gold and silver coins as well as by notes, in the latter by notes alone. Newfoundland has in use a gold coin representing two dollars in value.

The act of April 2, 1792, besides establishing the coinage mint at Philadelphia, fixed the values of the coins, providing for "dollars or units, each to be of the value of a Spanish milled dollar," as that coin was then current in the United States, and containing 371¼ grains of pure silver, or 416 grains of standard silver. An act of Jan. 18, 1837, fixed the weight of the dollar at 412½ grains troy, nine tenths fine, the quantity of pure silver being the same as provided by the act of April 12, 1792. This dollar was undervalued, and quickly went out of circulation.

The trade dollar was a coin authorized by the act of 1873, having a weight of 420 grains, but ceased to be coined in 1883. It was intended for use in the trade with China and Japan. By an act of March 1, 1887, the Treasurer of the United States was authorized to redeem in standard silver dollars all trade dollars presented within six months following.

The coinage of gold dollars was directed by an act of March 3, 1849. These gold dollars consisted of 25.8 grains, nine tenths fine, 23.22 being pure gold. By the act of 1873 this gold dollar was declared the unit value of the United States, and the further coinage of the standard silver dollar was discontinued. The coinage of standard silver dollars was resumed in 1878, according to the act of February 28th of that year, known as the Bland-Allison Act, which directed the Secretary of the Treasury to purchase silver bullion to the amount of not less than $2,000,000, and not more than $4,000,000, per month, to be coined into standard silver dollars. This coinage was continued by the act of July 14, 1890, providing that the Secretary of the Treasury should purchase, from time to time, silver bullion to the aggregate amount of 4,500,000 ounces, or so much thereof as may be offered, each month. Nov. 1, 1893, the act repealing the purchasing clause of the act of 1890 was passed. Since that date the purchase of silver bullion by the government of the United States has consisted of the silver contained in gold deposits, the small fractions of silver for return in fine bars, the amount retained in payment of charges, surplus silver returned by the operative officers of the mints at the annual settlement, and mutilated domestic silver coin purchased for the subsidiary silver coinage under the provisions of section 3526 of the Revised Statutes.

The value of a United States silver dollar, as

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measured by the market price of silver and the quantity of silver purchasable with a dollar at the average London price of silver, was, in 1873, $1.016; in 1878, $0.936; in 1890, $0.926, and in 1893, $0.655; and it has decreased since.

The standard fineness for both coins, silver and gold, is nine tenths, one tenth being alloy. The gold dollar is generally estimated at an exchangeable value of 4s. 2d. in Great Britain.

By the act of Congress establishing the United States mint, the following coins were authorized: *Gold*, eagle, half-eagle, quarter-eagle; *silver*, dollar, half-dollar, quarter-dollar, dime, half-dime; *copper*, cent, half-cent. Changes have been made at various times, not only in weight and fineness, but also in the metals used for the minor coins. At present the following coins are struck: *Gold*, double eagle, eagle, half-eagle, three-dollar, quarter-eagle, dollar; *silver*, dollar, half-dollar, quarter-dollar, dime; *minor coins*, of nickel and bronze, five-cent, three-cent and cent.

By the act of Feb. 12, 1873, the metric system was to a certain extent used in determining the weight of the silver coins. Thus the half-dollar was to weigh 12½ grams, the quarter-dollar 6¼ grams, the dime 2½ grams.

Up to 1849, eagles, or ten-dollar gold pieces, were the highest denomination authorized. But the discovery of gold in large quantity in California caused a demand for a larger coin, and the double eagle was authorized by act of March 3, 1849, and issued in 1850. By the same act gold dollars were also authorized. Besides the governmental issues, there were octagonal and ring dollars, and even gold half-dollars and quarter-dollars, issued in California. The Mormons in Utah also had gold coins of their own. These had peculiar devices, and their favorite inscription, "Holiness to the Lord." Although the United States constitution prohibits coining by the states, it has been held that individuals may issue coins which are not similar to the national coinage. In December, 1892, a special silver half-dollar was issued by the United States to commemorate the World's Fair at Chicago, the entire issue of 5,000,000 coins immediately selling at one dollar each.

J. F. CARGILL.

COKE, RICHARD, statesman, was born at Williamsburg, Va., on March 13, 1829, and was graduated from William and Mary College in 1849. He was a district judge in 1865 and a justice of the Texas supreme court in 1866, but was removed under the Reconstruction act. He was governor of Texas from 1873 to 1877, and U. S. Senator from 1877 to 1889. He died on May 14, 1897. W.F.J.

BISHOP COKE.

COKE, THOMAS, a British clergyman; first bishop of the Methodist Episcopal Church in the United States; born in Brecon, South Wales, September 9, 1747. He was educated at Oxford and took orders in the established church of England. In 1776 he became acquainted with Wesley; and in 1780 became one of his assistants. In 1784 he removed to America and communicated the plan of government and discipline, drawn up by Wesley, and which still forms the bond of union to the great body of the Methodists in this country. In 1813 he sailed for Ceylon, in company with six other preachers, with a view to establish missions there, but died on the passage, May 3, 1814. He was the author of a *A Life of Wesley*, and other works. W.M.C.

COL, a depression or pass in a mountain range. In those parts of the Alps where the French language prevails, the passes are usually named *cols;* as, the *Col-de-Balme*, the *Col-du-Géant*, etc.

COLA, KOLA OR GOORA NUT. See NUT, Vol. XVII, p. 683.

COLBAN, ADOLPHINE MARIE, was born in Norway in 1814, and being left a widow without means in 1850, went to Paris and engaged in literary work. Her *Letters of a Barbarian* met with much success, as did a series of novels dealing with Scandinavian life and marked with fine literary qualities. They included *Loerinden; Tre Noveller; Tre Nye Noveller; En Gammel Jomfru; Cleopatra*, and *Thyra*. She died in 1884. W.F.J.

COLBURN, WARREN, an American mathematician; born in Dedham, Mass., March 1, 1793. He graduated at Harvard in 1820, and opened a school in Boston. In 1823 he was made superintendent of a factory in Waltham, Mass., and in 1824 took a similar position in Lowell. In 1821 he published *First Lessons in Intellectual Arithmetic*, a work which had an extraordinary sale, and in 1828 an *Algebra*. He died in Lowell, Sept. 13, 1833. E.E.T.

COLBURN, ZERAH, an American mathematical prodigy; born in Cabot, Vt., Sept. 1, 1804. At six years of age he manifested extraordinary powers of mental computation, and was placed on exhibition, visiting many of the American States, Great Britain, and France. He was placed in Westminster School, London, where he remained three years and then studied for the stage under Charles Kemble. Finding himself unfitted for an actor, he began to teach school, and, returning to America in 1824, he studied at the University of Vermont. In 1825 he joined the Methodist Church, and for nine years was an itinerant preacher. In 1833 he published his autobiography, and in 1835 was appointed professor of languages in Norwich University, Vt. He died in Norwich, March 2, 1840. E.E.T.

COLBY UNIVERSITY, an important institution at Waterville, Maine, affiliated with the Baptist Church. It was founded by that church in 1813, and was chartered by the state of Massachusetts, to which Maine then belonged, and was rechartered by the state of Maine in 1821. It was known as Waterville College down to 1867, when its name was changed to Colby University in honor of Gardner Colby, a philanthropist, who materially contributed to its development and prosperity. It receives both men and women as

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students, though in separate classes. It occupies a site of singular beauty, on a plateau overlooking the Kennebec River. W.F.J.

COLCHAGUA, a small province in southern central Chile, bounded by the provinces of O'Higgins on the north and Curicó on the south, and extending from the Andes to the sea. Area, 3,795 square miles; population 1895, 157,566. Its soil is very rich in the valley between the Andes and the Coast Range. Its capital is San Fernando, with 7,447 inhabitants.

COLCHESTER, a manufacturing town of New London County, southeastern Connecticut, on the Wood River Branch railroad. Pop. 1900, 1,133.

COLCHESTER, a town of Chittenden County, Vermont, on Lake Champlain. Pop. 1900, 5,352.

COLCHICINE, a powerful alkaloid poison. See COLCHICUM, Vol. VI, p. 113.

COLCOTHAR, a name given by the alchemists to the brownish-red peroxide of iron which remains in the retorts when green vitriol or the sulphate of iron is calcined. See COPPERAS, Vol. VI, p. 313.

COLDEN, CADWALLADER, an American physician and statesman; born in Dunse, Scotland, Feb. 17, 1688. He studied at Edinburgh, devoting himself to medicine and mathematics. In 1708 he emigrated to Pennsylvania, and practised medicine for several years. He returned to England, but again settled in Pennsylvania in 1716; in 1718 removed to New York; in 1719 was appointed surveyor-general of lands and master in chancery; and in 1720 member of the King's Council. In 1761 he was made lieutenant-governor of New York, a position he held till his death. He boldly defended the stamped paper brought out under the Stamp Act, for which he was burned in effigy. He was instrumental in founding the American Philosophical Society in Philadelphia, and corresponded with Franklin, Linnæus, and other eminent scientists. He published a treatise on yellow fever, which prevailed in New York in 1743; a description of some 400 American plants, in the *Acta Upsaliensia; History of the Five Indian Nations* (1727); a *Treatise on Gravitation*, etc. (1745). He died on Long Island, Sept. 28, 1776. E.E.T.

COLDEN, CADWALLADER DAVID, an American lawyer and public man; grandson of the preceding; born in Springhill, N. Y., April 4, 1769. He practised law in New York and Poughkeepsie, becoming eminent in his profession. In 1812 he was colonel of a regiment of volunteers; in 1818 was a member of the House of Assembly and was elected mayor of New York city; in 1822 was elected to Congress; and in 1824 became State senator. He was an active promoter of the Erie Canal. He died in Jersey City, Feb. 7, 1834. E.E.T.

COLD HARBOR, a location in Hanover County, Virginia, 10 miles N.E. of Richmond. Here, in May and June, 1864, the Confederate and Union armies confronted each other and a series of engagements took place. The fight began June 1st and lasted until the evening of June 3d. General Grant of the Federal army had advanced from Spottsylvania to the Chickahominy. The troops under Sheridan occupied Cold Harbor, May 31st. June 1st, they were joined by forces from Butler's army. An assault on the Confederates was made, which, though partially successful, resulted in a loss of two thousand men to the Union. During the next day the Federal forces were intrenched and placed in position with but little fighting. June 3d an assault was made by the troops on the right flank of the Confederates. But little ground was gained, and seven thousand men were lost. The Federal troops had, however, closed in on the Confederate works and gained positions advantageous for the battles around Petersburg. During the Cold Harbor fighting, the Union loss was almost thirteen thousand, while the Confederate was not over two thousand.

COLD-PIT, in gardening, a simple contrivance for the preservation of half-hardy plants through the winter. It consists of a pit about three feet in depth, covered with a frame either thatched or glazed.

COLD SPRING, the name of two places in the state of New York. One is a village of Putnam County, on the east bank of the Hudson River, nearly opposite West Point. It is the seat of some important machine shops and armories, and is reached by the New York Central and Hudson River railroad. Its population in 1900 was 2,067. The other is a village of Suffolk County, Long Island, at the head of Cold Spring Harbor. It is the site of an important fish hatchery belonging to the United States Fish Commission. It is 30 miles east of New York, and has a population (1900) of 756. W.F.J.

COLDSTREAM GUARDS, a celebrated regiment of Foot Guards in the Household Brigade of the British army, its organization dating from an earlier period than that of any other regiment excepting the First Foot. Raised in 1660 by General Monk at Coldstream, at first it was called Monk's Regiment, but when Parliament gave a brigade of guards to Charles II, this corps was included in it, and the name was changed to Coldstream Guards.

COLDWATER, Michigan, the seat of Branch County, a city on the Coldwater River and on the Lake Shore railway, 110 miles southwest of Detroit. It is an agricultural, manufacturing, and trading center, and has a state school for dependent children. Pop., 1900, 6,216. C.L.S.

COLE, GEORGE, a British landscape-painter; born in Portsmouth, England, in 1810; died in London, Sept. 7, 1883. He was a ship-painter by trade, but soon felt a desire to do a finer kind of work, and began to paint animals. His work in that line was first exhibited in London in 1840. Immediately he attracted the attention of artists, and ten years later found him a member of the Society of British Arts, of which, in 1878, he became the vice-president. Among his paintings are *Don Quixote and Sancho Pansa* and *Loch Lubnaig*, both examples of his earlier work; *A River Scene, Sussex* (1874); *Evening on the Thames* (1877); and *Windsor Castle—Morning* (1878).

COLE, SIR HENRY, an English civil administrator and author; born at Bath, July 15, 1808; died April

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18, 1882. He was educated at Christ's Hospital. He became assistant keeper of the records in 1838; was chairman of the Society of Arts; did valuable service on the committee of the exhibition of 1851; was the founder of South Kensington Museum, and in 1860 became director of that institution. He wrote much for newspapers and reviews, and under the name of "Felix Summerly," published a number of books for children, among which are *Alphabet of Quadrupeds; Heroic Tales of Ancient Greece;* and *Popular Fairy-Tales.*

COLE, THOMAS, an American artist; born in Bolton-le-Moors, England, Feb. 1, 1801. He came to Ohio in 1819, and developed artistic tastes, at first favoring portraits. Later he turned to landscape-painting, and in 1825 he removed to New York city, where he rapidly acquired celebrity, notably for his studies in the Catskills and the White Mountains. From 1829 to 1831, and again in 1841–42, he painted in Europe. His *Life and Works* was published in 1855. He died in Catskill, N.Y., Feb. 11, 1848. E.E.T.

COLE, VICAT, landscape painter; was born at Plymouth, England, in 1833, studied under his father, who was an artist, and early devoted himself to art, choosing for his specialty the portrayal of English landscapes. Many of his works are scenes in Surrey and are highly esteemed for their faithfulness to nature. He first exhibited in 1852, became in 1870 an associate and in 1880 a member of the Royal Academy, and died on April 6, 1893. W.F.J.

COLEBROOK OR GRAND FALLS, a port of entry of Victoria County, New Brunswick, Canada, at the head of navigation of the St. John River and just below the great falls of that stream. Its population in 1900 was more than 1,500. W.F.J.

COLEMAN, LYMAN, author and educator, was born at Middlefield, Massachusetts, on June 14, 1796, and was educated at Yale (1817) and at the Yale Divinity School. He taught school at Hartford, was a tutor at Yale, and in 1828 became pastor of a Congregational church at Belchertown, Massachusetts. Seven years later he became principal of the Burr Seminary in Vermont, where he remained for five years, and then principal of the English department of Phillips Andover Academy for five years. After two years of travel and study in Europe he was made professor of German at Princeton. Later he was a professor at Amherst, and at Lafayette College. He was the author of a number of works, chiefly dealing with ancient church history, and Biblical geography. He died on March 16, 1882. W.F.J.

COLENSO, JOHN WILLIAM, theologian; was born at St. Austell, England, on January 24, 1814, and was graduated from St. John's College, Cambridge. In 1853 he was made bishop of Natal, South Africa, and translated the Prayer Book and parts of the Bible into Zulu. He aroused much antagonism by asking that Zulu converts should be permitted to retain plural wives, and also by his work on the *Pentateuch*, in which he questioned its Mosaic authorship and historical accuracy. This work was condemned as heretical, and he was deposed and excommunicated, but retained general esteem for his upright and chivalrous character. He died on June 20, 1883. W.F.J.

COLENSO, WILLIAM, missionary to New Zealand, and scientist, cousin of the preceding; born in Penzance, Cornwall, in 1811. He was sent out to New Zealand by the Church Missionary Society to print the Bible in Maori. He printed the first book published in New Zealand, *The Epistles to the Ephesians and Philippians.* This was in 1835; from that time on he was engaged in missionary work. He was the only surviving witness of the signing of the treaty of Waitangi of 1840. He devoted much time to the study of the origin of the Maoris and their customs. He was an authority on the natural history of New Zealand, and in recognition of his services was made a fellow of the Royal Society. Died in New Zealand about Feb. 10, 1899.

COLEPEPPER, JOHN, a British statesman, a native of Sussex, England. But little is known of his history until his return for Kent in 1640 to the Long Parliament. In 1642 he became Chancellor of the Exchequer, a twelvemonth later master of the rolls, and in another twelvemonth Lord Colepepper. He died June 11, 1660.

COLERIDGE, DERWENT, an English clergyman, son of Samuel Taylor Coleridge; born Sept. 14, 1800, at Keswick, England; died April 2, 1883, at Torquay, England. In 1841 he became principal of St. Mark's College, Chelsea. While holding this position he was a prebendary of St. Paul's Cathedral, and later rector of Hanwell, Middlesex. He published *Lay Sermons* and *Notes on English Divines*, and edited *S. T. Coleridge's Dramatic Works.*

COLERIDGE, JOHN DUKE, first Baron Coleridge, eldest son of Sir John Taylor Coleridge and nephew of Samuel Taylor Coleridge; was born at Ottery St. Mary, England, on December 3, 1820, and was educated at Eton and Balliol, Oxford, being at the university a close associate of Matthew Arnold, Arthur Clough, Dean Church, Theodore Walrond, and Lord Lingen. He was graduated in 1842, took his M.A. in 1846, and was from 1843 to 1846 a Fellow of Exeter College. He became a student at the Middle Temple, London, in 1843, and was called to the bar three years later, entering the western circuit. He rapidly rose in his profession, was made recorder of Portsmouth in 1855, and queen's counsel in 1861. In 1865 he was elected to Parliament for Exeter, as a Liberal, and sat until 1873, when he became chief justice of the Court of Common Pleas. In 1868 he was made Solicitor-General and was knighted, and in 1871 was appointed Attorney-General. In the latter office he had charge of the famous Tichborne case (q. v.), in 1871–72, and his three weeks' cross examination of the "claimant," Arthur Orton, and his twenty-three days' speech in opening the case for the defendants, marked epochs in the history of litigation. In the fall of 1873 he was appointed chief justice of the court in which he had been

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conducting that case, the trial having ended a few months before. On January 10, 1874, while his father was still living, he was created Baron Coleridge of Ottery St. Mary, Devonshire. The next year he was elected a Fellow of the Royal Society, and in 1877 Oxford gave him the degree of D.C.L. For seven years he was the head of the Common Pleas Court, after which that office was abolished by law. He was then, in 1880, upon the death of Cockburn, appointed chief justice of the Court of Queen's Bench, commonly known as Lord Chief Justice of England. In that place he presided over a number of celebrated cases, including the Franconia case, involving the territorial jurisdiction of a government at sea within three miles of the coast, the suit of Bradlaugh vs. Newdegate, and that of the Queen vs. Dudley and Stephens, the only case in which a sentence of death had been passed in a royal court of justice. He was a jurist of profound learning, a scholar of wide and varied culture, and a man of irresistible personal charm and sympathy. He died on June 14, 1894. W.F.J.

COLES, ABRAHAM, author, was born at Scotch Plains, New Jersey, on December 26, 1813, and was graduated in 1835 from the Jefferson Medical College at Philadelphia. He wrote several volumes in poetry and prose, including thirteen original translations of the famous Latin hymn, *Dies Iræ*. He lived at Scotch Plains most of his life, but died at Monterey, California, on May 3, 1891. W.F.J.

COLES, EDWARD, statesman, was born in Virginia on December 15, 1786, was private secretary to President Madison, in 1814 urged the abolition of slavery, went on a special mission to Russia in 1816, and was one of the organizers of the state of Illinois. When he settled in Illinois he took his slaves thither, set them free, and gave each one 160 acres of land. In 1822 he was elected by the anti-slavery party as the second governor of Illinois. Afterward he founded the first agricultural society in Illinois. He died on July 7, 1868. W.F.J.

COLEUS, an ornamental plant. See HORTICULTURE, Vol. XII, p. 275.

COLEWORT, a name given to some of the many cultivated varieties of the common cabbage (*Brassica oleracea*). The name is also applied to cabbages cut for use before their leaves have fully closed into heads.

SCHUYLER COLFAX.

COLFAX, SCHUYLER, statesman, was born in New York on March 23, 1823, the grandson of General William Colfax, commander of Washington's Life Guards. In his boyhood he was taken to Indiana, where in 1845 he established the *St. Joseph Valley Register* at South Bend, and was its editor until 1863. He was secretary of the river and harbor convention at Chicago in 1847, secretary of the Whig national convention in 1848, a member of the Indiana constitutional convention in 1850, secretary of the Whig national convention in 1852, one of the organizers of the Republican party in 1854, and a representative in Congress from 1855 to 1869. He was an enemy of slavery, and made a notable speech on *The Conflict between Slavery and Freedom in Kansas*, in 1856. In December, 1863, he was elected Speaker of the House of Representatives, and in 1865 crossed the continent on a stage coach, in order to report to Congress and the nation upon the feasibility of building a railroad to the Pacific. He was elected Vice-President of the United States in 1868, and was the only man ever elected to be Speaker of the House and also Vice-President. In 1871 he declined the office of Secretary of State. In 1872 he was implicated in charges of improper connection with the Credit Mobilier, the company which had built the Pacific railroad, but earnestly denied them and was never brought to trial. At the end of his term as Vice-President he retired from political life, but was afterward prominent as a popular lecturer and also as a writer for the periodical press. He was a graceful speaker and possessed much personal charm. He died on January 13, 1885. W.F.J.

COLFAX, a flourishing town of Whitman County, southeastern Washington, on the Union Pacific railroad, 85 miles S. of Spokane. It is the trade center of an extensive and fertile agricultural district. Population 1890, 1,649; 1900, 2,121.

COLGATE, JAMES BOORMAN, banker and philanthropist; was born in New York city on March 4, 1818, and became a banker. He did much during the Civil War to maintain the financial credit of the nation. In 1864 he became a trustee of Madison University, at Hamilton, N. Y., which institution he richly endowed, and the name of which was changed in 1890 to Colgate University. W.F.J.

COLGATE UNIVERSITY, originally Madison University, but changed in 1889 to Colgate, in honor of

COLGATE UNIVERSITY.

James B. Colgate and family, by whose benefactions the institution has been benefited greatly. This university is the outgrowth of Hamilton Seminary, founded in 1820 at Hamilton, New York, which became Madison University in 1846. The endowment is nearly $2,000,000, in great part the gifts of J. B. Colgate. Since its first class, 2,150 have been graduated.

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There were, in 1900, 32 in the faculty, 360 students, and 30,000 volumes in the library. The president in 1900 was G. E. Merrill, D.D., LL.D.

COLISEUM OR COLOSSEUM. See AMPHITHEATRE, Vol. I, p. 680.

COLL, one of the western islands of Scotland, off the west coast of Mull, 2½ miles N.E. of Tiree Island. It is 12 miles in length. Population, 723; engaged in agriculture and fishing.

COLLAMER, JACOB, statesman; was born in Troy, New York, on January 8, 1791, and was graduated from the University of Vermont in 1810. He served in the War of 1812, became a member of the Vermont legislature, and in 1833–42 a justice of the supreme court of that state. He was elected to Congress in 1842, 1844, and 1846. In 1849 he was appointed Postmaster-General by President Taylor, and held the office until Taylor's death. Afterward he was a supreme court justice in Vermont again, and from 1854 to his death a United States Senator from Vermont. He died on July 9, 1865. W.F.J.

COLLAO is the name which was given by the Spanish Conquistadors to the region surrounding Lake Titicaca, in Peru, from the native name of a tribe living near the lake. The region is in the Department of Puna. W.F.J.

COLLE, a town of Tuscany, western central Italy, on the Elsa, 24 miles S.W. of Florence. It has an old cathedral and castle. Population, 5,090.

COLLECT, a name given to certain brief and comprehensive prayers found in all liturgies of the Roman Catholic and Protestant Episcopal churches. The origin of the term is not certain. According to some, it is from these prayers being said in the congregation, or collection, of the people; to others, because they are a brief and comprehensive summary of many longer petitions collected into one. Such prayers are of ancient origin, mention being made of them by writers of the third century.

COLLEGE FRATERNITIES, societies of students in almost all the colleges and universities of the United States. These organizations are sometimes known as "Greek-letter societies," an appellation derived from the fact that the majority of the societies have taken for their names two or more Greek letters which, to the members of the order, have some special significance; as, for instance, *Beta Theta Pi*. The college fraternities are, with one exception, secret societies. The general purpose is association for social privileges and the benefits naturally to be derived from united effort. The term *fraternity*, although masculine, is also applied to the organizations of young women, properly designated as sororities. The fraternities are divided into the fraternity proper, the honorary fraternity and the professional. The professional fraternity, as the term implies, is confined to the students taking the various scientific and literary professional courses. The honorary fraternity selects its members from the members of the senior classes, as a reward of scholarship. The following descriptions have to do with the collegiate fraternities, which may be termed the fraternities proper. These fraternities are divided into national and local. The national fraternity is made up of allied branches, or "chapters," in a number of colleges. The branches are under one general government, and are known by the general collective name of the national organization, and are distinguished from one another by individual Greek letters. Generally, the first chapter chartered is given the name *Alpha*, and the others, in the order of their founding, the consecutive letters of the Greek alphabet. The chapter is then designated, for instance, the *Alpha* of *Beta Theta Pi*. The union of individual chapters thus gives the national organization great strength, and each chapter is made more stable. There is never more than one chapter of any fraternity in any one college, although the number of fraternities represented in some institutions amounts to 25 or 30. The local fraternities have but one chapter, which has no connection with any similar organization. The number of chapters in a national fraternity varies from 20 to 70 or 80. The number of members in a chapter varies from 8 to 25 or 30. The various fraternities have badges by which their members are known. A student does not sever his connection with his fraternity upon graduation at college, but becomes an alumni member, to distinguish him from the active men still in college. Recently, many of the larger fraternities have established alumni chapters in many of the larger cities, where members of the alumni are naturally to be found. These chapters hold regular meetings and keep up the general organization of the active chapter. Members of fraternities are selected from the student-body,—in some cases on account of scholarship entirely, in others on account of prominence in social life or athletics. A man is asked to join, and can never seek admission. This asking is known as "spiking." Often spirited contests for desirable men take place between rival organizations. The inducements offered and attentions shown such men are included in the term *rushing*. Should a member see fit to leave one fraternity and join another, the action of the second fraternity is called "lifting," and the man is "lifted." At times some fraternities have taken into membership persons not in college, but eminent in public life. This action is, however, discountenanced by the better organizations. A number of chapters in various colleges live in rented or owned houses known as "chapter-houses." The national fraternities, with few exceptions, publish some kind of a periodical, and also possess song-books, etc. The authorities of some educational institutions—Princeton College, for instance—exclude fraternities from the college. In other institutions the term of membership is governed by faculty regulations.

The first Greek-letter society formed was the *Phi Beta Kappa*, at William and Mary College, Virginia, in 1776. This was at first a secret society, but is now classed among the honorary fraternities. Since its foundation there have been organized 28 national fraternities, with 800 chapters. Among them are *Alpha Delta Phi*, founded in 1832, at Hamilton College, New York; *Kappa Alpha*, at Union College, New York, in 1825; *Beta Theta Pi*, at Miami College, Ohio, in 1839; *Delta Kappa Epsilon*, at Yale College, in 1844; and *Psi Upsilon*, at Union College,

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New York, in 1833. There are 11 women's societies. *Pi Beta Phi*, the oldest, was founded at Monmouth, Illinois, in 1867. The professional societies number 16, with 50 chapters.

COLLEGE OF NEW JERSEY. See PRINCETON UNIVERSITY, in these Supplements.

COLLEGE POINT, a village of Queens County, southern New York, situated on the northern shore of Long Island, about ten miles E. of New York City. It contains a variety of manufactories and many fine residences of the business men of the metropolis.

COLLEGES, HISTORY OF AMERICAN. See EDUCATION IN THE UNITED STATES, in these Supplements; see also college names, under separate titles.

COLLEGEVILLE, a village of Montgomery County, Pennsylvania, in the southeastern part of the state, 20 miles from Philadelphia. It is the seat of Ursinus College and the Pennsylvania Female College. Its population, excluding the college, was 611 in 1900. W.F.J.

COLLEGIANTS OR COLLEGIANS, a religious sect which arose in Holland in 1619, founded by three brothers, John James, Adrian, and Gisbert Koddous. It had no definite creed, but invited all to join it who desired advancement in Scriptural knowledge and spiritual growth. In the main it united the characteristics of the Baptists and Quakers, and has by some been called the "Holland Quakers." It took its name from the circumstance that its conventions, twice a year, were held at or near the College of Leyden. Upon the proscription of Socinianism in various countries many of its adherents became Collegiants. The sect flourished for more than a hundred years, and then gradually declined and vanished. W.F.J.

COLLEGIATE CHURCHES, in England, one which, while not being a cathedral, nevertheless possesses a college or chapter, consisting of a dean or provost and canons, attached to them. They date from the ninth century, when such foundations in large towns became frequent. They are under the jurisdiction of the bishop of the diocese in which they are situated, and he exercises visitorial powers over them. Examples of such are Westminster Abbey and St. George's Chapel, Windsor. In the United States the term is applied to a collection of churches having their pastors in common, as the Dutch Collegiate Church of New York.

COLLEMBOLA. See INSECTS, Vol. XIII, p. 160.

COLLETT, JAKOBINE CAMILLA, authoress, sister of the Norwegian poet Wergeland (q.v., NORWAY, Vol. XVII, p. 605); born at Christiansand, Jan. 23, 1813; died at Christiania, Mar. 7, 1895. She was a novelist of wide reputation. Her works include *The Magistrate's Daughters; Tales; Against the Stream;* and *Last Leaves: Recollections and Confessions.*

COLLIER, JOHN PAYNE, an English Shakespearean critic and commentator; born in London, Jan. 11, 1789; died in Maidenhead, Sept. 17, 1883. While still a boy he became Parliamentary reporter for the London *Times* and subsequently for the *Morning Chronicle;* but his real literary career commenced in 1820 with the publication of *The Poetical Decameron.* The more important of his publications were a *History of English Dramatic Poetry to the Time of Shakespeare; Notes and Emendations to the Plays of Shakespeare; Bibliographical and Critical Account of the Rarest Books in the English Language* (1865); and *An Old Man's Diary Forty Years Ago* (1872). In one of his publications he announced the discovery of an extensive series of marginal annotations, in a seventeenth-century hand, on a copy of the second Shakespeare folio (1631–32), the famous Perkins folio. These annotations he soon placed in the text of his next edition of Shakespeare, and attempted to pass them as genuine Shakespeare emendations. This announcement caused a great commotion in the literary world, but it was subsequently shown that they were forgeries, and the discovery, after his death, of some manipulated books, in his own library, greatly injured his reputation.

COLLIMATOR, a subsidiary telescope used to detect or correct errors in collimation; that is, in directing the sight to a fixed object when adjusting for transit-observations. When the vertical thread in the field of view exactly coincides with the vertical axis of a telescope, the instrument is collimated vertically, and when the horizontal spider's thread just covers the horizontal axis, the instrument is correct in horizontal collimation. See also OPTICS, Vol. XVII, p. 824.

COLLIN D'HARLEVILLE, JEAN FRANÇOIS, a French poet and writer of comedies; born in 1755, at Maintenon, France; died in Paris, Feb. 24, 1806. His comedies were of such merit that they not only were successful during the life of the writer, but are popular to-day. His first drama was *The Inconstant Lover*, produced in 1786. His later works include *The Optimist; Old Bachelor;* and *Chateaus in Spain. Old Bachelor* is his best work.

COLLINGWOOD, a town of Simcoe, northern central Ontario, Canada, situated on the south shore of Georgian Bay, on the Grand Trunk railroad, 94 miles N.W. of Toronto. It has a large variety of manufactures, and is an important center of trade and transportation. Population 1901, 5,755.

COLLINGWOOD, CUTHBERT, British naturalist; born Dec. 25, 1826, at Greenwich, England; studied at Christ Church, Oxford, Edinburgh University, and in Paris and Vienna; from 1858 to 1866, professor of botany in the Liverpool Medical College and professor of biology in the School of Science. He traveled in China, Borneo and Singapore in 1866–67, on a voyage for studying marine zoölogy, sanctioned by the British Admiralty. He embodied the results of his investigations in *Rambles of a Naturalist on the Shores and Waters of the China Sea.* He is also the author of various scientific papers; among them, *Traveling Birds* and *A Vision of Creation.*

COLLINS, WILLIAM WILKIE, an English novelist; born in London, Jan. 8, 1824; died there, Sept. 23, 1889. He was educated partly at Highbury, but from 1836 to 1839 was with his parents in Italy. After his return to London he spent four years in business, but finding it uncongenial, he entered Lincoln's Inn as a student at law. Here his literary bent manifested itself in 1848, the *Life* of his father (WILLIAM COLLINS, 1787–1847, Vol. VI, p. 134) being his

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earliest production. He now entered upon an active career, devoting himself principally to works of fiction, several of them being first published as serial stories, in *Household Words; All the Year Round;* the *Cornhill;* and other periodicals to which he contributed. He formed the acquaintance of Charles Dickens in 1850, and owed much to the help and encouragement of that writer. His best-known works are *Antonina; or, The Fall of Rome* (1850); *Basil* (1852); *Hide and Seek* (1854); *The Dead Secret* (1857); *The Woman in White* (1860); *No Name* (1862); *Armadale* (1866); *The Moonstone* (1868); *The New Magdalen* (1873); *The Law and the Lady* (1875); *Alice Warlock* (1875); *The Evil Genius;* and *The Guilty River* (1886). Doubtless the best of these productions was *The Woman in White*, and the reputation this masterpiece of fiction made for him in England spread rapidly to America and the Continent, until his readers could be found in every civilized country on the globe. The powerful interest of his novels always lay in the mystery that was continued to the end of them, and in the art by which the reader's attention was held fixed and curious through the succeeding chapters. He visited the United States in 1873–74, and the distinguished consideration with which he was received everywhere afforded him great pleasure.

WILKIE COLLINS.

COLLINSIA, a genus of handsome plants found chiefly on the Pacific Coast of the United States. They belong to the family *Scrophulariaceæ*. Several species are cultivated for the beauty of their flowers. *C. verna*, of the eastern United States, is a handsome little vernal plant with its upper petals white and the lower blue. It was named in honor of Zaccheus Collins of Philadelphia.

COLLINSON, Peter, British manufacturer and botanist; born at Hugal Hall, near Windermere, Jan. 14, 1694; died Aug. 11, 1768. Although he became an extensive manufacturer of hosiery, in connection with which he did a large business with the American colonies, he was distinguished chiefly as a botanist. To him Benjamin Franklin first wrote regarding his theories on electricity, and by him they were read to the British Society, the members of which scoffed at Franklin's, to them, absurd conclusions. He established a system of exchange with the colonies which was of great advantage to the respective countries. A genus of *Lamiaceæ*, *Collinsonia*, was named after him by Linnæus. R.C.A.

COLLINSONIA, a North American genus of *Labiatæ*, of few species, the most common being *C. Canadensis*, a tall, large-leaved, strong-scented plant, of rich, moist woods, with panicled racemes of pale yellow flowers. Some common names are horse-balm, rich-weed and stone-root.

COLLINSVILLE, a manufacturing town of Hartford County, central northern Connecticut, on the Farmington River, and on the New York, New Haven and Hartford railroad, 13 miles W. of Hartford. Paper, plows, axes and cutlery are here manufactured. Population, 2,500.

COLLINSVILLE, a city of Madison County, southwestern Illinois, on the Terre Haute and Indianapolis railroad, pleasantly situated in the midst of a fertile agricultural district, 12 miles E. of St. Louis. Population, 1890, 3,498; 1900, 4,021.

COLLISION, the act of striking or dashing together. In maritime law, although the term *collision* is applied to all cases of vessels running foul, technically it only applies to the act of two vessels striking together; when one vessel strikes against another, it is called "allision." In either case, the injured parties have, under the general maritime laws of all civilized nations, a claim against the offending vessel for any damage resulting. See Navigation, Vol. XVII, p. 285; Seamanship, Vol. XXI, p. 631; and Rule of the Road at Sea, in these Supplements.

COLLITZ, Hermann, a German philologist; born in Bleckede, February 4, 1855. He was educated at the University of Berlin, and studied at Göttingen. In 1883 he was appointed assistant librarian at Hälle. In 1884 he removed to the United States and became professor of comparative philology at Bryn Mawr College. He has written *Modern Philology* and the *Relationship of the Greek Dialects*. He is a well known contributor on philology to the magazines and reviews. W.M.C.

COLLOID, in chemistry a term used to describe a peculiar state of aggregation in which substances are characterized by little or no tendency to diffuse through animal membrane and do not readily crystallize. See also Diffusion, Vol. VII, p. 188. W.R.B.

COLLUSION, a deceitful agreement between two or more persons to defraud or prejudice a third person, or for some improper purpose. The most common cases of collusion occur in arrangements between bankrupts and their creditors, such as payment, by anticipation, to a favored creditor on the approach of bankruptcy, arrangements for granting preferences by circuitous transactions or otherwise. In judicial proceedings, collusion is an agreement between two persons that one should institute a suit against the other in order to obtain a judicial decision for some improper purpose. Judgments so obtained are void.

COLLYER, Robert, clergyman, was born in Yorkshire, England, on December 8, 1823, and became a blacksmith. In 1850 he came to America and worked at his trade. A few years later he became a "local preacher" of the Methodist Episcopal Church, but in 1859 became a Unitarian. He founded Unity Church (Unitarian) in Chicago in 1860 and was its pastor until 1879, when he removed to New York and became pastor of the Church of the Messiah, of which he is now pastor emeritus. He has written many books, and was for years a popular lecturer. W.F.J.

COLMAR, a town of Germany in Alsace Lorraine. Pop. 1900, 36,824. See Colmar, VI, 135.

COLOBUS. See Ape, Vol. II, p. 133.

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COLOCZA OR KALOCSA, a town of southwestern Hungary, situated on the Danube, 68 miles S. of Budapest. It has a cathedral, a college and a gymnasium. Population, 16,302.

COLOGNE, a city of Prussia on the Rhine. It has made steady progress both in improvements and population since its description was written for Vol. VI, p. 136 of this work. The city purchased the site formerly occupied by the circular wall and constructed a fine boulevard upon it, in 1885. The fortifications were rebuilt beyond this boulevard, extending the city limits to twice their former area and incorporating suburban towns on both sides of the river. The imposing and historic cathedral was completed in 1880. It contains a bell of 543 cwt. Some of the modern structures of note are the post office, the Imperial Bank, municipal library and archives, all in Gothic architecture; an artistic, central railway station and a large harbor building. The combined receiving and clearing of tonnage at the port approximate a million and a half annually. Industrially and commercially, Cologne ranks high among the manufacturing cities of the world. Pop. 1900, 372,299.

COLOGNE WATER. See Vol. VII, p. 533.

COLOGNE YELLOW, a pigment composed of two parts of yellow chromate of lead, one of sulphate of lead and seven of sulphate of lime or gypsum.

COLOMBES, a town in France, 7 miles N. of Paris, on railway from Paris to Havre. Pop. 1901, 23,061.

COLOMBIA, REPUBLIC OF, known from 1863 to 1886 as the "United States of Colombia," and since 1886 as the Republic of Colombia, composed of nine states. See COLOMBIA, Vol. VI, p. 137. The independence of Panama and her separation from the jurisdiction of Colombia, in 1903, reduced the republic to eight states — called departments since the revolution of 1885 — and to an area of 473,202 square miles and an estimated population of 4,245,000. Under the new constitution of 1886, the legislative power rests with a Congress of two houses, the Senate and House of Representatives. The former consists of three members from each department, elected by the legislatures thereof, and the latter elected by vote of the people, on the basis of one representative for every 50,000 inhabitants. The President is elected by electoral colleges for a term of six years. He has a Cabinet of eight ministers, who are responsible to Congress, but chosen by the President. These ministers are in charge of the departments of the Treasury, Interior, Finance, War, Foreign Affairs and Public Instruction. The judicial authority is vested in a supreme court, composed of seven judges, appointed by the President and holding office during good behavior, removable only by impeachment by the Senate; the district courts and circuit courts, appointed by the President upon the nomination of the supreme court. In each municipality there are as many judges as the municipal council may determine. The Congress assembles every two years; its members are elected for four years. Suffrage is limited to those male citizens who are able to read and write or who have an income of five hundred dollars a year or real estate worth fifteen hundred dollars. In each department there is a legislative body, known as the departmental assembly, composed of one deputy for each twelve thousand inhabitants, elected by direct vote of the citizens. This assembly convenes every two years in the capital of its department. Each department is divided into municipal districts, in charge of a municipal council, at whose head is the alcalde, the official representative of the governor. The only department whose government was in any way different from the system explained was Panama, which was ruled directly by the national government. The republic maintains a standing army of 6,000, since having had to contend with civil war and strife with Venezuela. A national university has been established, which includes four colleges, with 1,083 students in attendance. In all the cities, libraries have been founded, and some valuable collections are the result. At Bogotá, the capital, a city of 120,000 inhabitants, is the seat of an astronomical observatory at an elevation of 8,600 feet above sea-level. The Roman Catholic is the state religion, but freedom in religious belief is constitutional.

The greatest industry of the republic is mining. The production of gold amounts to about $3,000,000 annually; that of silver, $1,250,000 annually. The unhealthy climate of the interior, where the mines are located principally, prevents active operations that would probably result in greater outputs. Salt-mining and the refining of the salt-waters of a number of springs is one of the greatest sources of revenue to the government. Agriculture engages the greater part of the population. The articles exported include coffee, cotton, tobacco, cacao and hides. Very little manufacturing is done. In some departments cattle-raising is engaged in to a great extent. In 1893 the exports amounted to $10,124,189, and the imports, $9,375,080. The external debt (1901) of the republic was about $22,000,000, besides a considerable internal debt, consolidated and floating, including the paper money in circulation. The estimated revenues for 1901–02 were $21,148,600, while the expenditures, it was estimated, would be $28,163,368. The principal sources of revenue, in addition to the customs duties, were from the salt works, Panama railroad, stamp tax and slaughter-house tax. All deposits of rock-salt are the property of the nation. Legal-tender bills have been issued by the government through the National Bank of Colombia. The peso is the legal tender. In commerce with foreign nations the peso varies in value as does the 10-real peso; the 8-real peso is used in the republic. According to the ruling of 1892 of the United States Treasury, the peso is valued at $0.692. Other coins are the silver real, 2-real and ½-real; the nickel 1¼ cents, 2½ cents and 5 cents; gold condor and double condor. The value of the condor is $9.647 in U. S. money. The metric system of measurement is in use. The kilogram is the standard weight, equal to 2.2 pounds, avoirdupois. In 1901, there were 400 miles of railroad in the republic, and 8,600 miles of telegraph. Diplomatic relations are maintained with the principal nations of the world. Since 1887 an extradition treaty has been in force with the United States.

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COLOMBO-ROOT (*Jateorhiza calumba*), a climbing shrub native of Africa. Its roots, resembling parsnips cut into slices and dried, form the Calumba root of medicine, a bitter stomachic tonic. W.R.B.

COLON, a department in the N.E. part of Honduras, extending from the Cuero River to the Rio Segovia, from the Caribbean Sea to the departments of Yoro and Olancho. In the west it is mountainous, but the eastern part contains fertile plains. Area, 7,000 Sq. m.; pop. 15,000; capital, Truxillo, 4,000.

COLON, a city of the Republic of Panama, on the northern coast of Panama and at the terminus of the Isthmian Canal connecting with the Atlantic Ocean. Estimated population 1903, 10,000.

COLONEL, the chief officer of a regiment in the United States army, ranking next below brigadier-general and first above lieutenant-colonel. In Great Britain regimental colonels are general officers who have had a regimental command given to them as a reward for long service, and virtually as an honorary retirement. Under this system, except in the artillery and engineers, the position is a sinecure, the real commander being the lieutenant-colonel. In 1888 it was decided to discontinue these appointments as soon as those who have a vested right to succeed to them have been satisfied, and it has been decided that no officer shall obtain the rank of colonel except by brevet, or on being selected for certain appointments carrying with them that rank. In the German, Austrian and Russian armies, where the regiments are very large, the colonelcies are mostly honorary posts, held by members of royalty and other distinguished personages. In the United States the pay of a colonel varies, according to length of service, from $3,500 to $4,500. The pay of the British colonel ranges from $2,000 to $3,000, according to the branch of the service to which he is attached.

COLONIA DO SANTISSIMO SACRAMENTO, a port of Uruguay, or Banda Oriental, capital of the department of Colonia. It is situated on the left bank of the Plata, about one hundred miles above Montevideo, the capital of the state. It is one of the oldest towns on the Plata, and has one of the best harbors on that estuary. It has considerable trade with Argentine, and with points in Uruguay.

COLONIAL ANIMALS OR COMPOUND ANIMALS. These terms are applied to groups or colonies of animals which have originated from a single ovum. The individual which develops directly from the ovum produces the others by processes of incomplete budding or fission, so that the individual animals remain more or less intimately united. Examples of colonial animals are found among the protozoa, sponges, corals, hydroids, worms, bryozoa and ascidians. Many colonial forms exhibit polymorphism or physiological division of labor to a greater or less degree.

COLONIAL COLLEGE, a British industrial school for training young men, preparatory to sending them to some of the British colonies. The institution is located at Hollesley Bay, Suffolk, England. Instruction is given in all branches of manual training, agriculture, surveying and veterinary science. A large farm covering 1,800 acres is owned by the college, and the income from it assists largely in the maintenance of the institution.

COLONIAL DAMES OF AMERICA. See COLONIAL SOCIETIES, in these Supplements.

COLONIAL OFFICE, that department of the executive branch of the government of Great Britain which has to do with the relations of the crown government with colonial dependencies. The chief officer is the Colonial Secretary, who is *ex officio* a member of the Cabinet, and whose appointment is political, the holder of the office changing with the changes in the government. The Colonial Secretary nominates the governors of colonies, subject to the ratification of the crown. All enactments of colonial legislatures are brought before him for approval or disapproval. All diplomatic relations of the colonies is governed by him. See MINISTRY, Vol. XVI, p. 495.

COLONIAL SOCIETIES. Under this head are included those organizations of descendants of men who took some part in the American Revolution, or who were of active service in the founding of the colonies. The general intent common to all these societies is the perpetuation of the memory of colonial history and the memory of the men who helped make that history. The first of the colonial societies was the *Society of the Cincinnati*, organized in May, 1783, by the officers of the Continental army, then encamped on the Hudson. There were a number of French officers in the army at the time, and the society was organized in part, as stated in the constitution of the society, "to perpetuate . . . the mutual friendships which have been formed." Thirteen states formed societies, and one was organized in France. At the time, the privilege of membership was confined to all Continental officers in good standing and all officers of the French auxiliaries. Honorary membership was granted all signers of the Declaration of Independence. Membership to-day descends to the eldest son, with the same conditions of inheritance as restricts the heirs to the English crown. There were, in 1895, eight state societies, and in 1893 the roll showed a membership of 499.

Similar were the purposes of the founding of the *Society of Tammany*, or *Columbian Order;* but the organizers, to some extent, were moved by a spirit of jealousy of what they termed the "aristocratic tendencies" of the Society of the Cincinnati, and also were inspired by political designs. The political phase soon was in the ascendency, and the organization of to-day is purely a political one. It was founded in 1789, in New York City. It never spread beyond the city.

The *Sons of the Revolution*, organized in 1876, in New York City, was the first of the dozen or more general colonial societies. Membership is confined to male descendants of any military or naval soldier and civil official of the thirteen original states who took some part in the Revolutionary struggle from 1775 to 1783. In 1895 there were 27 state societies, with a membership of 5,151.

The *Sons of the American Revolution* was founded in New York in 1889. Its purposes and rules ar

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the same as those of the Sons of the Revolution. In 1895 there were 30 societies, in as many states, with a membership of 5,492.

The *Naval Order of the United States* was instituted at Boston in 1890. The rules limit membership to officers of the United States navy who have taken part in some of the wars of the United States.

Lineal descendants of the *Mayflower* Pilgrims organized, in 1894, the *Society of Mayflower Descendants*, at New York. The purpose of the society is to preserve the records of those who came to America in the *Mayflower* on its first voyage in 1620. The descendants, over 18 years of age, of any of those passengers, and of all who signed the famous compact, are eligible to membership.

The *Society of Colonial Wars* was organized in 1892, and includes in its membership the male descendants of all who took any part, civil or military, in the founding and subsequent growth of the colonies from 1607 to 1775.

The *Military Order of Foreign Wars* was founded in 1895. It includes the descendants of all soldiers of the Revolutionary War, the war of 1812, the Mexican War and the war with Tripoli.

The *Colonial Dames of America*, *Daughters of the Revolution*, *Daughters of the American Revolution* and *United States Daughters* are organizations of women, and include the female descendants of all those Colonial and Revolutionary soldiers and men of civil prominence that are remembered in the constitutions of the male societies. These societies have all been organized since 1890. The *Daughters of the Revolution*, founded in 1891, had, in 1895, societies in 32 states. The *Daughters of the American Revolution*, founded in Washington, District of Columbia, in 1890, had 42 societies and a membership of over ten thousand in 1895. The *United States Daughters* was instituted in 1892. Its membership includes descendants of veterans of the War of 1812. The *Colonial Dames of America* was founded in 1893. It has 13 societies.

COLONIAL SYSTEM, a term applied to the regulations of the commercial maritime relations between a home government and its colonies. The phrase was used almost exclusively with respect to Great Britain. The establishment of free trade between the colonies and all countries has ended all such legislation. During the seventeenth and eighteenth centuries these laws and regulations, known in Great Britain as Navigation Acts, played an important part in bringing about some of the wars of those periods. The American Revolution was in part brought about by the enforcement of those regulations. At that time the struggle for commercial supremacy was at its height. Deeming the colonies to be solely for the benefit of the mother-countries, it was enacted by the European maritime nations that all exports and imports of the colonies should be carried in vessels belonging to the parent-country, and all trade must be carried on with that parent-country exclusively. These rules, while intended to encourage trade, prevented it. Until the middle of the eighteenth century it had been the custom of a nation at war to throw open the ports of its colonies to the vessels of neutral nations. But in 1756 England took the stand that such neutral vessels as engaged in trade with the colonies of an enemy were no longer neutral, and were to be considered a part of the shipping of the enemy, and therefore lawful prey. Shortly afterward, in order to avoid complications that constantly were arising, England took the still bolder stand that a neutral vessel that had taken a cargo at the port of an enemy, although it afterward touched at a neutral port and reshipped its cargo, was under the rule, and liable to seizure; in other words, that the voyage from the colonial port homeward was to be considered continuous. It was not until 1849 that the navigation acts were repealed; but before that time their provisions were no longer put into effect. While to England is given the credit for many of the maritime laws in relation to the system, Spain carried to the farthest extent the restricting of colonial trade. See also SHIPPING, Vol. XXI, pp. 866, 867.

COLONIAL WARS, SOCIETY OF. See COLONIAL SOCIETIES, in these Supplements.

COLONIZATION SOCIETY, THE AMERICAN, a society organized in 1816 by Bishop Meade of Virginia, Rev. Dr. Finley of New Jersey, Charles F. Mercer of Virginia, and others, for the purpose of transferring negroes from the United States and colonizing them in Africa. It was intended not only for the good of the negro, but also to relieve the South of the burden of the free negro population. The first president of the society was Bushrod Washington. Henry Clay was for many years president of the society. The first colonists, consisting of 86 persons, were sent in 1820 to the west coast of Africa, where they founded what in 1847 became the Republic of Liberia. The society merged into the abolition party in 1831, and its practical work terminated soon after the emancipation of the colored people of the United States.

COLONNA, CAPE (ancient Sunium Promontorium), a headland of Greece, forming the southmost point of Attica. Its summit, crowned by the ruins of the temple of Minerva, rises 270 feet above the water. Sixteen white marble columns, from which the cape derives its name, are still standing. See FALCONER, WILLIAM, Vol. IX, p. 6.

COLONSAY AND ORONSAY, two islands of the Argyllshire Hebrides, 16 miles N.N.W. of Port Askaig, in Islay, separated from each other by a sound 100 yards wide, and dry at low-water. Colonsay, which rises to a height of 493 feet, is 16 square miles in area; Oronsay, only 3. On the latter are a sculptured cross and a fourteenth-century Augustinian priory, with some curious effigies; whilst in the former are standing stones, a bone cave, Colonsay House (1722), and an obelisk to the memory of the lawyer, Duncan McNeill, Lord Colonsay (1794–1874). Near the center of the island of Colonsay is the beautiful Loch Fad. See also HEBRIDES, Vol. XI, p. 542.

COLOPHONY, a gum. See ROSIN, Vol. XX, p. 875.

COLORADO, the thirty-eighth state admitted to the Union, lies nearly midway between the Mississippi River and the Pacific Slope, and at nearly an

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equal distance between British Columbia and Mexico. It is popularly called the "Centennial State," from the date of its admission, 1876. The area is 104,500 square miles, or 66,880,000 acres, of which about 26,000,000 acres are mountain lands, the remaining 40,880,000 acres mesa and valley lands. The climate is equable, and from the high altitude of the greater part of the state, dry and very agreeable, and beneficial to invalids, especially to those suffering with lung diseases. The average temperature, covering a period of five years, as recorded by the United States Signal Service, was as follows: January, 26.8°; February, 34.8°; March, 39.4°; April, 49°; May, 57.6°; June, 66.8°; July, 72.2°; August, 69.2°; September, 62.4°; October, 50°; November, 35.8°; December, 35.8°. The average number of cloudy days in a year is not more than forty. Health-resorts are numerous in the mountain regions, and mineral and thermal springs abound.

For a number of years the state has led in the production of the precious metals; almost every

STATE SEAL OF COLORADO.

known mineral is found within its borders, and mining has always been the chief occupation of the people. There are thousands of producing mines scattered throughout the length and breadth of the state, lodes of silver and gold seaming almost every mountain. There are also immense deposits of argentiferous lead ores, and for more than a decade the state has produced from forty to fifty per cent of the entire lead output of the whole country. One mine located at Leadville has yielded over $158,000,000 since its discovery. Of gold and silver alone Colorado has produced since 1859, $407,588,028, the increase each year over the preceding one being very marked. In 1872 the amount taken from the mines was $3,740,000, which had increased in 1900 to $55,000,000. The output of some of the gold-mines of the state has been little short of marvelous, the Robert E. Lee producing $118,500 worth of ore in 17 hours. On the opening of the Minnie mine at Leadville it was estimated that there was in sight $10,000,000 gross. In the early days of gold-mining the main work was done in placers, the only equipments necessary being the shovel, gold-pan and sluice-box, and in this way over $10,000,000 were taken during the first ten years of work. Subsequently, mines were sunk in the ground to varying depths, some being worked with profit as deep as 1,900 feet. Notwithstanding the rapid advances being made in agriculture and manufacturing, mining bids fair to continue to be the chief source of wealth for many years. The discovery of gold in the Cripple Creek district opened up one of the richest gold-fields in the world, and gave a new impetus to the mining industry in Colorado. (See CRIPPLE CREEK, in these Supplements.) Iron exists in great masses in many parts of the state, and is of the best quality. Bessemer steel has been produced at Pueblo for the past ten years; and the mills of that city, which is termed the Pittsburg of the West, turn out large quantities of the best quality of all kinds of iron made. The supply of copper, zinc, silica, cement, gypsum, onyx, kaolin and all kinds of valuable clays is beyond computation, as is that of an innumerable variety of commercial and manufactural minerals. The coal-fields of the state cover an area of almost forty thousand square miles, and the best anthracite and bituminous coal has been found in veins of great thickness, easy of access. Every town and city of the state has coal within close reach, and the mining is attended with small expense. The first record of the amount of coal produced was in 1873, when 69,977 tons were mined. In 1900, this had increased to 5,495,734 tons.

The parks of the state are great natural gardens, composed of broad, level valleys, once the beds of inland lakes or seas. The four largest of these, with their approximate area and elevations, are given as follows:

	AREA. SQUARE MILES.	ELEVATION. FEET.
North Park	2,500	9,000
Middle Park	3,000	8,500
South Park	2,200	9,500
San Luis Park	9,400	7,500

The soil of Colorado is so fertile that the possibilities of production are limited only by the water-supply. About 34,560,000 acres are arable and accessible to water. Early recognizing the importance of irrigation, efforts were put forth to inaugurate a system of canals so that the arable lands might have the advantages of the moisture denied by summer rains. Reports made in 1893 show that there were then in operation 12,400 miles of irrigating-canals, reclaiming 4,800,000 acres of otherwise arid land, and of this amount one half was then under cultivation, the remainder awaiting settlement and tillage. The leading crops, in the order of their importance as cultivated, are wheat, oats, alfalfa and potatoes, while rye, barley, tobacco, corn, fruits and hay are produced in great quantities. Garden vegetables give an enormous yield, and the small fruits are prolific to a high degree. Sorghum, buckwheat, navy beans, broom-corn, hops, sugar-beets, hemp and flax are also grown. Maximum results attained at the State Agricultural College have been: Wheat, 91 bushels per acre; rye, 52 bushels; oats, 102 bushels; Irish potatoes, 400 bushels; barley, 72 bushels; and corn, 67 bushels, shelled. Alfalfa leads all of the agricultural products of the state in tonnage and value. It affords the best of forage for stock and can be cut during every month of summer. For hay it is unexcelled, and yields from four to six tons per acre. The great strides made in stock-raising and farming generally are in a great measure due to the advantages derived from this plant, which flourishes at all altitudes below seven thousand feet. The climate is well adapted to fruit-

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growing, and vineyards give generous yields of unsurpassed quality. Among the leading fruits are peaches, apples, pears, plums, cherries, nectarines and apricots, while among the small fruits are the blackberry, gooseberry, currant, raspberry and strawberry. The average orchard in full bearing gives profits as high as $500 per acre, and strawberries return a revenue of from $200 to $300 per acre. Large vineyards have given an average of $400 per acre for several seasons in succession. The value of the agricultural products of the state for 1900 was estimated at $33,048,576, and the fruit output for the same year amounted to $380,000; the wool-clip reached 8,500,000 pounds, valued at $1,115,000; and the potato crop was 4,465,748 bushels, valued at $1,717,000. Cattle, horses, sheep and hogs are widely raised throughout the state. The total value of all kinds of live-stock in 1900 was given as $52,018,000. A profitable industry as yet in its infancy is that of dairy-farming. Bee-culture has also received much attention, the conditions for success being so advantageous as to invite the agriculturist to engage in it. The annual production of honey is now in excess of 500,000 pounds.

In 1900, the state had 3,570 manufacturing establishments, employing 24,725 hands, turning out products of the value of $102,830,137, and paying in wages $15,146,667. The city of Denver alone had 1,474 of these manufactories. A great part of the manufacturing is in connection with the mineral products of the state, the leading industries being brass-works, lead-works; foundries and machine-shops, making engines, boilers and mining machinery; iron-works, building materials, tin, sheet-iron and copper works, flouring-mills, furniture, etc.

Building-stone of the very best quality is found in abundance in many parts of the state, and, in addition to its use in Colorado structures, has been used in the construction of some of the principal buildings of Chicago, St. Louis, Omaha, Kansas City, Salt Lake City and various other places. Marble of the best quality and of all colors, in great quantities, has been found, and is extensively quarried. Petroleum has been discovered in several localities. In and near the town of Florence there are 27 producing wells, aggregating about 1,100 barrels per day, the entire product being refined at Florence.

The numerous railway systems in Colorado form a network of lines throughout the state, the total trackage in 1900 being 5,000 miles, assessed for taxation at $30,428,444. All of the different lines center in the city of Denver, making that place the greatest railway point west of Kansas City. The telegraph and telephone mileage in 1894 was 5,751, with an assessed valuation of $455,306.

In 1899 the school population of Colorado was 135,800, and the total value of school property, $5,790,770. From the general government the state received 3,500,000 acres of valuable land for school purposes, and from the sale of less than one third of this a permanent fund has arisen, now amounting to over $1,000,000. Since the admission of the state into the Union in 1876 there has been expended on the common schools alone an amount approximating $16,000,000. This does not include the State University, Agricultural College, School of Mines and the State Normal School, all of which are state institutions, and well sustained by legislative appropriation. The first-named of these is located at Boulder, the second at Fort Collins, the School of Mines at Golden and the State Normal School at Greeley. Other institutions of learning are the University of Denver, the Colorado College, at Colorado Springs; the Westminster University of Colorado, at Denver; the Presbyterian College of the Southwest, at Del Norte; the Longmont College, at Longmont; the Tillitson Academy, at Denver; St. John's College and Wolfe Hall, at Denver; and the Jesuit College of the Sacred Heart, at Highlands. There are numerous other institutions of learning and private schools of varied character, and in great numbers. The educational exhibits at the World's Fair received 29 prizes from the bureau of awards. There are 30 public libraries in the state, with about 64,000 volumes. The state institutions include the Industrial School for Boys, the Industrial School for Girls, the Insane Asylum, the Mute and Blind Institute, the Penitentiary, the Reformatory and the Soldiers and Sailors

STATE CAPITOL, DENVER.

Home. The new capitol building, which was completed and occupied in 1894, cost more than $2,250,000, and is one of the finest structures of its kind in the West.

Woman suffrage prevails in Colorado, having been adopted in the election of 1893 by a majority of about 5,000 votes.

In 1894 the total assessed value of all property was $208,905,279. The total assessed valuation of property in the state, 1904, was $465,000,000.

The state stands thirty-first in population, the census of 1890 showing 404,468 whites, 7,730 colored, 1,083 Indians and 612 Chinese, a total of 412,198. The census of 1900 gave the population as 539,700; that of 1870 was only 39,864.

The principal cities of the state are Denver, the capital; Pueblo, Colorado Springs, Leadville, Highlands, Aspen, Boulder, Cañon City, Durango, Cripple Creek, Salida, Ouray, Central City, Grand Junction, Fort Collins, Georgetown, Colorado City, Longmont.

The state flower is the Colorado Columbine, sometimes called the purple columbine.

The following is a list of the governors, with their respective terms of office:

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TERRITORIAL.

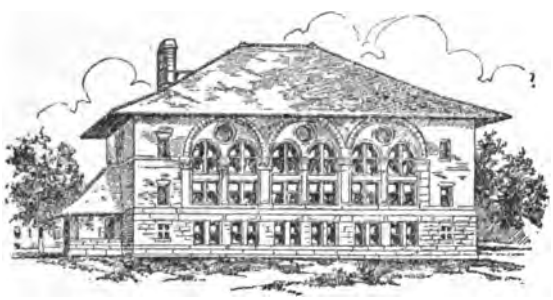
William Gilpin..... 1861–62	Edward M. McCook 1869–73
John Evans.....1862–65	Samuel H. Elbert.....1873–74
Alexander Cummings....1865–67	John L. Routt.....1874–76
A. Cameron Hunt.....1867–69	

STATE.

John L. Routt.....1876–79	Albert W. McIntire.....1895–97
Frederick W. Pitkin.....1879–83	Alva Adams.....1897–99
James B. Grant.....1883–85	Charles S. Thomas.....1899–1901
Benjamin H. Eaton.....1885–87	James B. Orman.....1901–03
Alva Adams.....1887–89	James H. Peabody.....1903–05
Job A. Cooper.....1889–91	Alva Adams.....1905
John L. Routt.....1891–93	James H. Peabody..Mch. 16, 1905
Davis H. Waite.....1893–95	Jesse F. McDonald..Mch. 17, 1905

For a historical episode (mine strike), see NOTABLE CHRONOLOGICAL EVENTS, Vol. XXIX. *June 6, 1904; Gubernatorial Contest, March 16, 1905.*

COLORADO COLLEGE, situated at Colorado Springs, Colorado. It is a non-sectarian, co-educational institution, founded in 1874, and in 1896, under the presidency of W. F. Slocum, Jr., the principal educational institution of Colorado. Full collegiate courses are offered here, both in the classics and the sciences. The opportunity for scientific



COLORADO COLLEGE.

study is such, however, that it is expected that in time the school will be prominent in that direction. In 1902, there were 515 students of both sexes in attendance, with a faculty of 34 and a library of 25,000 volumes. The productive funds of the institution amounted to about 360,000 in 1900.

COLORADO DESERT, a very arid district in southern California, the whole length of which is traversed by the Southern Pacific railroad from San Bernardino on the north to Yuma on the south. The northern portion is known as Coahuila Valley and the southern as the Yuma Desert. The southern portion has the hottest climate of any point in the United States, the thermometer registering, during the summer months, as high as 134° F. The Coahuila Valley, it is thought, was formerly a part of the Gulf of California. A large portion of it lies below the level of the sea. The accepted theory is that the formation of the delta of the Colorado River cut off this valley from the Gulf of California, and the outlet of the river changing its position, the valley was left in its present unwatered condition.

COLORADO SPRINGS, the seat of El Paso County, 75 miles south of Denver, on the Chicago, Rock Island & Pacific railroad, and on divisions of the Atchison, Topeka & Santa Fé, Colorado & Southern, Colorado Midland, Colorado Springs & Cripple Creek District, and the Denver & Rio Grande systems. Situated at an altitude of 5,960 feet on the eastern slopes of the Rampan Range, with Pike's Peak 10 miles westward and the Garden of the Gods and Monument Park on the northwest, Colorado Springs, founded in 1871, has become a fashionable health resort, on account of its medicinal springs and baths and climatic and scenic attractions. It is also the center of the richest metalliferous and gold producing district of the state. Population, 1900, 21,085. C.L.S.

COLORADO, UNIVERSITY OF, a co-educational institution, the State University, situated at Boulder, Colorado, 28 miles N.W. of Denver. It was organized in 1877, and is supported by state taxes. In addition to the regular collegiate courses, instruction in law and medicine is given. The medical department is known as the Denver Medical College. The president in 1896 was James H. Baker. There were, in 1901, 92 in the faculty, 900 students and a library of 23,000 volumes. Since its organization, 791 have been graduated.

COLOR-BLINDNESS, a peculiar defect of sight, in which those who are affected are incapable of distinguishing different colors. To some, objects seem to be either light or dark, but gray is most usual. Others cannot distinguish either the primary colors from each other or from the secondary, confounding red with blue, blue with green, etc. The first class is rare, the second common. A distinguished chemist, Dalton (q.v., Vol. VI, p. 691), who himself suffered from color-blindness, was the first to draw attention to it, and hence the affection is frequently called Daltonism.

COLORED METHODIST CHURCHES. See METHODIST CHURCHES, in these Supplements.

COLOR PHOTOGRAPHY. See PHOTOGRAPHY, in these Supplements.

COLOR-PRINTING. Previous to May, 1895, printing in colors was a tedious and expensive process, involving an amount of patience and skill only appreciable by those familiar with the work. In that month there was marketed a commercially successful method of color-printing in three impressions, producing the effects previously obtainable only by a score or more of printings. The process can be used for all sorts of illustrations produced by photography and printing. The principle involved is, that if three photographs of a thing be taken respectively in red, blue and yellow light, and a plate be made from each photograph by some photomechanical process, the plates may then be printed in their appropriate color, one on top of the other, thus producing a print in the three primary colors of nature, and producing a combination involving all the colors of the original. The theory was understood as early as 1865, but the obstacles to successful execution were so numerous that many inventors gave up the problem after years of study. The results now obtained are not quite perfect, owing to the difficulty of securing exact shades of ink, and to the changes in color incident to printing one color on top of another, instead of blending them in, as nature does. Nevertheless the pictures made are vastly better than any previous three-color printings. The plates for the three negatives are color-sensitized by means of

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three different dyes, each of which absorbs one third of the spectrum and reflects the other two thirds. In photographing, color-screens are used to assist in absorbing those rays which are not wanted for a particular plate. From the three photographs three half-tone electrotypes are taken—one for printing in each color. The plate from which the red and blue light was excluded in photographing is printed in yellow, the plate from which the yellow and red light was excluded is printed in blue, and the plate from which the blue and yellow light was excluded is printed in red. The result is a theoretically accurate reproduction of the scene in its natural colors.

C. H. COCHRANE.

COLOR-WHEEL. The Maxwell color-wheel is a device designed to aid in the exact definition and determination of colors. It consists of a set of colored cardboard disks, mounted so that they may be rotated rapidly. The disks are colored in vermilion, mineral-orange, light chrome-yellow, emerald-green, ultramarine-blue, black and white, and being made circular, they are mounted centrally upon the same axis. A straight slit is cut in each disk from the outer edge to the center, so that any other disk in the set can be pulled partially through the slit and made to overlap the top disk. In this way it is possible to exhibit a fraction of any or all of the color-disks at once. Then by rapidly rotating the disks by means of a belt-mechanism, the colors shown are blended into one. In use, if it is desired to determine the exact constituents of a shade of purple, the operator will overlap his red and blue and whirl the disks. If there is too much red, he will alter the disks and try again, and so on until he hits the same shade. He then stops the wheel and looks at a chart placed circumferentially in the rear of the disks, and is able to read off the percentages of his standard colors that go to make up the shade of purple he desires to match. He may telegraph this information to some distant place, with the certainty that the recipient, who understands the system, will be able to duplicate the color for him as accurately as he himself reproduced it on the color-wheel.

In connection with this color-wheel there has been prepared a table of typical colors, which are reproduced readily. For instance, cyan-blue is shown in the table to be composed of 21 parts white, 46 parts green and 33 parts blue; and mauve is produced with 47 parts white, 6 parts yellow, 9 parts green and 38 parts blue. These typical colors can all be reproduced exactly by any one having the table and the color-wheel, and thus it is now possible, in many kinds of business, to order special colors without sample, with a certainty of accuracy never before obtainable.

C. H. COCHRANE.

COLOSTRUM. See BEESTINGS, in these Supplements.

COLQUHOUN, ARCHIBALD ROSS, explorer and author; was born off the Cape of Good Hope in March, 1848, and was educated in Scotland (where his family belonged), and on the Continent. He served in the Indian Public Works Department, and as secretary to the government mission to Siam and the Shan States in 1879. He explored a railroad route from Bhamo to Canton in 1881–82, was correspondent of the London *Times* in China and Tonquin in 1883–84, revisited Burmah, was administrator in Mashonaland in 1890, explored American isthmian canal routes in 1895; China, in 1896; Siberia, in 1897, and the islands of the Pacific in 1900–01. During much of these travels he was a correspondent of the London *Times*. He has written *Across Chryse* (1883); *Amongst the Shans* (1885); *The Key of the Pacific* (1895, a masterly discussion of the Nicaragua and Panama Canal routes); *China in Transformation* (1898); *The Overland to China* (1900); *Russia against India* (1900); *The Renascence of South Africa* (1900); *The Mastery of the Pacific* (1902), and *Greater America* (1904). He has received medals from the Royal Geographical Society and the Society of Arts. W.F.J.

COLQUHOUN, PATRICK, publicist; was born at Dumbarton, Scotland, on March 14, 1745, became provost of Glasgow in 1782, and in 1792 became a police magistrate in London, in which place his great work was done. He promoted legislation for administrative reforms, and the improvement of commercial and educational methods, was the author of many pamphlets, and wrote two books of permanent value, on the police of London and on the population and resources of the British Empire. He died on April 25, 1820. W.F.J.

COLQUHOUN, PATRICK MACCHOMBAICH, SIR, was born on April 13, 1815, son of the Chevalier James Colquhoun, *chargé d'affaires* of the King of Saxony. He was educated at Cambridge, being graduated in 1837, and at Heidelberg, 1838, was called to the bar in 1838, and became queen's counsel in 1868. Through his father's influence in Germany he was in 1840 appointed envoy plenipotentiary of the Hanse Towns to make treaties with Turkey, Greece and Persia. From 1857 to 1866 he was councilor to the King of Saxony. In 1858 he was made a justice of the supreme court of the Ionian Islands, and in 1861 became chief justice of that court and was knighted. He died on May 18, 1891. He was a remarkable linguist, the champion oarsman of England and founder of the Colquhoun Sculls prize, and the author of a standard *Summary of the Roman Civil Law*. W.F.J.

COLQUITT, ALFRED HOLT, lawyer and Senator, was born in Georgia on April 20, 1824, and was educated at the College of New Jersey (Princeton), where he was graduated in 1844. He became a lawyer in Georgia, served in the Mexican War, and in 1852 was elected a representative in Congress, as a Democrat. Upon the outbreak of the Civil War he entered the Confederate army as a captain and rose to the rank of major-general. He was elected governor of Georgia in 1876, upon the resumption of power by the Democratic party in the South, and was elected to the United States Senate in 1882 and again in 1888. He died at Washington when nearing the

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end of his second Senatorial term, on March 26, 1894. W.F.J.

COLTON, a city in a township of the same name, in San Bernardino County, California, in the southern part of the state. It lies at the western foot of the San Bernardino Mountains, in the heart of the richest fruit region of southern California, and in a country much frequented for health and pleasure. It is 50 miles east of Los Angeles on the Southern Pacific railroad, and had in 1900 a permanent population of 1,285. W.F.J.

COLTON, CALVIN, an American clergyman; born in Longmeadow, Mass., in 1789. He graduated at Yale in 1812; studied theology at Andover; and took charge of the Presbyterian Church in Batavia, N. Y., in 1815. He abandoned preaching in 1826 and took up the pen, going to England in 1831 as correspondent of the *New York Observer*. About 1835 he took orders in the Episcopal Church, but again turned to writing. In 1852 he was appointed professor of political economy at Trinity College, Hartford, Conn. Among his publications are: *Church and State in America* (1835); *Four Years in Great Britain* (1835); *Thoughts on the Religious State of the Country* (1835); *Junius Tracts* (1840–44); *Life and Speeches of Henry Clay* (1844), followed by the *Private Correspondence* (1855), *Last Seven Years of the Life* (1856), and the *Speeches* (1857) of the same statesman. He died in Savannah, Ga., March 13, 1857. E.E.T.

COLTON, WALTER, an American clergyman; born in Rutland, Vt., May 9, 1797. He graduated at Yale in 1822 and at Andover in 1825, and became professor of moral philosophy and belles lettres in an academy at Middletown, Conn. Resigning this position in 1830, he took up the editorship of *The American Spectator and Washington City Chronicle*. President Jackson appointed him chaplain in the navy, Jan. 29, 1831. In 1832 he was ordered to the Mediterranean, and in 1835 to the Charlestown navy yard. In 1827 he was for a short while editor of the *Colonization Herald*, and in 1838 was assigned to the navy yard at Philadelphia, where he became one of the editors of the *Independent North American*. In 1845 he was ordered to the Pacific station, and on July 28, 1846, was appointed alcalde of Monterey, a position he held for about three years. He established the first newspaper in California, now published in San Francisco as the *Alta California*. He also built the first schoolhouse in California, and announced the discovery of gold in the Sacramento Valley in the Philadelphia *North American* in May, 1848. In 1849 he returned to Philadelphia with impaired health. He wrote *Ship and Shore in Madeira, Lisbon, and the Mediterranean* (1835); *Visit to Athens and Constantinople* (1836); *Deck and Port* (1849); *Three Years in California* (1850); *Land and Lee in the Bosporus and Ægean* (1851); *Notes on France and Italy* (1851). His works were later edited by Rev. H. T. Cheever. He died in Philadelphia, Jan. 22, 1851. E.E.T.

COLUBER, a genus of non-poisonous snakes. See SNAKES, Vol. XXII, pp. 203, 204.

COLUMBÆ. See ORNITHOLOGY, Vol. XVIII, p. 50.

COLUMBIA, a city in a township of the same name, the county seat of Boone County, Missouri, in the central part of the state. It lies on Hinkson Creek, a tributary of the Missouri River, and on the Wabash railroad, 26 miles north by west of Jefferson City, and is the site of the University of Missouri. Its population in 1890 was 4,000, and in 1900, 5,651. W.F.J.

COLUMBIA, a borough of Lancaster County, southeastern Pennsylvania, on the east bank of the Susquehanna River, and on the Columbia branch of the Pennsylvania railroad, 81 miles W. of Philadelphia. It was founded by English Quakers in 1726. A railroad bridge over a mile in length connects Columbia with Wrightsville, on the opposite bank of the Susquehanna. It is a large manufacturing center, having extensive rolling-mills, foundries, oil-refineries, saw-mills, flour-mills, tanneries, gas and water works, and manufactories of steam-engines and railroad iron. Population 1890, 10,599; 1900, 12,316.

COLUMBIA, a city and the capital of the state of South Carolina and Richland County (see COLUMBIA, Vol. VI, p. 150). The city, which has long been famed for its beauty, is built on a plateau about two hundred feet above the Congaree River, affording a magnificent view of the surrounding country. It is about two miles square, regularly laid out, with broad streets, several of them one hundred feet wide, handsomely shaded, with macadamized roadways and paved sidewalks. The state house is built of granite, three stories high, and cost three million dollars. The United States courthouse and post-office, also of granite, and the new city hall are handsome buildings. The South Carolina University, which was organized as a college in 1806, was, in 1880, reorganized, with two branches, the South Carolina Agricultural and Mechanical College at Columbia, for whites, and Claflin University at Orangeburg, for blacks. Other educational institutions are a Presbyterian theological seminary, the Winthrop Normal College, several academies for the education of both sexes, and excellent public schools. The Roman Catholics also have a school, the Ursuline Convent. There is a library containing thirty thousand volumes belonging to the university. There are a number of factories, including a very large cotton factory recently erected, run by water-power. Population 1900, 21,108.

COLUMBIA, the county seat of Maury County, western central Tennessee, on Duck River, on the Louisville and Nashville and Nashville, Chattanooga and St. Louis railroads; by the former, 47 miles S.S.W. of Nashville. The city is the seat of Jackson College, and has two seminaries for young ladies. It has a stock-yard, a grain-elevator and flour and cotton mills. It is the location of a large United States arsenal. Population 1900, 6,052.

COLUMBIA CITY, a city and the capital of

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Whitley County, northeastern Indiana, situated on Blue Creek, on the Pittsburg, Fort Wayne and Chicago and the Wabash railroads, 20 miles W. of Fort Wayne. It contains manufactories of flour, lumber and woolen goods. Population 1900, 2,975.

COLUMBIA COLLEGE, a non-sectarian educational institution, located in New York City. It was chartered in 1754 as King's College. As early as 1746, funds had been raised for the establishment of an institution for collegiate instruction. The method employed for procuring this first endowment was the lottery system legalized by act of the legislature. The original sum was added to until in 1851 a nucleus of about $17,000 had been raised. The institution was chartered by George II in October, 1754. The first building was begun on ground donated by Trinity Church in 1756. During the American Revolution the building was used as a hospital, and all work of the college stopped. Classes were resumed in 1784, under the present name, Columbia College. The first location of the college was in what is now the heart of New York City, at

COLUMBIA UNIVERSITY.

the corner of Barclay and Murray streets. In 1857 the institution was removed to Forty-ninth Street and Fourth Avenue, its location to 1897. The demand for better facilities caused the college authorities to take steps toward securing possession of a tract of 17½ acres lying between One Hundred and Sixteenth and One Hundred and Twentieth streets. The purchase was made in 1892, but the erection of new buildings was not begun until 1895. In 1897 it moved to its new location known as Morningside Heights. In 1903 the endowment was estimated at over $12,362,000 and the total income, including tuition receipts, $1,630,768. In 1904 the library consisted of 362,000 volumes, which included all departmental libraries. There are, in addition to the regular collegiate course of instruction, six special schools, all of which go to make up the college. The oldest of these special schools is the School of Medicine, first organized in 1767. From 1813 until 1860 the medical department was permitted to merge with the independent school called the New York College of Physicians and Surgeons. In 1860 this school was reorganized as the Medical Department of Columbia College. The second of the special schools is the Law Department, established in 1858; the third, the School of Mines, was organized in 1863; the fourth, the School of Political Science, in 1880; the fifth, the School of Philosophy, in 1890; and the School of Pure Science in 1892. Under these seven heads courses are given in every branch of collegiate instruction. In 1904 there were 551 in the combined faculties, and 4,833 students were in attendance. From the organization of the institution until 1901, 17,710 had been graduated. The presidents of the college and their terms of office are as follows: Samuel Johnson, 1753–63; Myles Cooper, 1763–75; Benjamin Moore, 1776; no organization, 1776–84; William Moore, 1784–87; W. S. Johnson, son of the first president, 1787–1800; C. H. Wharton, 1800; Benjamin Moore, 1800–11; William Harris, 1811; W. A. Duer, 1829; N. F. Moore, 1842; Charles King, 1849; F. A. P. Barnard, 1864; Seth Low, 1888; N. M. Butler, 1902.

COLUMBIAN EXPOSITION (1893). See WORLD'S FAIR, in these Supplements.

COLUMBIAN UNIVERSITY, THE, OR GEORGE WASHINGTON UNIVERSITY, an educational institution at Washington, District of Columbia, organized by an Act of Congress in 1821 under the auspices of the Baptist Church. The name was originally Columbian College, but in 1873 was changed to Columbian University,

COLUMBIAN UNIVERSITY.

and in 1904 to the George Washington University. The institution has medical, law and dental departments, a scientific school and the Corcoran school founded by W. W. Corcoran in 1884. In 1904 the university had 183 instructors and 1,408 students. The library contains 7,850 volumes. The grounds and buildings are valued at $1,000,000. W.M.C.

COLUMBIA OR OREGON RIVER, the largest American river that enters the Pacific. See OREGON, Vol. XVII, p. 846.

COLUMBINE, the common name of plants of the genus *Aquilegia*, natural order *Ranunculaceæ*, natives of the temperate and colder regions. *A. Canadensis* is a beautiful plant which grows wild in many parts of the United States, but is cultivated with the greatest ease. It has terminal flowers, scarlet without and yellow within, pendulous, and much embellished by the numerous descending yellow stamens and styles. See also HORTICULTURE, Vol. XII, p. 256.

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COLUMBIUM. See NIOBIUM, Vol. XVII, p. 527; also CHEMISTRY, Vol. V, pp. 467, 468.

COLUMBUS, a city and the capital of Muscogee County, central western Georgia, on the Chattahoochee River, on the Central railroad of Georgia, the Georgia Midland and Gulf and the Columbus Southern railroads. Columbus is at the head of steam-navigation from the Gulf of Mexico, a distance of three hundred miles. It is connected with Macon, Georgia, by the Southwestern railroad, and is the terminus of the North and South railroad. It is also on the Western and the Mobile and Girard railroads. A change in the level of the Chattahoochee River at this point affords unlimited water-power, which has fostered extensive manufacturing interests. The largest cotton and woolen mills in the South are located at Columbus, producing a great variety of colored goods, ginghams, etc. The city contains an opera-house, superior county buildings, churches, a high school, several graded schools, a female seminary, male academy and several excellent hotels. The streets are broad, handsomely shaded and well-lighted. Population, 1890, 17,303; 1900, 17,614. See COLUMBUS, Vol. VI, p. 153.

COLUMBUS, Indiana, a city in a township of the same name, the county seat of Bartholomew County, in the south-central part of the state. It is on White River, and is reached by the Cleveland, Cincinnati, Chicago and St. Louis, and the Pittsburg, Cincinnati, Chicago and St. Louis railroads. Its population was 6,719 in 1890, and 8,130 in 1900. W.F.J.

COLUMBUS, Kansas, a city and the county seat of Cherokee County, in the southeastern corner of the state. It is reached by the Kansas City, Fort Scott and Memphis, and St. Louis and San Francisco railroads. Its population in 1900 was 2,310. W.F.J.

COLUMBUS, a town in Hickman County, southwestern Kentucky; situated on the Mississippi River, 12 miles below Cairo; on the Mobile and Ohio railroad. It is an important center of trade and transportation, and contains manufactories of furniture and crockery. Population, 1900, 1,235.

COLUMBUS, Mississippi, a city and the county seat of Lowndes County, on the eastern border of the state. It lies in an agricultural region, and is reached by the Mobile and Ohio, and the Richmond and Danville railroads. Its population was 4,559 in 1890, and 6,484 in 1900. W.F.J.

COLUMBUS, Nebraska, a township and coextensive city, the seat of Platte County, in the central part of the state. It lies just north of the Loup and Platte rivers, 75 miles west of Omaha, and is reached by the Union Pacific railroad, and by the Burlington and Missouri River railroad in Nebraska. Its population was 3,134 in 1890, and 3,522 in 1900. W.F.J.

COLUMBUS, a city and the capital of the state of Ohio, is reached by no less than 15 different lines of railway, and has 30 miles of street-railways, operated by both horse and electric power. There is an abundant supply of natural gas, which is used largely by manufacturers, as well as by private families, for fuel. Carriage-manufacturing is the leading industry, one company manufacturing two million dollars' worth of goods annually. The area of the city is twelve square miles. Public parks cover 195 acres. The State University, United States Garrison, State Fair, Capitol and other grounds — all fine parks — have a total area of 600 acres. A United States custom-house was established in Columbus in 1889, which transacted about one million dollars' worth of business in 1890. Pop., 1890, 90,398; 1900, 125,560. See COLUMBUS, Vol. VI, p. 153.

COLUMBUS, Texas, a city and the seat of Colorado County, in the southeastern part of the state. It lies on the Colorado River, 80 miles from Austin, on the Southern Pacific railroad. Its population was 1,824 in 1900. W.F.J.

COLUMBUS, DON BARTOLOMEO COLON, an older brother of Christopher (who had two brothers and one sister), also a navigator, whose date of birth is not known; followed his brother to Lisbon, where he became famous as a cartographer. From Lisbon he went to England, and from there, in 1493, to London. In 1494 he was placed in command of three ships on an expedition to Hispaniola, where he arrived in the same year and was raised to the dignity of an adelantado, or vice-governor of the island. He took part in the last expedition of his brother in 1502. With his nephew, Diego, he returned to America in 1509, and was again in Spain in 1511. Having sailed once more to Hispaniola, he died there in the latter part of 1514. Christopher Columbus' younger brother, GIACAMO COLUMBO, called in Spain *Don Diego Colon*, was in the New World in October, 1493, returning in April, 1495. After his second visit in 1498, he was thrown in chains and brought with his brother to Europe. He remained in Spain, where he died at Seville, Feb. 21, 1515. G.A.S.

COLUMELLA, the axis to which the carpels of a compound pistil often are attached (see BOTANY, Vol. IV, p. 135), and the central axis of spiral univalve shells. See CORALS, Vol. VI, p. 332.

COLUSA, a town and the capital of Colusa County, northern California, on the Sacramento River, 65 miles N.N.W. of Sacramento, on the Colusa and Lake railroad. It has flouring-mills and manufactories of carriages and farming tools. Population, 1900, 1,441.

SIDNEY COLVIN.

COLVIN, SIDNEY, author and art critic; was born in England on June 18, 1845, and was educated at Cambridge. He became Slade professor of fine arts at Cambridge in 1873–85, and director of the Fitzwilliam Museum in 1876–84, and since 1884 has been keeper of prints and drawings at the British Museum. He has written much upon art topics and is the author of a *Life of Walter Savage Landor* (1881); *Life of Keats* (1887); *A Florentine Picture and*

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Chronicle (1898); *Early History of Engraving in England* (1901), and other works. He has also edited *Selections from Landor* in *The Golden Treasury Series* (1882); *Letters of Keats* (1887); the Edinburgh edition of Robert Louis Stevenson's works (1894–97), and *Letters of Robert Louis Stevenson* (1899). W.F.J.

COLWELL, STEPHEN, merchant and economist, was born in Virginia, now West Virginia, on March 25, 1800, was educated at Jefferson College, at Canonsburg, Penn., studied law, and was admitted to the bar. In 1836 he became an iron manufacturer, and was thus led to study political economy and to advocate the maintenance of the protective system as founded by Hamilton. He wrote a number of important works on political economy, the chief of them being *The Ways and Means of Payment*, in 1859. He also contributed many articles to *The Princeton Review*, on political economy and on theological topics. on 1865 he was appointed a member of the Internal Revenue Commission. He died in 1871. W.F.J.

COLYMBIDÆ, a family of web-footed birds. See DIVER, Vol. VII, p. 254.

COMA BERENICES, a small and close cluster of stars near the equinoctial colure, south of the tail of the Great Bear, visible in April and May, near the zenith. It is one of the nine constellations introduced by Hevelius. According to Egyptian legends, Coma Berenices, the English rendering of which is Berenice's Hair, was the name given to this constellation, owing to the belief that the hair of Berenice, a wife of Ptolemy Euergetes, king of Egypt in 248 B.C., which had been given into the care of the priests of the temple of Venus at Samos and disappeared, had been placed by the gods in the tail of Leo in the form of this constellation.

COMAN, KATHERINE, an American educator; born in Newark, Ohio, in 1857. She was graduated from the University of Michigan in 1886 and was appointed professor of history and political economy at Wellesley College. She has written the *Growth of the English Nation* and other works. W.M.C.

COMANCHE, Texas, the seat of Comanche County, 120 miles N.W. of Austin, on the Fort Worth and Rio Grande railroad, with cotton and grain growing, cattle raising, milling, and quarrying industries. Population, 1900, 2,070. C.L.S.

COMETS. See ASTRONOMY, Vol. II, pp. 712–714; and ASTRONOMY, in these Supplements.

COMET-SEEKER or COMET-FINDER, a telescope with a low magnifying power, and a short focus as compared with the size of its object-glass. It has a wide field, and is employed to find comets.

COMFORT, GEORGE FISK, educator and author, was born at Berkshire, N. Y., on September 20, 1833, and was educated at Wesleyan University, Middletown, Conn. He also studied educational systems and fine arts in Europe. He was professor of modern languages and æsthetics at Allegheny College, and afterward at Syracuse University, where he was founder and is now dean of the College of Fine Arts. He was one of the organizers of the Metropolitan Museum of Art in New York, and has written much on art and other topics. W.F.J.

COMFREY, the common name of species of *Symphytum*, a genus of *Boraginaceæ* (or *Asperifoliaceæ*), and natives of the Old World. They are coarse, branching and leafy herbs, with tubular-funnel-form flowers, nodding in raceme-like or forked clusters. *S. officinale*, the common comfrey, with yellowish-white flowers, is naturalized in the United States. *S. asperrimum*, with reddish-purple flowers changing to blue, is cultivated somewhat. The root of various species, notably *S. officinale*, is used in a medicinal way, and formerly was cultivated widely in Europe for this purpose.

COMISO, Sicily, a southern hill town, 8 miles west of Ragusa, with railway connection. It manufactures paper and other articles for export. Population, 18,200. C.L.S.

COMMANDER OR KOMMANDORSKII ISLANDS, named after the title of their discoverer Commander Bering, belong to Russia, and are situated in the Bering Sea, from 150 to 250 miles east of Nijni Kamchatka, on the east coast of the Kamchatka Peninsula. They comprise two islands, Bering Island the largest and nearest to the mainland, about 48 miles long, with a maximum width of 18 miles, and Miedni or Copper Island, about 30 miles long and 5 miles wide, at its broadest part. They are of volcanic origin and barren; the climate is temperate. C.L.S.

COMMANDITE, SOCIÉTÉ EN, or partnership in, an expression used in France to express a partnership in which one may advance capital without taking charge of the business. In other words, it is similar in nature to the "special partnership" recognized by the statutes of several states in the Union.

COMMENTRY, France, a manufacturing town in the department of Allier, 10 miles by rail S.E. of Montluçon. Valuable coal deposits in the neighborhood promote mining, iron-founding, and other industries. Pop., 10,000. C.L.S.

COMMERCE AND LABOR, DEPARTMENT OF. The Department of Commerce and Labor was established by the Fifty-seventh Congress and approved February 14, 1903, being the ninth cabinet position provided for by the U. S. government. The duty of this department, as defined by the act, is to promote and develop the foreign and domestic commerce, the mining, manufacturing, and shipping and fishing industries, the labor interests and the transportation facilities of the United States. The Secretaries of Commerce and Labor have been George B. Cortelyou (1903), Victor B. Metcalf (1904). A.R.R.

COMMERCIAL AGENCIES. See MERCANTILE AGENCIES, in these Supplements.

COMMERCIAL LAW is a term denoting those branches of law which prescribe the rights of property, and the rules governing the business relations of persons engaged in commerce or trade. The rules of commercial law are more nearly the same throughout the world than any other branch of municipal law, for the reason that the commercial

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relations between the various countries of the world tend to bring about a similarity in the rules of law governing trade and commerce.

COMMERCIAL MUSEUM OF PHILADELPHIA, a department of the Philadelphia, Pennsylvania, museums, established by special ordinance of the city councils, June 15, 1894. The project had its inception at the World's Columbian Exposition, when, at the instance of public-spirited citizens of the Quaker City, the most important parts of the exhibits at Chicago, from Mexico, Central and South America, Australia, South Africa and many Asiatic countries, were, at the close of the Exposition, removed to Philadelphia to form the nucleus of the museum. The products of other countries were obtained and added to the collection. Consisting, as the museum does, of collections of natural products from all the countries of the world which have entered the American markets, or which may be made available for them, its objects are: To bring before the American manufacturers, dealers and consumers all the varied products of the world, so that the American consumer, dealer or manufacturer can make the best selection for his special interest; to publish scientific and useful information concerning such products, and periodically to exhibit fresh manufactures and samples of goods likely to be of service in American markets. The museum is under the control of a board of trustees elected by the councils and approved by the mayor. The exhibit of raw products numbered over sixty thousand specimens in 1896, and collectors for the museum have been sent abroad to secure further and more recent material. A bureau of information affords specific information to manufacturers on any desired subject within the scope of the museum's work.

COMMERSON, PHILIBERT, French botanist; born Nov. 18, 1727, at Châtillon-les-Dombes; studied medicine at Montpellier. In 1756 he founded the botanical gardens of Châtillon, and accompanied Bougainville in a voyage around the world completed from 1766–69, collecting 160 new species and varieties of plants. He died, March 13, 1773, on Isle-de-France. G.A.S.

COMMINATION, a penitential office used in the Church of England after the Litany on Ash Wednesday, consisting of sentences taken from Deuteronomy xxvii and other passages of Scripture. To each sentence that is read the congregation responds "Amen." This office has never been incorporated in the American prayer-book.

COMMISSION, a writing, generally in the form of a warrant, authorizing one or more persons to perform duties or exercise powers belonging to another or to others. Instruments of delegation bearing this title are issued by the government to officers in the army and navy, judges, justices of the peace, postmasters and others. Another class of commissions are those granted to a body of persons intrusted with the performance of certain special duties of a public or legal character.

COMMISSIONAIRES, a name applied in France and elsewhere to a class of guides, agents, couriers, etc., who wait upon travelers at railway stations, etc., to look after their baggage, direct them upon their way, and perform other services. Often they act as interpreters. In England the name belongs to an enrolled body, the Society of Commissionaires, founded in 1859, composed of partly disabled veteran soldiers, who serve as messengers, agents, and doorkeepers. W.F.J.

COMMODORE. See NAVY, in these Supplements.

COMMON CARRIER. See CARRIER. Vol. V, p. 122.

COMMON SCHOOLS OF THE UNITED STATES. See SCHOOL, COMMON, in these Supplements.

COMMUNICATION, PRIVILEGED, a communication between such persons or under such circumstances that it does not involve an action for damages, or a communication between such persons and under such circumstances that the receiver cannot be called upon to produce it as an admission in a suit. The most common instance of such privilege is in the case of a client and his legal adviser. In the United States members of the legal profession are privileged, and, as a rule, what a client communicates to them cannot be disclosed except the right of confidentiality be waived. The privilege is extended to the communications of several parties, or of their counsel and agents engaged on the same side of a cause, and made with a view to their joint prosecution or defense. Interpreters stand in the same relation as attorneys.

Confessions made to a clergyman or priest in some states are privileged by statute, but generally it is otherwise. By a statute of the state of New York, ministers of the Gospel and priests of every denomination are forbidden to disclose confessions made to them in their professional character, and in the course of discipline enjoined by the church Similar statutes exist in Missouri, Wisconsin, Michigan and Iowa. Communications made to a physician are in some states privileged, and in others not Communications between husband and wife are privileged from disclosure.

In England no special privilege is extended to the Roman Catholic confessional, and the question as to how far a confession made to a clergyman for the purpose of obtaining spiritual comfort and consolation is protected, was long considered doubtful. The rule has, however, been established for some time that clergymen are not entitled to the same privilege as legal advisers; in Scotland the point has never been decided. In England communications to a medical man, even in the strictest professional confidence, are not protected from disclosure; and the same is the case in Scotland. For communications involving no liability for defamation, see LIBEL, Vol. XIV, p. 505.

COMMUTATOR, a recent improved form of commutator is found in the Western electric iron-clad arc dynamo. It is built up on a substantial disk of hardwood veneering mounted on a brass flange. The wooden disk is faced with mica, and each segment screwed in independently. These segments are tapered slightly toward the inner side, to allow slate wedges to protect the mica and veneer-

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ing. Air-insulation is provided for between the segments, thus confining any flashing almost wholly to the brushes. All the screws are accessible from the front, for convenience in making repairs. The segments are increased in size at the working part so as to provide for long life, and also to hold the flashing as much as possible in the working parts of the segments. In some dynamos the commutators are now made of greatly increased diameter, so as to allow of more commutator-bars, and a consequent increase in the number of alternations in the current.

C. H. COCHRANE.

COMNENUS, the name of a family, originally Italian, of which many members occupied the throne of the Byzantine empire from 1057 to 1204, and that of Trebizond from 1204 to 1461. For biographical particulars as to them, see ALEXIUS I, Vol. I, p. 442; ANDRONICUS I, Vol. II, p. 22; ANNA COMNENA, Vol. II, p. 53; ISAAC I, Vol. XIII, p. 384; JOHN II, Vol. XIII, p. 727; and MANUEL I, Vol. XV, p. 512.

COMO, a town of Park County, central Colorado, and an important junction of the Denver, Leadville and Gunnison railroad; situated at the head of Kenosha Pass. It is surrounded by extensive coal-mines. Population 1900, 407.

COMODO, an island of the Malayan Archipelago, in lat. 8° 30′ S., long. 120° E. It is 35 miles in length and 16 miles in width, and occupies nearly the entire width of the strait which separates the islands of Sambawa on the west and Flores on the east.

COMORIN, CAPE, the most southerly extremity of India, in lat. 8° 4′ 20″ N., and long. 77° 35′ 35″ E.

COMPARETTI, DOMENICO, philologist; born June 27, 1835, in Rome; became in 1859 professor of Greek language and literature at Pisa, and a few years later at Florence. Among his writings are *Saggi dei Dialetti Greci dell' Italia Meridionale* (1866); *Virgilio eel Medio Evo* (1896); *La Cómissione Omerico di Pisistrato e il Ciclo Epico* (1881); *Monumenti Antichi* (1893). With D'Ancona he published *Canti e Racconti del Popolo Italiano.*

G. A. S.

COMPASS PLANTS, a name that has been applied to those plants, the "fixed light position" of whose leaves is vertical and directed north and south. As a consequence, the leaves stand edgewise and twist into the meridian plane. The purpose is to expose the broad leaf-surfaces to the incident rays of light during the morning and evening, and to protect them from the too intense light and heat of the mid-day rays. The best-known "compass plants" are *Silphium laciniatum*, a "rosin-weed" of the prairies of the United States, and *Lactuca Scariola* of Europe, but extensively naturalized in the United States. Both of these plants belong to the great family of *Compositæ*, and both strikingly exhibit the phenomenon referred to. When grown in shaded or otherwise protected places the phenomenon does not appear, and the use of these plants as "compasses" in very cloudy weather is a doubtful story.

COMPETITION. See POLITICAL ECONOMY, Vol. XIX, p. 394; WAGES, Vol. XXIV, p. 330.

COMPLAINT, in criminal law, is the formal charge, made in writing, and usually under oath, before some magistrate or other proper tribunal, alleging that some person has been guilty of a designated offense, which the party making the charge offers to prove. The person making the charge is called the complainant. Complaint is also a term used in connection with civil actions, especially in states which have adopted a code of procedure, and when so used refers to the first pleading filed by the plaintiff, setting forth his cause of action in detail. In this sense it has the same meaning as declaration.

COMPLEMENTARY COLORS. A term used in art to describe colors, the combination of which produces white light. According to the laws of physics, the complementary color to green is red, that to blue is orange, that to purple is yellow, and *vice versa*. In practice, the combination of complementary colors does not produce pure white at all, but gray.

COMPLINE, the last service of the day in a Roman Catholic Church, celebrated after sunset, and generally just before bedtime. See CANONICAL, Vol. V, p. 21.

W. F. J.

COMPLUTENSIAN POLYGLOTT. See JIMENES, Vol. XIII, p. 705; POLYGLOTT, Vol. XIX, p. 431.

COMPOSITÆ, by far the largest family of flowering plants, containing ten to twelve thousand species distributed throughout the world. Those of temperate regions are chiefly herbs, although many of them are shrubby in the arid regions of the western United States, notably the "sage brushes," while many tree-forms occur in the tropics. It is regarded not only as the most numerous, but also the most highly organized family of flowering plants. It is characterized by its small flowers being collected in dense heads surrounded by involucral bracts, thus giving the appearance of a single flower, which was formerly called a "compound flower." The calyx is modified into the characteristic "pappus" of the group, which appears as a tuft of hairs, or bristles, or scales of various kinds. The corolla is gamopetalous, either tubular throughout or becoming flat (like a strap) above. The strap-shaped corollas, in many cases, are found only at the margin of the head, and as they are usually relatively large and brightly colored, they still further increase the resemblance to a single flower by simulating a set of separate petals. In such cases as the dandelion all the flowers are strap-shaped. Notable members of the family are asters, goldenrods, sunflowers, thistles, arnicas, etc. Many species are cultivated for their beauty; many yield valuable products useful in the arts, in medicine, etc. Among the common food-producing species are lettuce, artichoke, salsify, chicory, etc.

COMPOSITION, in bankruptcy, is an agreement between a debtor and creditor, whereby the creditor accepts a part of his demand in discharge of the entire debt, upon terms or by means different than are provided in the original contract or required by

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law. Such agreements are frequently made in other forms of insolvency proceedings; also, especially where the debtor, in consideration of the discharge, is able to borrow sufficient money from friends to pay a larger portion of his debts than could be realized by the sale of his assets through the usual course of administration. A composition agreement is generally in writing, and if made in good faith, will be valid.

COMPOSITION OF FORCES. See MECHANICS, Vol. XV, p. 708.

COMPOSTS. See HORTICULTURE, Vol. XII, p. 238; and MANURE, Vol. XV, p. 513.

COMPOUND ANIMALS. See COLONIAL ANIMALS, in these Supplements.

COMPOUNDING A FELONY, the act of the party against whom an offense has been committed, who agrees with the felon that he will not prosecute him, upon condition that the thief returns the stolen goods, or who in any manner accepts reward or other consideration for not prosecuting the offender. This offense was, at common law, punishable in the same manner as the felony compounded. Throughout the United States the offense is indictable, and the punishment fixed by statute, but is now usually punishable only as a misdemeanor. Any note, receipt or other contract given upon such consideration, in whole or in part, is void in law. The failure to prosecute does not constitute the offense, unless accompanied with the acceptance of some consideration, therefor. Compounding a misdemeanor is also indictable, but if the offense be such that an action for damages will lie against the offender at the suit of the party injured, the law will generally permit a compromise, even though a criminal prosecution could have been maintained. Advertising a reward for the return of stolen property, with an offer not to prosecute, is a similar offense to compounding the theft.

COMPRESSED AIR. See AIR-COMPRESSORS AND USES OF, in these Supplements.

COMPRESSED-AIR MOTORS. See MOTORS, in these Supplements.

COMPTON, BARNES, an American public man; born in Port Tobasco, Maryland, Nov. 16, 1830. He graduated at Princeton in 1851. He was elected a member of the state house of delegates from Charles County in 1860 and 1861, and of the state senate in 1867, 1868, 1870 and 1872, serving as its president in 1868 and 1870. Was elected state treasurer of Maryland six times, holding the office eleven years and two months, when he resigned. In politics he was a Democrat, and was elected a representative from the fifth Congressional district of Maryland to the Forty-ninth and Fiftieth Congresses. He was declared re-elected to the Fifty-first Congress, but was unseated by the House of Representatives. He was elected to the Fifty-second and Fifty-third Congresses from the same district. Died in Laurel, Md., Dec. 2, 1898.

COMPTROLLER OR CONTROLLER, literally, one who controls. The name is applied to various functionaries. In the United States government there is a comptroller of the currency, who has supervision of the national currency. Many of the states have comptrollers in charge of the state finances. In New York city the comptroller is the most important and powerful of the financial officers of the municipality. In nautical parlance a controller is a cast-iron block over which the anchor chain passes between the locker and the hawse hole. In electric engineering it is a device for regulating or controlling the current or the speed of a motor. W.F.J.

COMPULSORY EDUCATION. See SCHOOLS, PRIVATE, in these Supplements.

COMPURGATORS, twelve persons whom Anglo-Saxon law permitted the accused to call in proof of his innocence, and who joined their oaths to his. They were persons taken from the neighborhood, or otherwise known to the accused. It was rather in the capacity of witnesses to good character, than of jurymen, that they acted, though the institution has been spoken of as the Anglo-Saxon jury; what they swore to was not so much their knowledge as their belief. See JURY, Vol. XIII, p. 793.

COMSTOCK, ANTHONY, an American reformer; born in New Canaan, Connecticut, March 7, 1844. He received a common school education and enlisted as a private in the Union army at the outbreak of the Civil War. In 1873 he was appointed a post-office inspector in New York and became special agent and secretary for the Society for the Suppression of Vice. His work was especially directed toward the seizure of obscene literature. He has published *Frauds Exposed* (1881); *Traps for the Young* (1883) and *Morals vs. Art* (1887). W.M.C.

COMSTOCK, CYRUS BALLOU, an American military engineer; born in West Wrentham, Mass., February 3, 1831. He was graduated from West Point Military Academy in 1855, and after several years as an instructor in engineering was called to Washington to erect defenses for the National Capitol. In 1862 he was chief engineer with the army of the Potomac and was senior engineer at the siege of Vicksburg. He was chief engineer in the assault and capture of Fort Fisher, and in 1865 was aide-de-camp to General Grant. At the close of the war he held the rank of brevet brigadier-general of regulars and brevet major-general of volunteers. He was president of the Lake Geodetic Survey, president of the Mississippi River commission and member of the Permanent Board of Engineers for Fortifications. In 1884 he was made a member of the National Academy of Sciences. He was placed on the retired list of the army in 1895. W.M.C.

COMSTOCK, JOHN HENRY, an American entomologist; born in Janesville, Wisconsin, February 24, 1849. He was graduated from Cornell University in 1874. In 1879 he was United States Entomologist, and in 1881 became professor of entomology and zoölogy at Cornell. His books include *Report on Cotton Insects* (1879); *Introduction to Entomology* (1888); *Manual for the Study of Insects; Insect Life* (1901) and *Elements of Insect Anatomy* (1903). W.M.C.

COMSTOCK, JOHN LEE, an American author; born in Lyme, Connecticut, in 1789. He studied medicine and during the War of 1812 was assistant surgeon on the northern frontier.

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He wrote *System of Natural Philosophy* (1831); *History of the Greek Revolution* (1828); *History of the Precious Metals* (1849); *Natural History of Quadrupeds* (1829); *Grammar of Chemistry* (1825); *Introduction to Botany* (1835). He died in Hartford, Connecticut, Nov. 21, 1858. W.M.C.

COMSTOCK LODE. See NEVADA, Vol. XVII, p. 377; MINING, Vol. XVI, p. 492; and also SILVER AND SILVER-MINING, in these Supplements.

COMZA RIVER. See AFRICA, in these Supplements.

CONANT, THOMAS JEFFERSON, an American Biblical scholar; born in Brandon, Vermont, December 13, 1802. He was graduated from Middlebury College in 1823 and became a tutor at Waterville College and the Rochester Theological Seminary. In 1857 he was appointed by the American Bible Union one of a committee to prepare a revision of the English version of the New Testament. He was also a member of the American committee on the English revision of the Old Testament. His publications include *Hebrew Grammar* (1856); *Matthew, Revised Version* (1860); *Genesis, Revised Version* (1868); *The New Testament; Common Version Revised* (1871); *Proverbs, Revised* (1872); *Prophecies of Isaiah* (1874), and *Historical Books of the Old Testament, Joshua to II. Kings* (1884). He died in Brooklyn, N. Y., April 30, 1891. W.M.C.

CONCENTAYNA, a town of Valencia, southeastern Spain, situated on the southern slope of the Sierra Mariola. It has manufactories of linen, woolen, paper, soap, etc. Population, 7,756.

CONCENTRATION OF ORE. See SILVER AND SILVER-MINING, in these Supplements.

CONCEPCION DEL URUGUAY, distinguished from several other places called simply CONCEPCION, is an important city in the province of Entre Rios, in the eastern part of the Argentine Republic. It lies on the Uruguay River, which forms the eastern boundary of the Republic, 157 miles north of Buenos Ayres, has much commerce, and had in 1900 a population of nearly 8,000. W.F.J.

CONCEPTION, NATURE OF MENTAL. See PSYCHOLOGY, Vol. XX, pp. 62, 83.

CONCEPTUALISM. See SCHOLASTICISM, Vol. XXI, p. 442.

CONCERTINA, a portable musical instrument invented by Sir Charles Wheatstone in 1829, consisting of a pair of bellows, usually polygonal in form, with a set of keys at each end, which, on being pressed, admit wind to fill metallic reeds. The name is often improperly applied to inferior instruments of similar nature, as the *accordion*, which has a single keyboard, sounds notes in one key only and produces different notes on expanding and compressing the bellows. In the English concertina the compass is very extensive, beginning with the lowest note of the violin, G, and ascending chromatically for three-and-a-half octaves to C. Violin, flute, and oboe music can be performed on the concertina with good effect. Either sound on the scale is double and can be produced by pulling the bellows open, or by pressing them together. Much variety of tone can be produced by a good performer, and it has the power of being played with great expression. There are tenor, bass, and double bass concertinas with great variations of size and shape. W.R.B.

CONCERTO, the name given to an instrumental composition designed to show the skill of an executant and usually accompanied by an orchestra. Ludovico Viadana, in 1602–03, published a series of motets for voices and organ which he called "Concerti Ecclesiastici," but the real inventor of the modern concerto as a concert piece was Giuseppe Torelli, who in 1686 published a "Concerto da Camera" for two violins and bass. From the beginning of the last century to the present time the piano and violin were the sole instruments mostly used in concertos. The modern form of the concerto was finally settled by Mozart. W.R.B.

CONCH, originally a shell-fish, but now more particularly the shell of a large gasteropod. It is often used as an instrument of call in Hindoo temples and West India plantations. W.R.B.

CONCHIFERA, a term used by Lamarck to designate the bivalve molluscs, such as the oyster, and the brachiopods. See MOLLUSCA, Vol. XVI, p. 710. R.W.C.

CONCHOID OF NICOMEDES, in geometry, a plane curve of the fourth order invented by Nicomedes. If from a fixed point (the pole) straight lines be drawn intersecting a fixed straight line (the asymptote), and on these lines points be taken at a constant distance from their intersections with the asymptote, this succession of points will form a *conchoid of Nicomedes* consisting of two branches, one on each side of the asymptote. W.R.B.

CONCHOLOGY, that branch of natural history which deals with the shells of mollusks. From the time of Aristotle the beauty and variety of these structures have made them favorite objects of study, and few zoölogical subjects have excited so much popular enthusiasm. The study often became unscientific, and sometimes a craze. Since the shells are only external coverings, and seldom were considered in relation to their tenants, or in connection with the internal and external influences to which they owe their shapes, conchology has been somewhat barren of scientific results.

CONCINI, CONCINO, MARQUIS D'ANCRE, BARON DE LUSIGNY, a Florentine adventurer; born in Florence, and accompanied Maria de Medici (queen of Henry IV of France) when she went to Paris in 1600. He married Eleonora Galigai, a favorite attendant of the queen. Concini made his mark by his talents for intrigue, and on Maria becoming regent in 1610, his fortune was assured. In 1613 he was appointed a marshal of France and prime minister. His rapacity having provoked general and widespread hatred, he was assassinated near Paris, April 24, 1617.

CONCLAVE, the secret meeting of the college

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of cardinals for the purpose of electing a pope. (See also CONCLAVE, Vol. VI. p. 213.) The Saviour himself, according to Catholics, selected the first pope, St. Peter, but nowhere in Scripture or tradition can any law be found by which he determines by whom, or in what manner, the succeeding pontiffs are to be chosen. Hence, from time to time, the church has enacted laws on this matter, which, also, have been changed whenever necessity required it. Whether the pope can choose his own successor is a controverted and difficult question among canonists. While all admit that the pope has the power of determining by whom and in what way his successors shall be chosen, nevertheless they hold diametrically opposite views as to whether he can select his own successor. Pope Boniface II, in 529, actually appointed his successor, but the next year he annulled his decree. On the other hand, Pope Celestine III wished to resign the papacy in favor of Cardinal John de St. Paul, but because such an action was unknown in the church he determined not to do it. Under Pope Paul IV the question was discussed in consistory, and he, with a majority of the cardinals, thought the affirmative opinion should be rejected as false, but no decree was issued on the subject.

The method of selecting the pope has been different in different ages. In the beginning of the church the election pertained to the priests and deacons of the city of Rome. But from the time of St. Sylvester, when the Christian religion began to be professed publicly, the whole Roman people had a certain part in his election, by bearing testimony to his life and character. Throughout the first four centuries, while the pope was selected in this way, the greatest liberty prevailed. But from the fifth to the eleventh century, emperors and kings usurped great authority in the matter, so much so that at times the election ruled by them was clearly injurious and invalid, and was declared so by those who had the right of suffrage. To preclude such injurious interference on the part of temporal authority, in the year 1059 Pope Nicholas II prescribed a certain form and method for filling the Roman see, which was published in the Lateran Council, and by which the cardinal bishops (see CARDINAL, in these Supplements) were declared the electors of the sovereign pontiff, while to the other cardinals, the clergy and the Roman people it was left only to consent to the election made by these cardinals. In the year 1178, in another Lateran Council, Pope Alexander III decreed that the election of the sovereign pontiff should pertain to all the cardinals, but to them alone, and that he who received two thirds of the votes of all the cardinals participating in the election should be the pope.

A vacancy occurs in the Apostolic See when the pope resigns or dies. Notice of the vacancy is sent to all cardinals, and without being summoned, but guided only by the law, after the funeral services of the deceased pope, on the morning of the eleventh day after his death, they enter the conclave under the presidency of the cardinal dean. The conclave must be held in the city where the pope dies, unless by special decree to the contrary. The windows in that section of the palace or building devoted to the conclave are walled up, and also all doors except one, which is doubly locked, one key being kept by the cardinal camerlengo, the other by the governor of the conclave. Food is introduced through a turning box, which is also doubly locked. There is, however, a small opening or window through which audience may be given to the ambassadors of those nations which claim the privilege of each excluding one objectionable candidate. A strict watch is kept by prelates assigned for that purpose, so that no letter or message may be transmitted to or from the conclave, and severe punishment follows an offense in this matter. Inside the conclave, and subject to its restrictions, each cardinal is allowed to bring two servants, who must have been in his employ for at least a year, and must be real servants, not brothers or nephews, of the cardinal. Besides these, there are several officials, such as the sacristan, masters of ceremonies, physicians, barbers, a carpenter, a mason, and some servants for general work. During the balloting every one is excluded from the chapel, except the cardinals.

The election of a pope may be accomplished in three ways: By quasi inspiration, when all the cardinals unanimously and at once agree on the same person, without there having been any previous deliberation on the subject; by compromise, when the cardinals commit the right of choosing the pope to a few specified persons; or by ballot.

The governments of Austria, France and Spain claim the privilege of each excluding one candidate who is objectionable. Whence this privilege originated, or at what time, is unknown, but a diligent examination fails to reveal any trace of it in canon law or in any concordat granted by the Holy See. Many writers claim it is wholly a usurpation. However, it has been exercised even in the present century, and though Pius IX, in three bulls, published in 1871, 1872 and 1873, entirely abolished all rights or privileges of exclusion, still, in the conclave which elected his successor, Cardinal Bonnechose, in the name of France, opposed Cardinal Bilio after the first ballot. Cardinal Pecci, who took the name of Leo XIII, was elected then. Because of the loss of the Papal States, and the possible interference of secular governments, Pope Leo XIII issued several regulations for future conclaves, specifically denying all privileges assumed by these governments in the past in regard to conclaves.

If no choice is made the first day, two sessions are held each day until a pope has been elected canonically. Meanwhile, in all the churches of Rome and the world, special prayers are offered. As soon as the tellers find that some candidate has received two thirds of the votes, his name is declared. If the newly elected pope is present, the cardinal dean asks him whether he consents, and if so, what name he intends to take. Then

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he is placed before the altar, where he receives the salutation of all the cardinals. The camerlengo then places the fisherman's ring on his finger. In the mean time the senior cardinal deacon goes to the balcony over the entrance to the palace, and announces to the people the election of the new pontiff. The castle of San Angelo then fires its guns, and the bells of the city churches are rung, in salute. Ordinarily, the pope immediately goes to St. Peter's Church, where the *Te Deum* is sung in thanksgiving.

P. A. BAART.

CONCOMITANCE, SACRAMENTAL, is the doctrine of the Roman Catholic Church, as established by the Council of Trent, that the body and blood of Christ are given both under the form of bread and under that of wine; hence that he is received whole and entire when taken under the form of bread alone or wine alone. Since the Council of Constance, the principle has been fixed in that church that Christ was given whole and entire under either species. The Protestant Church maintains that the officiating priest receives both body and blood twice, and that it holds equally good for one kind in the sacrifice of the mass.

CONCONULLY, a village and the capital of Okanogan County, central northern Washington, on the Conconully Creek, 18 miles above the Okanogan River. It is in a rich mining district, where gold, silver and lead are found. Population about 300.

CONCORD, Massachusetts, one of America's most historic towns, is in Middlesex County, 17 miles east of Boston. It was the scene of one of the first engagements of the Revolutionary War, and has since been known as the home of a number of eminent men, including Emerson, Thoreau, Hawthorne, Alcott, and others. It is reached by the Fitchburg and the Boston and Maine railroads. Its population was 5,652 in 1900. W.F.J.

CONCORD, a city and the capital of Merrimack County, central southern New Hampshire, and capital of the state, on the Boston and Maine railroad. The Merrimack River divides the city into two portions, which are connected by seven bridges, three of them railroad bridges. The streets are wide, well paved and lighted. The chief educational institutions are St. Paul's (Episcopal) School, a public high school, and several graded schools. It has also a public library, and a state library containing 11,000 volumes. Its principal public buildings are the state house, built of granite, city hall, state prison, two orphanages, a home for the aged, and a state insane asylum. Concord has many fine hotels and extensive manufacturing interests, but chiefly is noted for its valuable granite-quarries. Population 1890, 17,004; 1900, 19,632. See CONCORD, Vol. VI, p. 214.

CONCORD, North Carolina, a city and the county seat of Cabarrus County, in the south central part of the state. It is in the valley of the Yadkin River, and is reached by the Richmond and Danville Railroad. Its population was 4,339 in 1890 and 7,910 in 1900. W.F.J.

CONCORDIA, a town of the Argentine state of Entre Rios, on the Uruguay, 302 miles N. of Buenos Ayres by river, on the Argentine Republic railroad. It has a custom-house, and a river trade exceeded only by that of Buenos Ayres and Rosario. Population, 5,498.

CONCORDIA, a city and the county seat of Cloud County, Kansas, in the northeast central part of the state. It lies on the Republican River, in an agricultural and stock raising country, and is an important railroad center, and shipping point for produce, being reached by the Atchison, Topeka and Santa Fé, the Missouri Pacific, the Union Pacific, and the Burlington and Missouri River railroad in Nebraska. Its population was 3,184 in 1890 and 3,401 in 1900. W.F.J.

CONCUSSION OF THE BRAIN. See INSANITY, Vol. XIII, pp. 107–114.

CONDENSED MILK consists of cow's or goat's milk which has been evaporated in vacuum pans to about one fourth of its volume, and sugar added to the amount of about one and one quarter pounds to the quart of condensed milk produced. It is also prepared without sugar, but the unsweetened article requires refrigeration, to be kept for any considerable length of time. But little change has been made in the methods of condensing milk since the process was first patented and perfected, but the consumption of the article has increased to such an extent that it is estimated that in 1896 fully 500,000,000 gallons of milk were used by the condensing companies now doing business in the United States. The best condensed milk will keep for an indefinite time, stand changes of temperature and climate, and, being ready for instant use by the addition of amounts of water varying with the purposes for which it is intended, it has become one of the staple articles of commerce. See MILK, Vol. XVI, p. 317.

CONDENSERS. See ELECTRICITY, Vol. VIII, p. 32; also ELECTRICITY, §§ 34, 35, in these Supplements.

CONDITION, in law, a declaration or provision that upon the occurrence of an uncertain event an obligation shall come into force or shall cease, or that the obligation shall not come into force until a certain event. Such conditions are known, respectively, as precedent or subsequent, resolutive and suspensive.

CONDITION, in logic, that which must precede the operation of a cause. It is not regarded as that which produces an effect, but as that which renders the production of one possible. For instance, when an impression is made on wax by a seal, the seal is said to be the cause; the softness or fluidity of the wax, a condition.

CONDITIONED, DOCTRINE OF THE, relates to the philosophical system of Sir William Hamilton. See Vol. XI, p. 373. R.C.A.

CONDONATION, a legal term used to express the act or course of conduct by which a

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husband or wife is held to have pardoned a matrimonial offense of which the other has been guilty, conditionally on a promise of future behavior. Thus if a wife voluntarily cohabits with her husband after she has discovered that he has been guilty of adultery, she is held to have condoned the offense, and such condonation is a bar to an action for divorce unless the original offense has been revived by subsequent matrimonial offenses.

CONDUCTIVITY. See ELECTRICITY, Vol. VIII, p. 49; also ELECTRICITY, §44, in these Supplements.

CONDUCTORS AND INSULATORS. See ELECTRICITY, § 6, in these Supplements.

CONDUCTORS AND NON-CONDUCTORS. See ELECTRICITY, §§ 10, 11, in these Supplements.

CONDURANGO (*Marsdenia condurango*), a Peruvian climbing shrub, the bark of which was introduced into therapeutic use in 1871. Known also as cundurango, or "condor vine" because the condor eats its leaves as an antidote to the venom of serpents. W.R.B.

CONE, in botany, a flower whose sporophylls (stamens and carpels in flowering plants) are inserted close together upon an elongated axis, forming an approximately cone-shaped body. The most notable illustration is the characteristic carpellary cone of the pines, spruces, etc., which gives the name *Coniferæ* to one of the three great divisions of Gymnosperms. It should be said that the morphology of the cone of *Coniferæ* is in dispute, some regarding it as a cluster of flowers, rather than a single flower. Cones are also common in *Equisetum*, *Lycopodium* and *Selaginella*, genera of Pteridophytes, although they are included among what commonly are called "flowerless plants."

CONEMAUGH FLOOD, a name given to the most disastrous flood known in American history. It occurred in Johnstown, Pennsylvania, in the afternoon of May 31, 1889. About ten miles above Johnstown, on the South Fork Creek, a little above its junction with the Conemaugh River, was a dam owned by the "South Fork Fishing and Hunting Club," an organization of wealthy men, most of them residents of Pittsburg. By means of that dam the water of the creek and upper watershed had been accumulated, forming an immense reservoir, bearing the name of Conemaugh Lake, stocked with fish. Weakened by heavy rains, the dam gave way and the freed waters rushed down the valley with the speed of a race-horse, sweeping away most of the hamlets and villages of Woodvale, Conemaugh, South Fork, Mineral Point, Morrellville, and the large villages of Cambria City and Johnstown—the whole borough familiarly called Johnstown City—embracing, with the hamlets and villages, an estimated total population of 45,000 living on the direct line of the flood. The wreckage was complete, and was rendered more appalling by the obstruction of floating wreckage at the stone bridge of the Pennsylvania railway. Whole houses, in which families were imprisoned, at this point were hurled bodily upon each other, or submerged beneath the rushing waters. Then the obstructed timbers caught fire from an overturned stove. Pinned in the wreck, hundreds of men, women and children were burnt to death.

The loss of life in the valley reached a total of 2,500; 99 entire families were lost.

An appeal for aid met with generous response, both in the United States and abroad. A Flood Relief Commission was appointed to receive the donations, which reported the total cash contributions as $4,116,801.58. Of this amount, $2,912,346.30 passed through the hands of the relief commission, divided as follows: Contributions sent to Governor Beaver, $1,236,146.45; contributions disbursed by Philadelphia Permanent Relief Committee, $600,000; by Pittsburg Relief Committee, $560,000; by New York Relief Committee, $516,199.48. The expenditures by the commission were $2,845,140.83, of which $2,592,936.68 went to the relief of the Conemaugh valley, $246,475.26 to the relief of other portions of the state, and $5,728.89 for general and office expenses.

CONEY ISLAND, one of the chief popular resorts of New York city, lies at the southwestern end of Long Island, from which it is separated by Sheepshead Bay and a narrow tidal creek, and forms part of the borough of Brooklyn, City of New York. Its name is derived from that of its former owner, a man named Coney or Cooney. It is about six miles long, from east to west, and at no point as much as a mile wide; and it consists almost entirely of beach sand. The western extremity, formerly known as Norton's Point and then a resort of prize fighters, but now called Sea Gate and occupied by wealthy and exclusive residences, forms the eastern side of the entrance to New York Bay, and is famed as the scene of Henry Hudson's landing in 1609. East of it is a large tract devoted to summer homes for the sick children of the poor. Then comes Coney Island proper, a community with a permanent population of several thousand, and with a transient population in summer often exceeding 250,000. It consists largely of cheap hotels, music halls, theaters, drinking places, restaurants, and all imaginable places of amusement and entertainment, together with vast bathing establishments along the beach. In recent years its character has been much improved by the creation of large amusement parks and buildings providing entertainment of a really high class. East of it lies a city park, and beyond this the Ocean Parkway, a great boulevard, reaches the beach from Prospect Park, in Brooklyn, five miles away. Here are several fine hotels. East of the Parkway is Brighton Beach, with a large hotel and a race track, and beyond it, occupying the eastern half of the island, is Manhattan Beach, with two of the largest and finest seaside hotels in the world, a summer theater, and a vast enclosure in which elaborate firework spectacles are given. All parts of the island are reached by electric railroads and driveways from New York and Brooklyn, and two or

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three lines of excursion steamers run thither during the summer season. W.F.J.

*CONFEDERATE STATES OF AMERICA OR SOUTHERN CONFEDERACY. From its inception compelled to defend its claim of independence by force of arms, the external history of the Confederacy of America is the history of the Civil War; and that will be found recorded under UNITED STATES, Vol. XXIII, pp. 814 et sq.

It remains only to give a brief account of the interior political history of this government. From the days when South Carolina attempted to nullify the tariff of 1828 up to the admission of California in 1850, national politics had turned upon the effort to maintain an equilibrium between Northern and Southern states. Until the latter part of this period the predominance of the South in public matters practically went unchallenged. As stated by Alexander H. Stephens, for sixty years Southern Presidents had ruled the United States, as compared with 24 years' tenure of office by statesmen chosen from Northern states; 18 judges of the supreme court had hailed from the southern side of Mason and Dixon's line, as against 11 from the northern side. In the matter of the presidents of the Senate (*pro tem.*), 24 Southerners had filled the office, as compared with 11 Northerners; of 35 speakers of the House of Representatives, no less than 23 were from the South; of Attorney-Generals, 14 were Southerners to 5 of the colder climate; 86 foreign ministers out of 140 had been furnished by the land where cotton was king; while, to complete the picture, a vast majority of the army and navy officers, and fully two thirds of the Federal office-holders, were natives of that section of the country, which contained one third of the white population of the republic, and seemed to rule the remaining two thirds.

The causes which brought about the clash between the North and South in feats of arms were as follows: The War of 1812 merged all partisan differences into one policy, represented by Monroe. His administration was Democratic (then called Republican) in name, but Federalist in measures, and its exemption from political factions led men to style the times "the era of good will." New political alignments were to grow out of the ambition of members of his Cabinet, which contained Crawford of Georgia, John C. Calhoun, John Quincy Adams and William Wirt. Calhoun, a man of great insight and force of character, and not destitute of ambition, sought to make his section a unit in national affairs and thus preserve its ascendency, as a united South could have a predominance denied a divided North. If he could establish such a political equilibrium, there would be the reward of Southern gratitude, and the probable possession of the White House at Washington for a Presidential term or two. His own state of South Carolina, in its attempted nullification, was left without general support, and it was seen that neither questions of trade nor any abstract notion of states' rights would unite the South. At this time slavery had virtually disappeared north of Mason and Dixon's line, and that institution had become localized. It furnished an adequate ground upon which to build Southern unity, and it was the labor of Calhoun's life to bring that about. Long after his death the preservation of the equilibrium between the Northern and Southern states lay at the core of national politics. The issue was the more unfortunate, as it was not one of simple expediency, but touched the moral sentiment of the nation, making sensitive those who defended slavery, and aggressive those who opposed it. It left no secure basis for compromises; and these, when made, were short-lived.

From 1833 until the firing upon the *Star of the West*, slavery, its extension or restriction, was the dominant issue between the great parties, and the South, with honest logic, believed that those who would restrict would ultimately extinguish.

When the question arose of law for the organization of Kansas, the administrations of both Pierce and Buchanan threw their weight on the side of the slave power in that territory. The turmoil and violence attending the organization of Kansas constituted the first physical strife between the slave and free states for predominance on any given territory, and the free states party won. It then became evident that the South had lost control forever of the long-maintained balance between slave and free states in the United States Senate, in so far as that balance rested upon an equal number of both kind of states in the Union. A feeble defense for the Southern institution was found in the Supreme Court, which, in the Dred Scott case, ruled that slavery was an institution of domestic concern, intrenched as such in the Federal constitution, and that any legislation concerning it was beyond the power of Congress. Owing to the feebleness inherent in the judiciary, especially in times of high political passion, it was seen that the Supreme Court was but a broken reed for Southern hopes, and in Mr. Buchanan's Cabinet there were men who began at once to plan for the success of a secession movement, which was foreseen to be imminent. Vessels of the navy, by a Northern Secretary of War, were sent far away; arms and munitions of war were removed from Northern to Southern arsenals; the credit of the government was impaired. At this time it was given out that the Republican party, which had evinced surprising strength in the elections of 1856, would, if it elected a President, justify the South in retiring from the hated compact of Union.

In order to bring about this pretext for disunion, fire-eating leaders contrived to disrupt the Democratic convention which met in Charleston in 1860. Had the Democratic party then been united it would still have controlled all departments of the government. Instead thereof, two Democratic tickets, one headed by Breckenridge of the states' rights party, and the other by Douglas as the regular nominee, were put in the field, and Mr. Lincoln, in consequence, obtained a

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majority of the electoral votes and was made President. Mr. Lincoln's popular vote was nearly four hundred thousand less than the ballots cast for the two Democratic nominees.

The day after the election, and on mere report that Mr. Lincoln had been constitutionally chosen President, the legislature of South Carolina summoned a convention to meet at Columbia to take that state out of the Union and pass bills for enrolling and arming the militia. On the 20th of December the convention of that state seceded in a manner subsequently followed by all other states that joined the Southern Confederacy, namely, by simply repealing all former acts ratifying the Federal constitution. At once the governor confiscated all United States property in the state except Fort Sumter, in Charleston harbor, to which Major Anderson, in anticipation of this action, had transferred from Fort Moultrie a little garrison of eighty men.

The course of South Carolina was followed by Mississippi on the 9th of January, 1861; on the 10th by Florida; on the 11th by Alabama; on the 19th by Georgia; on the 26th by Louisiana; and on the 1st of February by Texas. The Federal government was able to hold Fort Pickens, in Pensacola harbor. Thus there were seven states avowedly out of the Union, and they were resolute to draw to their support the remaining eight slave states.

In Washington the winter passed with dissension and strife in the Cabinet, and in futile efforts to find some method of compromise. Cass left the Department of State in December because President Buchanan would not reinforce the troops in Charleston Harbor; Cobb abandoned the Treasury in January, and went home to Georgia to forward the secession of that state. In December, Floyd forsook the War Department because Fort Sumter and Pensacola were not given up to the states in which they were located. Thompson of the Interior Department was engaged in efforts to instigate the secession of North Carolina, acting as the agent of Mississippi for this purpose, while still holding office under the government he was trying to disrupt. By the middle of January, Mr. Buchanan's Cabinet was reconstructed, but no aggressive movements could be expected from it during that President's term. In February, General Twiggs, having the largest collection of troops of the army under his command, surrendered it in Texas to an officer of the provisional Confederate government. Many of the officers and privates came North and did good service for the Union cause.

On the 4th of February, 1861, a congress of delegates from the seven seceded states met in Montgomery, Alabama, prepared a provisional constitution, and elected Jefferson Davis President and Alexander H. Stephens Vice-President. It then proceeded to draw up a permanent constitution, which was adopted unanimously on the 11th of March. But the President and Vice-President remained in provisional office until the 22d of February, 1862, when they were inaugurated for a term of six years by virtue of an election held in the Confederacy in the preceding October. On the 21st of May, 1861, the government and Mr. Davis removed to Richmond, Virginia, and on the 18th of February, 1862, the first Congress under the permanent constitution assembled in that city.

The Confederate constitution was framed upon the lines of that of the United States; it differed from that in the recognition of the sovereign and independent character of each state in the Confederacy; in the declaration that slavery was to be protected in all new territories; in the prohibition of protective tariffs and of the expenditure of Confederate money for internal improvements; in the lengthening of the executive term to six years, and making the President ineligible for re-election; in conferring upon the heads of departments the right to debate in Congress. New states were to be admitted on a vote taken by a poll of the states; state legislatures could impeach Confederate officers each within its own jurisdiction. The declaration of free trade was virtually a device to secure the support of Great Britain, whose textile industries were dependent upon the export of cotton, and whose traditional policy was always for securing and retaining new markets. The constitution further provided for the rendition of fugitive slaves to their owners, and that five slaves should count as three persons in the basis of representation or taxation. The new Congress immediately began to emit bills of credit payable ninety days after the Confederate States had secured their independence. The new government passed almost immediately to a paper currency, which from time to time was emitted freely, until before the close of the war it was practically valueless, and financially the Confederacy was virtually in the same condition as France in 1792. A small loan of ten million dollars was taken in France and England. It was proposed at that time that a loan of fifty times as much should be offered abroad in order to secure in foreign countries financial interest in the success of the Confederate arms, and also to give ground for interference in the American strife by the governments of France and England. Mr. Davis's government had not the courage to make this attempt, and those who had invested in his foreign securities eventually lost their money.

When Mr. Lincoln was inaugurated he found an enemy in possession of seven states, occupying over 560,000 square miles, and inhabited by nearly five million persons, of whom about half were black. In the eight border states was a population of seven and a quarter millions and an area of about 320,000 square miles, in which the ratio of the blacks to the whites was less.

Much depended upon the course that should be taken by the border states, in which there existed a strong sentiment of Union. In fact, this sentiment was so strong that the friends of secession were fearful of risking their case in conventions and popular elections. It was felt that some bold and bloody means should be

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taken to break up the passive attitude of the border states. The occasion for firing the Southern heart was found at Fort Sumter, then besieged by an army of seven thousand men under Beauregard. The attempt to provision that fort in January had been frustrated by arms, and the steamer *Star of the West* fired upon. On the 11th of April, 1861, the Confederate general, Beauregard, demanded the surrender of the fort, and on the refusal of his terms, ordered its bombardment. On the following morning, fire was opened, and on the 13th Major Anderson surrendered his feeble garrison with the honors of war. The effect was electric, and the response of the North was the rapid gathering of militia to the defense of Washington.

On the other hand, the border states were quivering with excitement, and contemptuously refused to place their militia under the command of President Lincoln. Virginia, which, on the 4th of April, had defeated the secession ordinance by a two-thirds vote, in convention on the 17th voted it in secret session, and her executive authorities proceeded at once to seize the Norfolk navy-yard and Harper's Ferry arsenal, with their immense stores of ordnance and ammunition.

These summary proceedings were not acquiesced in by the western part of the state, where forty counties refused to recognize the secession ordinance of the convention. On the 11th of June these counties organized a convention which declared them a separate state, and established a local provisional government to act until such time as the state was organized more regularly and admitted into the Union. Arkansas and Tennessee joined the Confederacy on the 6th of May, but eastern Tennessee admitted no allegiance to the confederated states, and was only held in subjection to them by military occupation. North Carolina seceded on the 20th of May, and there the process of disruption practically ceased.

Fresh governments were set up in Kentucky, Missouri, and even in Maryland, but their officials had neither resources nor effectual authority. Recruits for the Confederate army were obtained in the border states with considerable freedom, but Delaware, from its position, was helpless.

The government established by Mr. Davis under the permanent constitution consisted of Judah P. Benjamin as Secretary of State; Charles G. Memminger as Secretary of the Treasury; James A. Seddon as Secretary of War; Stephen R. Mallory as Secretary of the Navy; and John H. Reagan as Postmaster-General. The Confederate Congress finally lost all semblance of independence, and became absorbed in the military situation and in criticisms of Mr. Davis. The government degenerated into a military despotism, the act of *habeas corpus* was suspended, conscriptions grew severer, until all the white male population between 17 and 55 years of age was enrolled in subjection to military orders. Congress usually sat in secret session, but in November, 1864, it fell into useless criminations and complaints of Mr. Davis, and into an impotency which left all the vitality of the Confederacy to the President and General Lee.

The overthrow of the Confederate troops in the field put an end to the existence of the Confederate States of America. On the surrender of Lee, Mr. Davis and his cabinet fled from Richmond, some of them abandoning the country. Mr. Davis was taken prisoner in Georgia while on his way to the sea-coast of Florida. The last of the Confederate armies to surrender was that of General Kirby Smith, in the country west of the Mississippi, on the 26th of May, 1865.

It still remains for some competent and unprejudiced historian to weave into a just narrative the vast material which the Civil War produced. Until this shall be accomplished perhaps the best extant authorities upon the subject are *The War Between the States* (1870), by A. H. Stephens; *The American Conflict* (1866), by Horace Greeley; and *A History of the American Civil War* (1870), by John W. Draper.

D. O. KELLOGG.

CONFEDERATION OF THE RHINE. See NAPOLEON, Vol. XVII, p. 217; GERMANY, Vol. X, p. 451; and AUSTRIA, Vol. III, p. 116.

CONFERENCES, in diplomacy, see CONGRESS, Vol. VI, p. 239; in religious bodies, see METHODISM, Vol. XVI, pp. 195 et seq. and METHODIST CHURCHES, in these Supplements.

CONFERVA, a genus of green, filamentous, unbranched algæ, belonging to the family *Ulothricaceæ*. The family reproduces by the formation of motile spores (*zoöspores*) formed in any cell. In some cases smaller zoöspores are formed which fuse in pairs and form a heavy walled spore (*zygospore*), such a process being sexual. The name *conferva* was formerly applied to all green filamentous algæ, but has now been much restricted.

CONFESSION is a technical term widely used in law and theology. In law it is the acknowledgment of a debt made by the debtor to the creditor, or an acknowledgment of guilt made by a criminal to the court. In ecclesiastical affairs confession is one of the sacraments of the Roman Catholic and some other churches, and consists in the personal confession of sins to a priest, usually followed by the giving of absolution or the imposition of penance. Theologically it is applied to various statements of faith or creed, as the Augsburg Confession, the Westminster Confession, etc. W.F.J.

CONFISCATION, the act of appropriating, without compensation, private property to the public use; also, the act of seizing, by authority, property improperly obtained or held; as, to confiscate a set of burglar's tools or a set of gambling implements. When the goods of a criminal are declared forfeited, and adjudged to the public treasury, they are said to be confiscated. By the terms of an act of Congress passed in 1861, all property used for insurrectionary purposes was declared confiscated. In some European countries confiscation of the estates of an offender has been

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imposed as a punishment for certain political offenses.

In international law it is a general rule that the goods of an alien enemy may be confiscated when found within the state, unless there be treaty to the contrary. In the United States it is the rule that the strict right of confiscation exists only in Congress, and without an act of Congress the goods of an enemy found in this country cannot be forfeited. The custom in modern times is usually to provide by treaty, in case of war, that the subjects of each state residing in the territory of the other shall be permitted to remain and continue their business without interference, thus recognizing the right of confiscation under such circumstances, but waiving the right for the purpose of protecting the interests of the citizens of each country who may reside or transact business within the territory of the enemy. Debts due from citizens of one state to citizens of an enemy may be confiscated in the same manner as other property, even though they were contracted during times of peace. Goods which are contraband of war, or have been captured while under the protection of the enemy, are always confiscated.

CONGER, Edwin H., U. S. Envoy Extraordinary and Minister Plenipotentiary at Pekin, was born in Knox County, Ill., March 7, 1843, and graduated in 1862 from Lombard University, Galesburg, Ill. On leaving college, he entered the Union army as lieutenant, and later reached the rank of captain. He was subsequently brevetted major for gallant conduct on the battlefield. After the Civil War he studied law, graduating from the Albany Law School in 1866, and after being admitted to the bar practiced law in Galesburg. In 1868 he removed to Iowa and engaged in stock-raising and banking. From 1882 to 1885 he was State Treasurer of Iowa, and in 1884 was elected to Congress from Iowa. He served three terms in Congress and was appointed U. S. Minister to Brazil by President Harrison. In 1897, he was transferred to Pekin, where he has since served the United States as Minister to China. Throughout the anxious months of midsummer 1900, he was besieged by the Boxers, along with the representatives of the European governments, at the Chinese capital.

CONGREGATIONALISM IN THE UNITED STATES. For an account of the rise of Congregationalism and its gradual development into an ecclesiastical polity of individual church autonomy, see Independents, Vol. XII, pp. 761–767; Congregationalism, Vol. VI, pp. 238, 239. The early settlers in New England, the Puritans, who followed the Pilgrims and landed in the wilderness "for conscience' sake," were not Separatists or Congregationalists. They were dissenters, who still held it an honor to call the "Church of England, from whence wee rise, our deare mother," and who separated only from the sinful corruptions in the worship of God in the mother church. The Presbyterianism of England was likewise transplanted to Massachusetts, and Thomas Parker and James Noyes, who came over in 1634, did not hesitate to teach and preach the essential polity afterward held by a majority of the Westminster Assembly. Indeed, the New England churches early resolved themselves into more or less antagonistic bodies, some holding to "Brownism," some to the "Presbyteriall-government," and some to a middle way between these two, which was ably set forth by John Cotton in his famous book, *The Keys to the Kingdom of Heaven.* The Cambridge Platform, in the drafting of which nearly all the churches of New England took part, and which presented a Presbyterian polity, was at least tacitly accepted by the churches, the divergence being rather upon its interpretation than upon the essence of its rules, and more than two generations passed before any important modifications were made.

Difficulties arose out of the union of church and state. In Massachusetts and New Haven, by the king's letter in 1662, the franchise was limited to those who had a "certificate from the minister of the place where they dwell, showing that they be orthodox in religion," etc. Differences as to what constituted orthodoxy led to endless disputes. Furthermore, the churches were divided into synodists and antisynodists. The synodists maintained that the synod should have power of deciding certain controversies regarding church discipline, while the antisynodists held that only advisory authority was vested in the synod of elders. In Boston this led to the division of the First Church, and the establishment, by the seceders, of the "Old South" Church. The same struggle led to the call for a meeting of the associated ministers in 1705, to consult as to what steps should be taken, "that the councils may have due constitution in preserving the interests of the churches in the country." The essential steps taken related to the formation of a council, whose determinations "are to be looked upon as final and decisive," with the proviso, in certain cases, of an appeal to a larger council, which should have power to declare any church failing to accept its decisions as "no longer fit for communion with the faithful." But this was Presbyterian polity pure and simple, and the strife it engendered led ultimately to a restoration of the original Brownism, purged of its inconsistencies, and molded into the modern Congregationalism. But this result was still distant. When John Wise, an Ipswich clergyman, in 1710, in attempting to lead back the churches to the Cambridge Platform, really presented the fallacies of that platform in such a light as to leaven the whole of New England with views opposed to its direct Presbyterianism, the strife was continued by those advocating "consociation of churches"—a new form of council with definite powers—and by the "Associationists," who wished to create a commonwealth of churches. Both these were supported by some, attacked by others, and finally overthrown by the powerful attack of that "second father of Congregationalism," Nathanael Emmons, one of the most convincing preachers of his age, a consistent theologian, and one of the

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most pious and noble men in America. His famous axiom,

"Associationism leads to Consociationism; Consociationism leads to Presbyterianism; Presbyterianism leads to Episcopacy; Episcopacy leads to Roman Catholicism; and Roman Catholicism is an ultimate fact."

became a rallying-point for those who believed with him that the platform of church discipline given in Matthew xviii is right and sufficient, and "if we depart from this, there is nothing in Scripture to prevent our being Presbyterians, or Episcopalians, or Papists."

As late as May, 1844, a meeting of Congregational ministers at Boston reaffirmed almost the same principles of polity as those presented by their fathers in 1805. But the work of Wise and Emmons was bearing fruit, and in June, 1865, 502 elders, representing 25 states, met at the "Old South" Church, in Boston, and set forth the following simple declaration of faith and polity, which has since remained the rule of the Congregational Church:

"*Resolved*, That this Council recognizes as distinctive of the Congregational polity,—

"*First.* The principle that the local or congregational church derives its power and authority directly from Christ, and is not subjected to any ecclesiastical government exterior or superior to itself;

"*Second.* That every local or congregational church is bound to observe the duties of mutual respect and charity which are included in the communion of churches one with another; and that every church which refuses to give an account of its proceedings, when kindly and orderly desired to do so by neighboring churches, violates the law of Christ;

"*Third.* That the ministry of the gospel by members of the churches who have been duly called and set apart to that work implies in itself no power of government, and that ministers of the gospel not elected to office in any church are not a hierarchy, nor are they invested with any official power in or over the churches."

To this declaration was added another provision by the assembly of 275 delegates which met at Oberlin, Ohio, Nov. 15, 1871, and organized there the National Council of Congregational Churches of the United States, viz.:

"The churches, therefore, while establishing this National Council for the furtherance of the interests and work of all the churches, do maintain the scriptural and inalienable right of each church to self-government and administration; and this National Council shall never exercise legislative or judicial authority, nor consent to act as a council of reference."

Congregationalism, while it emphasizes church autonomy, also adds the principle that, all churches being of one divine family, owe to each other fraternal affection and communion which is manifested by reciprocal recognition, exchange of membership and working together in harmony for the good of all. Inasmuch as distant churches cannot meet as a body for fellowship and advice, they meet by delegation, and the assemblies of these delegates are termed councils.

Any competent number of believers desiring to be organized or received into fellowship may call a council, or any church needing advice, or any aggrieved member in a church that unreasonably refuses to issue a call, may himself call a council. These calls are usually made through written requests, termed letters missive. Councils called by individuals or churches seeking fellowship, or who desire light, are termed "advisory councils"; those called by two parties who stand in any way antagonistic to one another are termed "mutual councils"; and those called by an aggrieved party whom his fellows have refused to join in the call are termed "*ex parte* councils."

The tendency of the later Congregationalism is toward the extension of the principle of mutual sympathy and advice, to include, also, sister churches of other denominations, recognizing only the common faith in an adherence to the teachings of Christ as these may be understood by each individual according to the light given him. This broad principle of universal brotherhood can scarcely fail to exert a salutary influence.

In 1900 there were in the United States a total number of 5,604 churches, with a total membership of 629,874,—a gain since 1890 of 665 churches and 95,715 members. The average yearly gain in number of churches is about 125. In 1895, $2,187,050 were contributed for benevolent purposes, and $7,035,307 for home expenditures. Seven theological seminaries are maintained, located respectively at Andover, Massachusetts; Bangor, Maine; Chicago, Illinois; Hartford, Connecticut; Oberlin, Ohio; Pacific Seminary at Oakland, California; and the Divinity School at Yale University.

Six societies serve to carry on the united work of the denomination. *The American Board of Commissioners for Foreign Missions*, which was organized June 29, 1810, occupied, in 1895, 20 mission fields, with 1,265 stations; had 572 missionaries, assisted by 3,107 native helpers; had 461 churches in these missions, with a total membership of 44,413; had 1,165 Christian schools, with a total enrollment of 53,000 pupils; and spends annually about $600,000.—*The American Congregational Association* was organized in 1853, "to preserve, improve and promote the best use of the Congregational library, and to further the general principles of Congregationalism." The library contained, in 1895, over 73,000 books and pamphlets, and over 47,000 periodicals.—*The Congregational Church Building Society* was organized in 1853 for the purpose of aiding needy churches in building houses of worship. It receives and disburses annually about $140,000.—*The Home Missionary Society*, which was organized in 1826, has for its object the promotion of home missions, organizing new churches, and assisting in the support of their ministers until these mission churches become self-supporting. Up to 1895 this society had organized 6,339 missions, and had disbursed $17,411,950. The yearly receipts now approximate $800,000.—*The Educational Society*, organized in 1816, has for its purpose the assisting of worthy students in colleges and theological seminaries, and to aid in the support of teachers in home missionary colleges and academies in the West and South. This society expends about $150,000 annually. The amount of aid given to a student is usually $75 per annum; to an academy, from $500 to $1,500; to a college, from $1,500 to $5,000.—*The American Missionary Association*, organized in 1846, originated in a general sympathy for the friendless slaves, and its work is still among the friendless of the colored race. The receipts of the society for 1895 were $307,547; expenditures, $337,334.

CONGREGATIONS, ROMAN, are certain committees of cardinals established permanently for the purpose of hearing and deciding, either in the first instance or on appeal, questions or causes referred to the pope as head of the Roman Catholic Church. (See also ROMAN CATHOLIC CHURCH, Vol. XX, p. 644.) There are at least twenty congregations, not counting the special commissions appointed, from time to time, for the

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examination of local or special questions. The cardinals (see CARDINAL, in these Supplements) are assisted by various officials and by consultors, all of whom, in a broad sense, are said to belong to the congregations, though strictly only the cardinals constitute these committees. Formerly, all business was transacted in consistory (see CONSISTORY, in these Supplements), but now only the most important affairs are treated therein.

THE CONSISTORIAL CONGREGATION is a committee for the examination and preparation of business to be treated in consistory. It is composed of cardinals, eight to twelve in number, and the pope himself is its prefect. The secretary is a prelate, the same who is secretary to the College of Cardinals. The process for the appointment of bishops is examined by this congregation, and all matters concerning the erection of dioceses are settled by it. Its office is in the Palazzo della Cancellaria Apostolica. A second congregation, which is auxiliary to the consistory, is that *For Choosing Bishops*. Its work formerly was to gather information in regard to candidates for vacant sees, as well as to suggest to the pope desirable appointments. Practically, to-day it is merged with the committee for the examination of bishops, whose duty it is to examine a person chosen for bishop and find out his knowledge of theology and canon law; for, according to the Fathers of Trent, the simple owning a degree of doctor or licentiate in theology or canon law is not deemed sufficient, but it is required that the one to be promoted to the episcopate shall have obtained this degree meritoriously as the result of work and examination. Still another congregation, that *For Extraordinary Ecclesiastical Affairs*, may be called auxiliary to the consistory. It is a development of the particular committee instituted by Pope Pius VI in 1793, concerning the affairs of the French kingdom. As now organized it consists of fourteen cardinals, with a secretary and eight consultors. The competency of this congregation is not limited to a certain kind of business, but affairs which may be treated in this way better than in the ordinary congregations are assigned to it. Especially, all matters pertaining to concordats and other relations of the Holy See with the governments of the world are committed to it. Further, it treats all the church business of the countries subject to the Russian Empire, and also of those of South America. Its office is in the Vatican Palace, next to that of the Secretary of State. The other congregations may be grouped into those which treat matters of faith, those which attend to questions of worship in the church, and those whose special object is the enforcement of discipline.

THE SACRED CONGREGATION OF UNIVERSAL INQUISITION, or the HOLY OFFICE, was established as a committee in the year 1542 by Pope Paul III. Pope Sixtus V later enlarged and confirmed it as a congregation, and decreed that it should rank as the chief of all the Roman Congregations. The pope himself is its prefect, and the cardinals belonging to it, usually ten, are called cardinal inquisitors. To aid them, twenty-two consultors, six qualificators for examining books, and four lesser officials are assigned to the congregation, all chosen by the pope himself from the most learned canonists and theologians of the secular and regular clergy. They are all bound to absolute secrecy in regard to the questions considered, lest harm come to innocent people through divulging what should remain secret. The sentences and judgments of the Holy Office are the judgment of the Holy See, and are treated by Catholics with great reverence, but they are not considered irreformable, for a rehearing is sometimes granted. *The Congregation of the Index* may be considered an auxiliary of the Holy Office for the special work of examining books and condemning such as may be dangerous to the faith or morals of Catholic people. From the first ages bad and dangerous books were condemned by the church, but Pope Paul IV, in 1559, was the first to make a catalogue of them. The Council of Trent drew up ten rules on this matter, which are still in force, though a revision of them was begun in Rome during 1896. A most careful examination is made of a book before it is prohibited either as bad or dangerous; but the decree of the Index is not considered infallible. Books are sometimes prohibited until corrected. The Congregation of the Index is composed of about thirty cardinals, nearly two thirds of whom live away from Rome. It has also thirty-one consultors and four relators to read books, and report what censure they think should be attached to them. The cardinals in general meeting then decide.

THE COMMISSION FOR THE RECONCILIATION OF DISSIDENT CHURCHES is a new congregation established by Pope Leo XIII, March 19, 1895, for the purpose of considering the questions which may arise concerning the reunion of churches or nations with the see of Rome. The restoration of the Coptic patriarchate and the validity of orders in the Anglican Church were two of the first questions treated in this committee. The pope is its prefect, and eight cardinals were appointed its first members. It has also a proper number of consultors to study and prepare matters referred to it, but the submitting of these questions is performed by one of these consultors designated as secretary by the pontiff.

THE CONGREGATION ON STUDIES tends to preserve the faith and guard the faithful against error, by the institution and proper management of universities and other schools. The first universities, which grew out of cathedral and monastic schools, were approved by the Roman Church, which granted them special privileges, and by its action made the degrees conferred by them receive recognition before the civil as well as ecclesiastical authority. The Congregation on Studies was instituted by Pope Sixtus V as a competent tribunal for the settlement of all questions regarding the rights, privileges and exemptions of these universities. It is now composed of 26 cardinals, one of whom is its prefect, and has a secretary, 11 consultors and 6 officials. The establishment of new universities

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and their constitutions are matters over which this committee has jurisdiction. Abuse in conferring degrees (see TITLES, ROMAN CATHOLIC, in these Supplements) by Catholic universities is also in its purview. The congregations which attend to questions of worship in the church are: The Congregations of Rites, on Ceremonies, on Indulgences and Relics, for the Fabric of St. Peter's.

THE CONGREGATION OF RITES was instituted by Sixtus V in 1587. About 35 cardinals, half of whom live away from Rome, make up this committee. They are assisted by 31 consultors and other officials.

THE CONGREGATION ON CEREMONIES is a derivation from that on rites, and it exercises a watchful care over the rites and ceremonies, civil and ecclesiastical, of the court of the pope. It also resolves questions regarding pre-eminence among cardinals and prelates. Further, it instructs those concerned in the conferring of insignia on newly created cardinals. The dean of the College of Cardinals is always prefect of this congregation.

THE CONGREGATION ON INDULGENCES AND RELICS was established by Clement IX, in 1669, to do away with any chance of abuse in the matter of indulgences and relics. It does not grant any indulgence, that being done by the pope, but it sees that indulgences are not abused, and that false relics of saints are not given out as true. Thirty-two cardinals are attached to this congregation. It has also 17 consultors and a secretary, all of whom are prelates, and appointed by the pope.

THE CONGREGATION FOR THE FABRIC OF ST. PETER'S church in Rome is a development of a special committee appointed for the rebuilding of this basilica, and was instituted by Clement VIII in 1593. Formerly it had much work; to-day it has little, other than the care of St. Peter's basilica, the cardinal archpriest of which is always its prefect.

The congregations whose specified object is the enforcement of proper discipline are the Congregation of the Council, with several subordinate committees, and the Congregation of Bishops and Regulars, also with subordinate committees.

THE CONGREGATION OF THE COUNCIL interprets and applies the acts of the Council of Trent in all that relates to discipline, but its faculties do not extend to decrees regarding faith. It is composed at present of 28 cardinals, some of whom reside away from Rome, and it has a secretary, an auditor to summarize cases, and eight officials. A school for young canonists is attached to this congregation. A subcommittee for *Receiving and Examining the Reports of Bishops on the State of their Churches* was instituted by Benedict XIV, in 1740, to relieve the main congregation and facilitate the work of examining and replying to the reports and questions which bishops bring or send to the Holy See at stated times. This is termed the visit *ad limina apostolorum*, and must be made every three or five years by bishops of Europe, and every ten years by those of America and other countries. Another subordinate committee is that *For Reviewing Provincial Councils*, which was established by Pius IX, in 1849, to hasten the review and approval of these meetings of local bishops. Both these committees are made up of some of the cardinals belonging to the Congregation of the Council. In the same way the *Congregation on Ecclesiastical Immunity*, which was instituted by Urban VIII for the protection of the rights and privileges of the church, is now merged into that of the council, and much of its work is done immediately by the Cardinal Secretary of State. The *Congregation on the Residence of Bishops*, also auxiliary to that of the council, treats of questions concerning the obligation of bishops to reside in their own dioceses and other beneficiaries in their benefices. Leave of absence is granted by this committee, which formerly had six cardinals, but whose work is now done by the cardinal vicar of Rome, and the secretary of the Congregation of the Council.

THE CONGREGATION OF BISHOPS AND REGULARS is a union of two committees, one of which treated questions concerning the secular, the other questions concerning the regular, clergy. To insure uniformity they were united in 1601. Twenty-four cardinals make up this committee, and they are assisted by consultors and officials. Questions, either in the first instance or on appeal, which arise between bishops and their clergy, or between the secular and regular clergy, are referred to this committee for settlement, either summarily or by judicial process. By special authorization from the pope, it can also try and remove bishops. Special committees on *The Discipline of Regulars* and *State of Regulars* attend to the observance by religious orders of their special rules and constitutions. Changes are also authorized in these rules when circumstances render them necessary. Most of the work of these committees is now done by that on bishops and regulars.

THE CONGREGATION OF THE PROPAGANDA was instituted to spread the faith in infidel countries and attend to questions of discipline which may there arise among missionaries and bishops. (See PROPAGANDA, Vol. XIX, pp. 831–834.) The Roman congregations usually give no reasons for their decisions. They examine the questions, and simply reply affirmatively or negatively. Though each congregation has its special work, questions once referred to a congregation are treated by it also in those matters which may be in the purview of other congregations. The decision of one congregation is always recognized by all the others. Many cardinals belong to several of these committees, there being only about thirty in Rome to do the work of all. Trials before the congregations, except the Holy Office and the Index, are public. The questions are usually presented to the cardinals in general committee by the secretary of the congregation. When a decision is reached, especially in import-

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ant matters, it is referred to the pope for approval. The Latin or Italian language may be used. French is tolerated.

P. A. BAART.

*CONGRESS, AND THE LEGISLATIVE POWER OF THE UNITED STATES. The legislative power of the United States is vested in the Senate and House of Representatives, collectively called The Congress, under the supervision of the veto power granted to the President. Each of these bodies is sole judge of the election, returns and qualifications of its members, and has power to compel attendance of its members. Each may determine the rules of its proceedings, may punish members, and, with the consent of two thirds, expel a member. A majority in each constitutes a quorum, the presence of which is necessary to transact business. Each House must keep a journal, and one fifth of the members in each can cause the yeas and nays to be entered on the journal. Neither House, during the session of Congress, can, without the consent of the other, adjourn for more than three days, nor to any other place than where they shall be sitting. Members of Congress are paid for their services out of the Treasury. At present the compensation is $5,000 per annum, payable monthly, and a mileage of twenty cents for each mile traveled by a customary route in going to and returning from each session of Congress. Members can hold no office under the United States. The Congress meets the first Monday in December of each year, can change by law this time of meeting if it sees fit, and can be called in extra session by the President.

The Senate consists of two Senators from each state, chosen by the legislature thereof for six years, and is a permanent body. No state can be deprived, without its consent, of its equal suffrage in the Senate. Senators are divided into three classes, and one third of the number goes out every second year. Besides its legislative duties, the Senate, by its advice and consent on a two thirds vote, enables the President to make treaties, and by a majority vote confirms the appointments of important officers. The Senate is also a court of impeachment, thus in a limited way having executive and judicial, as well as legislative, functions.

As legislative bodies, the Senate and the House have equal powers; but all bills for raising revenue must originate in the House, except that the Senate may propose or concur with amendments, as in other bills. Custom, also, has made it imperative that the general appropriation bills shall originate in the House. The Senate, however, derives power in many ways from the fact that it is a permanent body and from its participation in executive functions.

The ordinary course of business in the Senate requires that after the journal has been read and approved, the presiding officer shall lay before the Senate messages from the President and communications from the heads of departments, commonly called Cabinet officers, and other communications addressed to the Senate, and also such bills, joint resolutions and other messages as may come from the House. He then calls, in the order named, for the presentation of petitions and memorials, reports of committees, the introduction of bills and joint resolutions, and finally, concurrent and other resolutions. Until the morning business shall have been concluded, and so announced from the chair, or until one o'clock, no motion to proceed to any subject on the calendar is entertained by the presiding officer, except by unanimous consent. Petitions and memorials are referred without putting the question, unless there is objection, in which case all motions relating to reception or reference are put without amendment, except to add instructions. Any matter from the President or House may be taken up at once by motion determined without debate, or the presiding officer may lay it before the Senate. Bills offered may be objected to, and thereupon lie over one day. All bills must be read three times, and, except by unanimous consent, on three separate days. After a bill has been twice read, it may be amended or committed. All bills, after the second reading, are considered by the Senate as in the Committee of the Whole, where any amendments are considered, and then reported to the Senate, where the amendments are again considered, after which further amendments may be proposed. After the third reading, amendments are not in order; but the bill may be sent to a committee, and, after the report of the committee, goes to the calendar, and must be again considered in committee of the whole. After each day's morning business is over, or at one o'clock, unless the Senate otherwise order, all bills not objected to are disposed of, debate being limited to five minutes for each Senator. Objection can be made at any time; but on motion without debate, the Senate may continue consideration. In that case the five-minute restriction is removed. This may go on until two o'clock, or until two hours have expired, if the Senate meets at another time than noon. After two o'clock, or after two hours, the calendar of general orders is taken up. This order of business on the calendar may be interrupted by appropriation bills, a motion to take up some other bill, a motion to pass over the bill under discussion, or a motion to put it at the foot of the calendar. All these motions are decided without debate. Any subject may be made a special order by a two-thirds vote, and special orders take rank by seniority, unless changed by direction of the Senate. When bills go to a committee and are reported, they are placed on the calendar with bills which have been read twice and objected to and not referred. When a bill has been taken up and is under discussion, a motion to take up and consider another bill on the calendar, or any question of privilege, disposes of the first, which cannot be again resumed except by a direct vote of the Senate. The precedence of motions is as follows: To adjourn, to adjourn to a day certain, or that when the Senate adjourns it be to a day certain, to take a recess, to proceed to the consideration of executive business, to lay

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on the table, to postpone indefinitely, to postpone to a day certain, to commit, to amend. It will be seen that there is no motion for the previous question; hence there is no method of closing debate except by unanimous consent. On an amendment, however, debate may be closed by laying the amendment on the table, which does not carry the bill with it.

The foregoing is a brief outline of the method of doing business in the Senate, according to the standing rules. In practice this system is much modified by what is called "Senatorial courtesy," which is but another name for the comity that grew up naturally in a body originally small in number, where every consideration is extended by the members each to the other. Sometimes it is claimed rather to the detriment of public business. In ordinary assemblies, for instance, a member discusses a question only when it is before the body for action. In the Senate, if a Senator announces that at a day named in the future he will state his views on a bill presented by him or some one else, he is permitted so to do, and speaks without limit. At no time is there any limit to the time a Senator may speak. Seventy-two hours with intermissions, and 14 hours without intermission, are perhaps the highest records thus far made.

In the House of Representatives, now composed of 357 members, there is necessarily a different system of procedure and different rules. In the days of John Quincy Adams, all matters, even petitions and memorials, were presented in the open House, and much time was consumed in mere routine. Among the more valuable reforms introduced into the House in the Fifty-first Congress (1889–91) was that system which now prevails, by virtue of which, without taking any of the time of the House, all bills, petitions, memorials and communications from the heads of departments and bills from the Senate are referred by the Speaker to appropriate committees, and all reports of committees, or rather the accompanying bills, except those which are privileged, are placed upon the calendars to which they belong. Messages from the President are always read to the House.

The calendars are three in number: The House Calendar, the Union Calendar and the Private Calendar. To the Private Calendar go all the private bills, to the Union Calendar all bills which appropriate money or require such appropriations. The House Calendar receives all other bills. No bill goes to either calendar until reported from a committee.

The order of business is as follows: Bills which do not carry appropriations, and which, having passed the House, are amended by the Senate and sent back, are first disposed of, and then the same class of bills passed by the Senate and sent to the House, which are substantially the same as bills of the House already reported by a House committee, can be disposed of when that committee request it. After this comes the unfinished business of the previous day, and next the morning hour for the consideration of bills. These bills must be on the House Calendar, and must be called up by the committees. The morning hour is not necessarily limited to sixty minutes, but may continue all day if the House so desire. At the end of sixty minutes, however, the House may go into the Committee of the Whole House on the State of the Union, either to take up bills in their order, or, when a committee authorizes a motion to be made, to take up a particular bill. If motions for these purposes are voted down, then the morning hour continues until the adjournment, or until the business in hand is finished. All appropriation bills, and bills to raise revenue, are considered first in a Committee of the Whole House on the State of the Union. The general appropriation bills, which provide for the different branches of the public service, and bills to raise revenue, have the right of way against everything but questions of privilege and conference reports. They cannot interrupt other business already begun, but may at any other time obtain consideration. On Fridays, private bills are entitled to be considered, unless the House refuses to go into the Committee of the Whole, in which case the public business proceeds as on other days. Congress not only legislates for the whole country, but in particular for the District of Columbia. Hence on the second and fourth Mondays of each month District of Columbia business is in order.

On the first and third Mondays of each month, and during the last six days of each session, the rules may be suspended and bills and resolutions may be passed by a two-thirds vote after a discussion of forty minutes, one half of which is given to either side. The precedence of motions in the House is as follows: To adjourn, to lay on the table, for the previous question (which motions shall be decided without debate), to postpone to a day certain, to refer, to amend, or to postpone indefinitely.

It will be seen that, unlike the Senate, the House has the motion for the previous question, and it may be added, that as the previous question may be ordered on any proposition or motion and on a bill to its final passage, the closure is ample. To prevent, however, undue use of it, no main question can be ordered to a vote without debate; for, unless there has been previous debate, forty minutes are allowed, except where the bill has been in a committee of the whole. There are two committees of the whole; the Committee of the Whole House on the State of the Union, in which appropriation bills and revenue bills are considered, and the Committee of the Whole House, wherein are considered private bills alone.

In the House, and in these two committees, each member is limited to one hour, and can speak but once, though this last prohibition is much disregarded. In committees of the whole, after general debate on the whole bill is closed, the bill is open to amendments, and to remarks for or against the amendment, limited to five

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minutes for and five minutes against. This is called debate under the five-minute rule. By the device of amending by striking out the last word, this kind of debate is often kept up a long time, as the five minutes are often lengthened by unanimous consent.

Bills and joint resolutions, of course, have to pass both Houses to become law, or in case of concurrent resolutions, to accomplish their purpose. Hence there must be communication between the two Houses, and some joint action. Such communication is by way of messages presented by the clerk of the House to the Senate, and by the secretary of the Senate to the House, and by the conference committees. Each House receives in person or by deputy the clerk or secretary of the other, and suspends all business to receive the message, which is disposed of under the rules of each body. When the two Houses have reached a point of disagreement, each appoints a conference committee of several members, usually three, who meet each other and endeavor to compose the differences. If they do not succeed, each committee reports the continued disagreement to its own House, which either lets the matter drop, in which case the bill is lost, or asks another conference. If the two committees, by a majority of each, agree, then the agreement is reported, and if the two Houses ratify the agreement, the bill thus modified becomes law, so far as the two Houses can make it so.

Under the constitution, however, the bill, after passing the two Houses, must undergo the scrutiny of the President. If he approves it, he signs it, and it becomes a law; if he does nothing, and Congress remains in session for ten days (Sundays excepted) after the bill is presented to him, it becomes a law; otherwise not. If he disapproves the bill, he transmits it, with his objections, usually called a veto message, to the House in which it originated. The objections are entered in the journal, and that House proceeds to reconsider it. If, after such reconsideration, two thirds of that House agree to pass the bill, it is sent, together with the objections, to the other House, and if that House passes it by a two-thirds vote, it becomes a law. The votes of both Houses must be by yeas and nays.

It will be seen that the President thus exercises a very important legislative power, and that a veto message makes one man in either House who thinks with the President the equal of the two who do not.

Such, in general, is the way of doing the routine business of both Houses. In both of them it will be seen that the work and direction of affairs are largely in the hands of committees. In the Senate, a bill, which in this article is used as a general term to include all propositions presented, may go to a committee or not, as the Senate may determine. In the Senate, a committee may, by order of the Senate, be discharged from the consideration of a particular bill, and required to report it back to the Senate, which may then act upon it. In practice, almost all the work is done by committees, certainly in all important cases. In the House, all matters, even those relating to the House alone, go to committees as of course, and are there discussed, acted upon and reported, or laid aside and not reported. The House cannot, under its ordinary course of procedure, discharge one of its committees from the further consideration of a bill and order it reported for action. There are no provisions in the order of business for such a course. The committees of the House have therefore the most complete control of the bill in its early stages. When it is brought into the House and is laid before the House for consideration, it is still under the fostering care of the committee; for the custom of the House requires, or rather expects, that the members of the committee shall first be heard in explanation of the bill, and in debate thereon. This proceeds upon the theory that they, having given special study to the subject, are best fitted to enlighten the House upon it.

Such is the great amount of business presented to the Congress, more than ten thousand bills being before the House of Representatives every two years, that a very small percentage of it is ever discussed or passed upon. A report from a committee is very far from being a passport to consideration, though without a report no progress can be made.

Such being the power of committees, it is important to know how they are created. In the Senate, they are chosen apparently by the body itself, but the choice is really made by caucus committees, selected by each side after division is made between the parties. The Senate thereupon ratifies the action taken. The House is too large a body for such a method. Committee appointments there are all made by the Speaker and announced to the House. Naturally, the Speaker has great power in determining the general policy of the House at the outset. At least, as the power is necessarily vested in him to determine who shall first be recognized in many cases to offer business to the House, he is forced to give much attention to the whole state of public business. As the general order of business is far from reaching all the matters which have to be taken up and disposed of, the Committee on Rules, of which the Speaker is chairman, has gradually become a committee on order of business, and has the power at any time to direct what matters shall be taken up, the method of procedure and the limitation of debate and amendment. The use of this power depends entirely on the amount of business deemed advisable to be done, which, in turn, depends on public sentiment.

The first Senate had 26 members; the Senate of 1896, 90 members. The constitution prescribed that the first House of Representatives should consist of 65 members. The House of Representatives now consists of 357 members. The Representatives are chosen every second year, and the term of service begins the fourth

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day of March following the election, which takes place at a time fixed by each state, but this time is usually during November of the even years. Their number is fixed by law, based on the preceding decennial census, and is distributed among the several states in proportion to population, but each state creates its own representative districts, or may elect members at large; that is, members chosen by the entire vote of the state, when the apportionment is in excess of the number of districts. Territories are represented by one delegate each, who may address the House and receive the same pay and perquisites as a member, but cannot vote.

T. B. REED.

CONGRESSIONAL APPORTIONMENTS. See CONGRESS, AND THE LEGISLATIVE POWER OF THE UNITED STATES, in these Supplements.

CONGRESSIONAL LIBRARY. See NATIONAL LIBRARY and ARCHITECTURE, in these Supplements.

CONGREVE, RICHARD, an English philosopher and author; born Sept. 4, 1818, studied at Oxford and became an ardent adherent of Comte's positivism. He died in July, 1899. Besides an edition of *Politics* by Aristotle he published *The Roman Empire of the West*, a work eulogistic on benevolent despotism; *Catechism of Positive Religion*; *Elizabeth of England*, and *Essays—Political, Social and Religious* (1874).

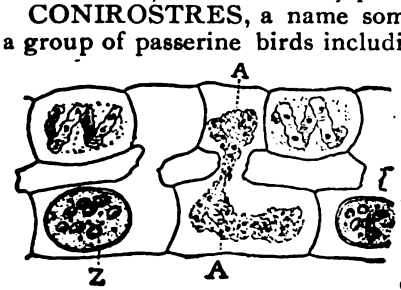
G.A.S.

CONGRUITY, a term applied in geometry to lines and figures which exactly correspond when laid over one another. See COINCIDENCE, in these Supplements.

CONIFERÆ OR CONE-BEARERS. See VEGETABLE KINGDOM, Vol. XXIV, p. 142; also ARBORICULTURE, Vol. II, pp. 276, 282.

CONINE OR CONIA ($C^8H^{15}N$), (or $C^8H^{17}N$, according to Hofmann), a liquid and volatile alkaloid extracted from the HEMLOCK (*Conium maculatum*); q.v., Vol. XI, p. 577. The seeds are crushed and distilled with sodium hydrate, and after passing through several other processes the product is dried over some fragments of calcium chloride and rectified in a vacuum. Conine is a limpid, oleaginous liquid, with a penetrating and nauseating odor, recalling that of hemlock. It boils at 168°, and is a deadly poison.

CONIROSTRES, a name sometimes given to a group of passerine birds including many families, such as the *Ploceidæ* (weaver-birds), the *Fringillidæ* (sparrows and finches), and the *Alaudidæ* (the larks, etc.). R.W.C.



Two filaments of *Spirogyra*, showing conjugation. A. Gametes; Z. Zygospore. (Original.)

CONJUGATION, in botany, a sexual process found among the lower algæ and fungi, and distinguished from *fertilization*. The two sexual cells are known as *gametes*. The fusion of similar gametes is called conjugation and the product a *zygospore*. The fusion of dissimilar gametes (spermatozoid and oösphore) is called fertilization and the product an *oöspore*.

CONJUNCTION, in astronomy, one of the aspects of the planets. Two heavenly bodies are in conjunction when they have the same longitude; that is, when the same perpendicular to the ecliptic passes through both. The sun and moon are in conjunction at the period of new moon. In general, a heavenly body is in conjunction with the sun when it is on the same side of the earth and in line with the sun.

CONKLING, ROSCOE, an American statesman; born in Albany, New York, October 30, 1829. He received his education in the common schools and the Albany Academy, after which he accompanied his father to Auburn and Geneva and there under him commenced preparation for the bar, which he continued for three years. In 1846 he entered the law office of Spencer & Kerman, at Utica. Here he received the appointment of district attorney of Oneida County, not only before his majority, but prior to his admission to the bar of the state. At twenty-one he was admitted to practice and commenced not only a brilliant legal career, but for the next ten years displayed his remarkable qualities as a manager in politics, becoming a recognized leader of his party in New York state. In 1858 he was chosen mayor of Utica, and in the next campaign, he was elected to the Thirty-sixth Congress, taking his seat December, 1859. The first term of his service was memorable on account of the long and bitter contest for Speaker. In 1860 he was re-elected to Congress and again in 1864. In this session he served on the Committee on Ways and Means and Reconstruction. He created a sensation by an arraignment and severe criticism of McClellan's generalship, and sounded the tocsin of a new departure in army work, which was followed by decisive action. In 1862 he opposed by speech and vote Spaulding's Legal Tender Act, sustaining, against the prevailing party views, Horton's amendment, providing for the issue of an interest-bearing note, in opposition to the final passage of the amendment proposed by Thaddeus Stevens. During the same session he voted for the payment in coin of the interest on the public debt. During the Civil War he was a faithful, fearless ally of the President, in his efforts to suppress the Rebellion. In 1866 he was again elected to Congress, but before the commencement of the session he was chosen United States Senator, assuming his duties March 4, 1867. He was re-elected in 1873 and also in 1879. He became an influen-

ROSCOE CONKLING.

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tial member of his party, rising from a leader in New York state to a figure of great national prominence. In 1876 he received 93 votes for the Presidential nomination, and in 1880, by his support of Grant, and his personal opposition to Blaine, divided the Republicans into two factions. In 1881 he and his colleague, Thomas C. Platt, suddenly resigned from the Senate, owing to a dispute with President Garfield over a question of the party patronage in New York city and state. The two New York senators, however, instead of retiring from the conflict, became candidates for re-election, and so opened a new and prolonged struggle, the scene of action now being transferred from Washington to Albany. The struggle was carried into every city and town in New York state. At length the contest was closed in the New York legislature by the rejection of both Conkling and Platt, and the election of Warner Miller to succeed Platt and Eldridge G. Lapham as the successor of Conkling, who thereupon resumed the practice of law in New York city. In June, 1880, he was a delegate to the National Republican Convention at Chicago, and in an eloquent speech nominated General Grant for a third term. He was appointed associate chief justice of the United States supreme court in 1882, but declined the position. He died in New York city, April 18, 1888. W.M.C.

CONLIN, BERNARD, American actor; known to the public as WILLIAM J. FLORENCE; born in Albany, New York, July 26, 1831. In his boyhood he took part in neighborhood amateur theatricals, and first appeared as a professional in the character of Peter, in the *Stranger*, at Richmond, Virginia, Dec. 4, 1849. He went to New York, and for the next three years took star parts and supported Forrest at Niblo's Garden, Wallack's Theater, and the Broadway Theater. He married Malvina Pray in 1853. She afterward starred with him in America and England, and contributed much to the successes of his life. Florence was best known for his Bardwell Slote, in the *Mighty Dollar;* Sir Lucius O'Trigger to Joseph Jefferson's Bob Acres, in the *Rivals;* and with the same actor, in the *Heir at Law*, as Zekiel Homespun. It has been said that in adaptability to parts and in the portrayal of varied emotions he has never been equaled. He published a volume of short stories. Died in Philadelphia, Pa. Nov. 20, 1891.

CONNAUGHT AND STRATHEARN, ARTHUR WILLIAM PATRICK ALBERT, DUKE OF, the third son of Victoria, Queen of England, was born at Buckingham Palace, May 1, 1850. He entered the Royal Military Academy at Woolwich in 1866 as a cadet; was commissioned a lieutenant in the Royal Engineers in 1868 and in the Royal Artillery in 1869. Thence he was trained in infantry duties in the Rifle Brigade, attaining the rank of captain in 1871. On obtaining his majority in that year, Parliament voted him an annual sum of $75,000, adding $50,000 more on his marriage to the Princess Louise Margaret of Prussia, March 13, 1879. After various appointments on the staff, including that of assistant adjutant-general at Gibraltar, the Duke was promoted to the rank of general of brigade in 1880. He commanded the brigade of Guards in the Egyptian expedition of 1882, was commander of the forces in Bengal, India, and later held various English commands being advanced to the rank of full general on being appointed commander-in-chief at Aldershot.

CONNECTICUT. The population of Connecticut in 1900, according to the decennial cen

STATE SEAL OF CONNECTICUT.

sus, was 908,420, an increase of 21.7 per cent over that of 1890, which was 746,258. The inhabitants of the state, other than white, consisted of 15,226 colored, 617 Asiatics and 153 Indians. The rank among the states and territories in 1900 was twenty-ninth, a fall of one since the census of 1890. The sexes in 1900 were about equally divided; the increase of males being 22.9, and of females 20.5, in the past decade. A little over 53 per cent of the entire population live in the 16 cities of the state.

Connecticut was one of the original 13 States. Population centers largely in manufacturing localities, the census of 1900 showing 53 per cent. in cities of over 8,000 inhabitants. The total land surface of the State is, approximately, 4,845 miles, the average number of persons to the square mile at the Census of 1890 and 1900 being as follows: 1890, 154.0; 1900, 187.4. The mean summer temperature of Connecticut is about 68°, and in winter about 28°.

Manufacturing, long the leading industry of the state, was increased during the decade preceding the census of 1900 over the one of 1880 to 1890 by about the same percentage that marked the growth of population during the same period, viz.: 21.7 per cent. The census report gives the number of manufacturing establishments as 9,128; their aggregate capital, $314,696,736; employees, 176,694; product of the value of $352,824,106; and wages paid, $82,767,725. These figures all give the rank of fifth to the state, but in diversity of manufactures the rank is first. The manufacture of cotton-goods comes first in importance among the textiles produced, that of silk and silk goods ranking second, and woolens ranking third. After these come hardware, brass and copper goods of all kinds, sewing machines, cutlery, ammunition, foundry and machine shop products, corsets, plated and Britannia ware, paper, clocks, tools, hats and caps, rubber and elastic goods, etc.

The agitation of the subject of child-labor in factories has borne its best fruits in Connecticut, where the number of children employed was cut down from 8,845 in 1880 to 3,479 in 1900, the greatest decrease recorded in any of the states. Trade and industrial education has also received much attention, and some excellent schools have

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been established for the preliminary education of those youths who are about to take up some one of the mechanical trades.

The principal agricultural product of the state is tobacco, of which the state raised 16,930,770 pounds in 1899, giving the rank of eleventh in the census reports. In the same year, 316,380 bushels of oats were raised, 203,400 bushels of rye, and 62,962 bushels of buckwheat. Corn, wheat and barley are also grown in the river valleys, which are very fertile. Potatoes and hay are produced in large quantities, and in localities accessible to New York markets, vegetables and small fruit are grown with much more profit than the cereals. Dairy-farming has always received much attention, the hill lands affording excellent pasturage. Seed-growing has proved a profitable pursuit, and in 1890 the state had 85 farms devoted to this branch of agriculture, a greater number than was reported from any other state. The total number of farms reported was 26,948, having an acreage of 2,312,083. The estimated value of the lands, fences, buildings, implements and live-stock was given as $113,305,580, and the value of the farm products, $28,276,948.

The timber of the state is chiefly hickory, white, red and yellow oak, ash, chestnut, white walnut, beech, birch, maple, elm and wild cherry. Limestone for lime, marble and red sandstone are all profitably quarried, as are flagstone, granite and gneiss. Fire-clay, tiling-slate, kaolin and hydraulic lime are also produced and shipped without the state in large quantities. While copper and lead, both combined with silver, are found in considerable quantities, the working of mines has not been carried on to an extent to make the business profitable. Iron ore is found in considerable quantities in many localities, and has been mined for more than a century.

Ten life and accident insurance companies have their general offices in the state, the aggregate of whose gross assets amounts to $141,625,628. Ten insurance companies, other than life and accident, are also local institutions, with a combined paid-up capital of $10,675,000. There are 2 fraternal companies in the state, making the total number of Connecticut corporations in this line of business 22. These bring into the state an immense annual revenue from all parts of the country, and the receipts from the mutual companies alone, as taxes, for 1900 was the sum of $291,067.

In 1900, there were 393,137 depositors in 88 savings banks, whose total deposits amounted to $174,135,195.

The grand list or statement of all taxable property for 1900 is given as $570,163,749. The total indebtedness of all of the towns, cities, boroughs and counties reported at the same time was $20,627,058 and the funded debt of the state $2,108,873. For the year ending Sept. 30, 1900, the total revenue receipts from all sources was $2,876,857, and the expenditure, $2,528,514.

In 1895, the different lines of railway operating within the state had a mileage of 1,819, and the property assets aggregated $175,000,000. The total current liabilities of these corporations within the state is given as $8,002,023, and their gross earnings for the year, $38,663,732. The amount received as taxes from the railway lines was $975,143.

The number of children within the school age of 4 to 16 years was, for the school year of 1900, 189,717, and the total number enrolled in the public schools, 151,325. The number of public

STATE CAPITOL, HARTFORD, CONNECTICUT.

schools was 1,546; number of departments, 3,338; number of schoolhouses, 1,632; number of public high schools, 37; number of evening schools, 35. There were also 7 teachers' institutes and 3 normal schools. The value of the school property was $8,450,600. The number of teachers was given as 3,631, of whom almost 90 per cent were females. The expenditures (1899) for the maintenance of the school system amounted to $3,120,516. There are a number of collegiate schools and 3 colleges, the latter having an enrollment of 2,323 in 1893. The leading institution for advanced education is Yale University, situated at New Haven. (See YALE UNIVERSITY, in these Supplements.) Connecticut has 179 public libraries, of over 300 volumes each, with an aggregate of 707,159 volumes. In 1895 there were 210 newspapers published in the state.

The Storrs Agricultural College, in the town of Mansfield, Tolland County, was established in 1881 for the purpose of educating boys in the practical knowledge and business of agriculture. This college, in addition to state aid and a liberal endowment, is entitled to receive from the general government the amount of the annual donation under the act of 1890. Pending litigation on this donation, the institution has not suffered, as the state expenditure in aid of agricultural affairs is usually about $60,000, about one half of which goes to the Storrs school.

The national guard embraces about 2,800 officers and enlisted men, which includes a division of naval militia. The annual expenditure for the support of the guard approximates $200,000.

The cities and towns located on the sound have a large coasting-trade, and steamboats constantly ply between all important points and the cities

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of New York and Philadelphia. Menhaden and oyster fisheries are conducted on an extensive scale, and yield a large revenue.

The state institutions include the state prison at Wethersfield, where about 550 convicts are confined; the Connecticut Hospital for the Insane, at Middletown, accommodating about 1,500 inmates; the Connecticut School for Boys, and the Connecticut Institute and Industrial School for the Blind, both model institutions; two schools for deaf mutes, one of which was the first established in the United States; and the Home for Dependent and Neglected Children, and the Connecticut School for Imbeciles. In addition, there are several state and general hospitals. The humane institutions of the state cost for maintenance during 1900, $314,943.

The most populous city is New Haven, which, according to the Census of 1900, had 108,027 inhabitants. Hartford, the capital, had at the same time a population of 79,850; Bridgeport, 70,996; Waterbury, 45,859; Meriden, 24,296; New Britain, 25,998; Norwich, 17,251; Danbury, 16,537; Norwalk City, 6,125; South Norwalk City, 6,591; Stamford, 15,997; New London, 17,548; Ansonia, 12,681; Middletown, 9,589; Willimantic, 8,937; Rockville, 7,287; Bristol (town and boro'), 9,643.

A constitutional convention was called in January, 1902, to change the method of representation in the Lower House, but the new plan proposed was voted down in June.

The following is a list of the governors of Connecticut since the state organization in 1784, with their term of office:

Matthew Griswold.....1784–86	Alexander H. Holley.....1857–58
Samuel Huntington.....1786–96	William A. Buckingham.1858–66
Oliver Wolcott.....1796–98	Joseph R. Hawley.....1866–67
Jonathan Trumbull.....1798–1809	James E. English.....1867–69
John Treadwell.....1809–11	Mashall Jewell.....1869–70
Roger Griswold.....1811–13	James E. English.....1870–71
John Cotton Smith.....1813–18	Marshall Jewell.....1871–73
Oliver Wolcott.....1818–27	Charles R. Ingersoll.....1873–77
Gideon Tomlinson.....1827–31	Richard D. Hubbard. ...1877–79
John S. Peters.....1831–33	Charles B. Andrews 1879–81
Henry W. Edwards.....1833–34	Hobart B. Bigelow 1881–83
Samuel A. Foote.....1834–35	Thomas M. Waller 1883–85
Henry W. Edwards.....1835–38	Henry B. Harrison.....1885–87
William W. Ellsworth....1838–42	Phineas C. Lounsbury....1887–89
Chauncey F. Cleveland...1842–44	Morgan G. Bulkeley 1889–93
Roger S. Baldwin.....1844–46	Luzon B. Morris.....1893–95
Isaac Toucey.....1846–47	O. Vincent Coffin.....1895–97
Clark Bissell.....1847–49	L. A. Cooke.....1897–99
Joseph Trumbull.....1849–50	George E. Lounsbury...1899–1901
Thomas H. Seymour.....1850–53	George P. McLean.....1901–03
C. H. Pond (acting).....1853–54	Abiram Chamberlain.....1903–05
Henry Dutton.....1854–55	Henry Roberts.....1905 —
William T. Minor.....1855–57	

See Vol. VI, p. 254.

CONNECTICUT RIVER, the chief river of the New England States, rises in a group of three small lakes in the northern end of New Hampshire, and flows westward to Beecher's Falls at the point where New Hampshire, Vermont and the Province of Quebec come together. Thence it flows south by west, forming the boundary between New Hampshire and Vermont, and thence across Massachusetts and Connecticut to Long Island Sound. Its lower part is navigable, but its chief value is the water supply which it affords to a great number of manufacturing towns and cities in the four states named. W.F.J.

CONNELLSVILLE, an incorporated borough in a township of the same name in Fayette County, Pennsylvania, in the southwestern part of the state. It lies on the Youghiogheny River in the heart of a coal region of great richness, and is one of the chief centers of the coke industry. It has an enormous coal trade, and was formerly a center of the natural gas industry. It is reached by the Pennsylvania and the Baltimore and Ohio railroads, and had a population of 5,629 in 1890, and 7,160 in 1900. W.F.J.

CONNERSVILLE, the capital of Fayette County, southeastern Indiana, situated on Whitewater River, on the Cincinnati, Cleveland and Dayton, the Cleveland, Cincinnati, Chicago and St. Louis and the Lake Erie and Western railroads. The city has a handsome courthouse and manufactories of woolens, furniture, blowers, etc. Population 1890, 4,548; 1900, 6,836.

CONNOR OR CUNNER OR CONNER, the name of several species of fish,—gilt-head (*Crenilabrus melops*) of the British seas; the blue perch (*Ctenolabrus adsperus*); and others. R.W.C.

CONODONTS, small Palæozoic fossils found in Russia, which resemble the teeth of various fishes. They are probably the remains of worms or mollusks. See also ICHTHYOLOGY, Vol. XII, p. 705.

CONRAD, ROBERT T., an American author: born in Philadelphia, June 10 1810. He studied law, but devoted much time to literary pursuits. In 1822 he started the *Daily Intelligencer*, subsequently merged in the *Philadelphia Gazette*. He resumed the practice of law in 1834, and was appointed recorder in 1835, judge of the court of criminal session in 1838, and of the court of general session in 1840. He next became editor of *Graham's Magazine*, president of a railroad company, and mayor of Philadelphia. He wrote the drama *Aylmere, or the Bondman of Kent*. He died in Philadelphia, June 27, 1858. E.E.T.

CONRAD, TIMOTHY ABBOTT, naturalist, was born in New Jersey on June 21, 1803, and was apprenticed to a printer. He soon turned his attention to natural history, and in 1831 published a book on marine conchology. A second volume, on fossil shells, appeared the next year, and in 1834 a third on the fresh water shells of North America. His researches and writings established his rank as a high authority upon American conchology, and he was elected a member of the Academy of Sciences in Philadelphia and became a frequent contributor to its *Journal*. In 1837–42 he was connected with the New York state survey, as geologist and palæontologist. He was the author of various other books, including a volume of verse, and took part in the controversy over Darwin's theory of the origin of species, dissenting temperately but most earnestly from most of Darwin's views. He died on August 9, 1877. W.F.J.

CONSCIENCE. See ETHICS, Vol. VIII, pp. 506 et seq.

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CONSCIENCE, HENDRIK, a Belgian novelist; born in Antwerp, December 3, 1812. After serving in the army he became a tutor in Flemish to the royal princes, and in 1868 was made conservator of the museum at Brussels. His first story, *In the Wonder Year 1566*, was received with unbounded popular favor and his delineations of lowly Flemish home life soon became familiar throughout Europe. His novels include *The Lion of Flanders* (1838); *What a Mother Can Endure* (1843); *Jakob van Artevelde* (1849); *Wooden Clara* (1850); *Blind Rosa* (1850); *The Conscript* (1850); *The Poor Nobleman* (1851); *The Peasants' War* (1853); *The Miser* (1853); *Batavia* (1858); *The Young Doctor* (1860); *Maternal Love* (1862); *The Burgomaster of Liege* (1866); *The Poet and His Dream* (1872); *Everhard T' Serclaes* (1874). He died in Brussels, Sept. 12, 1883. W.M.C.

CONSCIOUSNESS. See METAPHYSICS, Vol XVI, p. 97; and PHYSIOLOGY, Vol. XIX, pp. 24, 48. For different theories of consciousness, see CARTESIANISM, Vol. V, p. 125; COUSIN, Vol. VI. p. 465; HAMILTON, Vol. XI, p. 372; and LOCKE, Vol. XIV, p. 764.

CONSERVATION OF ENERGY. See ENERGY, Vol. VIII, p. 188.

CONSERVATORS OF THE PEACE are such officers as are vested with the power, and upon whom the duty is imposed, to preserve the peace. It is frequently provided by statute in the various states what officers shall be classed as conservators of the peace. Among the officers usually included in this class are judges, justices of the peace, sheriffs, constables, police-officers, the mayor of a city, and other officers who, by virtue of their offices, are charged with the duty of seeing that the public peace is kept. Such officers are clothed with the right to quell public disturbances and arrest any person guilty of a breach of the peace.

CONSHOHOCKEN, a town of Montgomery County, southeastern Pennsylvania, situated on the Schuylkill River, about three miles below Norristown, on the Pennsylvania and the Philadelphia and Reading railroads. It produces a variety of manufactures, including iron, cotton, shoddy and pottery. It is a well-built and growing town. Population 1900, 5,762.

CONSIDERANT, VICTOR, French socialist; born Oct. 12, 1808, at Salins, in the department of Jura. He became on the death of Fourier the head of his socialistic school. Elected into the National Assembly, in 1848, and in 1849 he ranged himself with the Radicals. Accused of high treason, he fled to Belgium and went from there to Texas, where he founded a socialist community, which failed, however, after a short time. He returned to France in 1869, and died in Paris, Dec. 27, 1893. Among his works are *Destinée Sociale* (1851); *Manifeste de l'École Societaire, Fondée par Fourier*, (1841); *Theorie du Droit de Proprieté et du Droit au Travail*. G.A.S.

CONSIDERATION, in law, is the material cause which induces one party to enter into a contract with another. Considerations are classed as good, as those of natural love or affection, and the like; or valuable, as the performance of some act or the conferring of some benefit to or upon the party to whom the promise is made, or some third party at his request. A beneficial consideration, however slight the benefit, is sufficient to constitute a valuable consideration, and in the absence of fraud the extent of the benefit will not be inquired into as between the parties to the contract. Without a consideration, either good or valuable, a contract cannot exist. Such a promise is called, in law, a *nudum pactum*, and cannot be enforced. But, at common law, in a contract under seal, a consideration is conclusively presumed, and evidence will not be admitted to deny the consideration. This rule arises from the solemnity and fullness of assent which the act of attaching a seal imports. In many states this rule has been relaxed by custom, or abolished by statute, and the want or failure of consideration may be a good defense against a sealed instrument. A contract based upon a good consideration alone will be enforced as between the parties, if made in good faith, but is void as to a subsequent purchaser for value and without notice, or creditors who are not able to procure other property of the debtor from which to realize their demands. The rule is, that one must be just before he is generous, and when the title to property is passed without valuable consideration, or for a consideration wholly inadequate, creditors may have the transfer set aside or require the payment of the value of the property, so that their demands may be satisfied. But generally, such step can be taken only when the debt existed at the time the property was transferred. In contracts where the consideration is expressed, and in negotiable instruments, the consideration is presumed, but such presumption may be overcome by proof.

CONSISTORY, properly, any place of assembly. According to St. Cyprian it was a most ancient custom of the church that the bishop should do nothing of importance without the meeting and advice of his clergy. The Roman Church early adopted this custom, and the priests and deacons of Rome, together with bishops of other cities who happened to be there, met with the pontiff, and with him decided all causes which were referred from every part of the world to this primary church. Similar was the rule of all metropolitan and cathedral churches, and from this practice sprang the cathedral chapter.

About the time of Constantine, the meeting of the pope with his advisers was given the name "consistory," and to-day it means "the solemn assembly or congregation which is made up of the pope and the college of cardinals gathered together as a senate in the Apostolic Palace." (See CARDINALS, in these Supplements.) In olden times the consistory was the only tribunal in the papal court, and in it the Roman pontiffs used to decide all causes which now are examined and decided by the various congregations of cardinals.

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(See CONGREGATIONS, ROMAN, in these Supplements.) Hence it met nearly every day, and heard, also, contentious causes. Later, much business was confided to commissions, and a number of permanent tribunals were instituted. Thus it was brought about that only important business was reserved for the consistory.

At the present time a consistory is either ordinary and secret, or solemn and public. Public consistories are called at the will of the pontiff, and in our times are celebrated but once or twice a year. What may be called a semipublic consistory is held when the canonization of a saint is in progress. To it all the bishops and archbishops, titular and residential, who may be in Rome at the time, are admitted. They may also vote. Such a consistory takes on the appearance of a general council, and in a manner represents the universal church.

The ordinary or secret consistories, according to former custom, were held twice a month, the usual time being Monday forenoon; but now the day and hour, as well as the consistory itself, depend entirely on the will of the pontiff. Notice is given the cardinals of the court, usually the day before the consistory. At the appointed time they are present, vested in cappa magna, rochet and beretta, and sit on wooden benches. The pontiff is dressed in ordinary white cassock, rochet, mozetta and pontifical beretta, and occupies a seat somewhat elevated, and covered with a baldachino. In secret consistory the pope is accustomed to address the cardinals on the general condition of the church, or on some storm which has broken out against it in some part of the world. He also points out errors and dangerous doctrines, to the end that, these allocutions being published to the world later, bishops, priests and people belonging to the church may be warned against such errors. The business brought before the consistory is prepared usually by the consistorial congregation, but sometimes by the congregation for extraordinary ecclesiastical affairs. The decrees of the consistory are issued by the apostolic chancery. See CONSISTORY, Vol. VI, p. 260.

P. A. BAART.

CONSOLATO DEL MARE. See CONSULATE OF THE SEA, Vol. VI, p. 282; PRIZE, Vol. XIX, p. 766.

CONSTABLE. In the United States, constables are officers exercising duties similar to those of petty constables in England. They have, to a limited extent, the powers of conservators of the peace. The chief duty of constables is the service of writs in matters arising in justice of the peace courts. They are also authorized to arrest, without warrant, any one who may be guilty of a breach of the public peace in their presence, or whom they may reasonably suspect of felony. The jurisdiction of a constable is confined to the county in which he resides. The office is elective, one or more constables being elected from each township or district within the county. See CONSTABLE, Vol. VI, p. 263.

CONSTANS, JEAN ANTOINE ERNEST, a French politician; born in Beziers, May 3, 1833. He studied law and became a professor at Toulouse and in 1876 was elected a republican member of the Chamber of Deputies. In 1880 he was appointed minister of the interior and in 1885 minister to China. In 1887 he was governor-general of Indo-China. He was elected senator in 1889 and was again minister of the interior in 1890. He is regarded as a clever diplomat and one of the most upright and honest of French officials. W.M.C.

CONSTANT, JEAN JOSEPH BENJAMIN, a French painter; born in Paris, June 10, 1845. He studied in the École des Beaux-Arts, and under Cabanel, and first exhibited at the Salon in 1869, with his *Hamlet and the King*, which was purchased by the French government. He is best known for his treatment of Eastern subjects. Among the best of his works are *Prisoners in Morocco* (1875); *Mahomet II* (1876); *The Harem* (1878); *The Favorite of the Emir* (1879); *The Day After a Victory in the Alhambra* (1882); and *The Vengeance of the Chérif* (1885). His *Justinian in Council* is in the New York Museum of Art. One of the most popular of contemporary French painters, he won many medals and the Legion of Honor, and figured at the Chicago World's Fair, 1893, where a series of decorated panels for the Sorbonne attracted considerable attention. He died at Paris, May 26, 1902.

BENJAMIN CONSTANT.

CONSTANT-CURRENT MACHINES. See ELECTRICITY, §83, in these Supplements.

CONSTANTIA, a district of Cape Colony, South Africa, lying between Cape Town and Simons Bay. The district consists of three estates, High, Great and Little Constantia, which are famed for the quality of their wines.

CONSTANTINE, Michigan, a village of St. Joseph Co., at the junction of the Fawn and St. Joseph rivers, 120 miles E. of Chicago, with flour, lumber and paper mills. Pop., 1,226. C.L.S.

CONSTANTINE, NIKOLAEVITCH, grand duke of Russia, the second son of Emperor Nicholas I, and brother of Alexander II; born in St. Petersburg, Sept. 21, 1827. In the Crimean War he was admiral of the Russian fleet. He was president of the council of state from 1865 to 1881 but in the latter year being suspected of sympathizing with the revolutionary party, was dismissed from office. Died in St. Petersburg, Jan. 25, 1892. W.M.C.

CONSTANTINOPLE, capital of the Turkish Empire. (See Vol. VI, p. 269). Aside from the ordinary, modern municipal improvements made since 1880, one of the most important changes was wrought by the extensive quays constructed on each side of the Golden Horn. Estimated population 1902, 1,225,000.

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CONSTANT-POTENTIAL MACHINES. See ELECTRICITY, § 84, in these Supplements.

CONSTIPATION, an irregular and insufficient action of the bowels, due either to deficient secretion of fluids in the digestive organs, or to imperfect muscular action of the bowels, but usually to both these causes combined. The retention, within the organism, of matters which should regularly be evacuated as they are formed, and their consequent absorption into the blood and tissues of the body, often lead to a whole train of unpleasant symptoms; headache, or pain in other regions, irritability, lassitude and debility.

CONSTITUTION OF THE UNITED STATES. For its history and limitations, see UNITED STATES, Vol. XXIII, pp. 786 et seq. The text of the constitution of the United States of America is as follows:

PREAMBLE.

We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this constitution for the United States of America.

ARTICLE I.

Sec. 1. All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Sec. 2. 1. The House of Representatives shall be composed of members chosen every second year by the people of the several states, and the electors in each state shall have the qualifications requisite for electors of the most numerous branch of the state legislature.

2. No person shall be a Representative who shall not have attained to the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that state in which he shall be chosen.

3. Representatives and direct taxes shall be apportioned among the several states which may be included within this Union, according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and, excluding Indians not taxed, three fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of Representatives shall not exceed one for every thirty thousand, but each state shall have at least one Representative; and, until such enumeration shall be made, the state of New Hampshire shall be entitled to choose three, Massachusetts eight, Rhode Island and Providence Plantations one, Connecticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

4. When vacancies happen in the representation from any state, the executive authority thereof shall issue writs of election to fill such vacancies.

5. The House of Representatives shall choose their Speaker and other officers; and shall have the sole power of impeachment.

Sec. 3. 1. The Senate of the United States shall be composed of two Senators from each state, chosen by the legislature thereof for six years; and each Senator shall have one vote.

2. Immediately after they shall be assembled in consequence of the first election, they shall be divided, as equally as may be, into three classes. The seats of the Senators of the first class shall be vacated at the expiration of the second year, of the second class at the expiration of the fourth year, and of the third class at the expiration of the sixth year, so that one third may be chosen every second year; and if vacancies happen by resignation or otherwise during the recess of the legislature of any state, the executive thereof may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies.

3. No person shall be a Senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that state for which he shall be chosen.

4. The Vice-President of the United States shall be President of the Senate, but shall have no vote, unless they be equally divided.

5. The Senate shall choose their other officers, and also a president *pro tempore*, in the absence of the Vice-President, or when he shall exercise the office of President of the United States.

6. The Senate shall have the sole power to try all impeachments. When sitting for that purpose, they shall be on oath or affirmation. When the President of the United States is tried, the chief justice shall preside; and no person shall be convicted without the concurrence of two thirds of the members present.

7. Judgment in cases of impeachment shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust or profit, under the United States; but the party convicted shall, nevertheless, be liable and subject to indictment, trial, judgment and punishment according to law.

Sec. 4. 1. The times, places and manner of holding elections for Senators and Representatives shall be prescribed in each state by the legislature thereof; but the Congress may at any time, by law, make or alter such regulations, except as to the places of choosing Senators.

2. The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day.

Sec. 5. 1. Each House shall be the judge of the elections, returns and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner and under such penalties, as each House may provide.

2. Each House may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two thirds, expel a member.

3. Each House shall keep a journal of its proceedings, and, from time to time, publish the same, excepting such parts as may, in their judgment, require secrecy; and the yeas and nays of the members of either House, on any question, shall, at the desire of one fifth of those present, be entered on the journal.

4. Neither House, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two Houses shall be sitting.

Sec. 6. 1. The Senators and Representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the Treasury of the United States. They shall, in all cases, except treason, felony and breach of the peace, be privileged from arrest during their attendance at the session of their respective Houses, and in going to and returning from the same; and for any speech or debate in either House, they shall not be questioned in any other place.

2. No Senator or Representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased, during such time; and no person holding any office under the United States shall be a member of either House during his continuance in office.

Sec. 7. 1. All bills for raising revenue shall originate in the House of Representatives; but the Senate may propose or concur with amendments as on other bills.

2. Every bill which shall have passed the House of Representatives and the Senate shall, before it become

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a law, be presented to the President of the United States; if he approve, he shall sign it, but if not, he shall return it, with his objections, to that House in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If, after such reconsideration, two thirds of that House shall agree to pass the bill, it shall be sent, together with the objections, to the other House, by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a law. But in all such cases the votes of both Houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each House, respectively. If any bill shall not be returned by the President within ten days (Sundays excepted) after it shall have been presented to him, the same shall be a law, in like manner as if he had signed it, unless the Congress, by their adjournment, prevent its return, in which case it shall not be a law.

3. Every order, resolution or vote to which the concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States, and before the same shall take effect shall be approved by him, or being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

Sec. 8. The Congress shall have power,—

1. To lay and collect taxes, duties, imposts and excises, to pay the debts and provide for the common defense and general welfare of the United States; but all duties, imposts and excises shall be uniform throughout the United States;

2. To borrow money on the credit of the United States;

3. To regulate commerce with foreign nations, and among the several states, and with the Indian tribes;

4. To establish a uniform rule of naturalization, and uniform laws on the subject of bankruptcies, throughout the United States;

5. To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures;

6. To provide for the punishment of counterfeiting the securities and current coin of the United States;

7. To establish post-offices and post roads;

8. To promote the progress of science and useful arts, by securing, for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries;

9. To constitute tribunals inferior to the supreme court;

10. To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations;

11. To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water;

12. To raise and support armies; but no appropriation of money to that use shall be for a longer term than two years;

13. To provide and maintain a navy;

14. To make rules for the government and regulation of the land and naval forces;

15. To provide for calling forth the militia to execute the laws of the Union, suppress insurrections and repel invasions;

16. To provide for organizing, arming and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the states respectively the appointment of the officers, and the authority of training the militia, according to the discipline prescribed by Congress;

17. To exercise exclusive legislation, in all cases whatsoever, over such district (not exceeding ten miles square) as may, by cession of particular states, and the acceptance of Congress, become the seat of the government of the United States, and to exercise like authority over all places, purchased by the consent of the legislature of the state in which the same shall be, for the erection of forts, magazines, arsenals, dockyards and other needful buildings; and

18. To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this constitution in the government of the United States, or in any department or officer thereof.

Sec. 9. 1. The migration or importation of such persons as any of the states now existing shall think proper to admit shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight; but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.

2. The privilege of the writ of *habeas corpus* shall not be suspended, unless when, in cases of rebellion or invasion, the public safety may require it.

3. No bill of attainder or *ex post facto* law shall be passed.

4. No capitation or other direct tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken.

5. No tax or duty shall be laid on articles exported from any state.

6. No preference shall be given by any regulation of commerce or revenue to the ports of one state over those of another; nor shall vessels bound to or from one state be obliged to enter clear or pay duties, in another.

7. No money shall be drawn from the Treasury but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

8. No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office or title, of any kind whatever, from any king, prince or foreign state.

Sec. 10. 1. No state shall enter into any treaty, alliance or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, *ex post facto* law, or law impairing the obligation of contracts, or grant any title of nobility.

2. No state shall, without the consent of the Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts laid by any state on imports or exports, shall be for the use of the Treasury of the United States; and all such laws shall be subject to the revision and control of the Congress.

3. No state shall, without the consent of Congress, lay any duty of tonnage, keep troops or ships of war in time of peace, enter into any agreement or compact with another state, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II.

Sec. 1. 1. The executive power shall be vested in a President of the United States of America. He shall hold his office during the term of four years, and, together with the Vice-President, chosen for the same term, be elected as follows:

2. Each state shall appoint, in such manner as the legislature thereof may direct, a number of electors, equal to the whole number of Senators and Representatives to which the state may be entitled in the Congress; but no Senator or Representative, or person holding an office of trust or profit under the United States, shall be appointed an elector.

3. The electors shall meet in their respective states and vote by ballot for two persons, of whom one, at least, shall not be an inhabitant of the same state with themselves. And they shall make a list of all the persons voted for, and of the number of votes for each; which list they shall sign and certify, and transmit, sealed, to the seat of the government of the United States, directed to the president of the Senate. The president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted. The person having the greatest number of

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votes shall be the President, if such number be a majority of the whole number of electors appointed; and if there be more than one who have such majority, and have an equal number of votes, then the House of Representatives shall immediately choose, by ballot, one of them for President; and if no person have a majority, then, from the five highest on the list, the said House shall, in like manner, choose the President. But in choosing the President, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two thirds of the states, and a majority of all the states shall be necessary to a choice. In every case, after the choice of the President, the person having the greatest number of votes of the electors shall be the Vice-President. But if there should remain two or more who have equal votes, the Senate shall choose from them, by ballot, the Vice-President. [This clause is annulled by Article XII of the Amendments.]

4. The Congress may determine the time of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the United States.

5. No person, except a natural-born citizen, or a citizen of the United States at the time of the adoption of this Constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years a resident within the United States.

6. In case of the removal of the President from office, or of his death, resignation or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice-President, and the Congress may by law provide for the case of removal, death, resignation or inability, both of the President and Vice-President, declaring what officer shall then act as President, and such officer shall act accordingly, until the disability be removed, or a President shall be elected.

7. The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected, and he shall not receive, within that period, any other emolument from the United States, or any of them.

8. Before he enter on the execution of his office, he shall take the following oath or affirmation:

"I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States, and will, to the best of my ability, preserve, protect and defend the Constitution of the United States."

Sec. 2. 1. The President shall be commander-in-chief of the army and navy of the United States, and of the militia of the several states, when called into the actual service of the United States; he may require the opinion, in writing, of the principal officer in each of the executive departments upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment.

2. He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two thirds of the Senators present concur; and he shall nominate, and, by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and consuls, judges of the supreme court, and all other officers of the United States whose appointments are not herein otherwise provided for, and which shall be established by law; but the Congress may by law vest the appointment of such inferior officers as they think proper in the President alone, in the courts of law, or in the heads of departments.

3. The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which shall expire at the end of their next session.

Sec. 3. 1. He shall, from time to time, give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may, on extraordinary occasions, convene both Houses, or either of them, and in case of disagreement between them with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed, and shall commission all the officers of the United States.

Sec. 4. 1. The President, Vice-President and all civil officers of the United States shall be removed from office on impeachment for and conviction of treason, bribery, or other high crimes and misdemeanors.

ARTICLE III.

Sec. 1. The judicial power of the United States shall be vested in one supreme court, and in such inferior courts as the Congress may, from time to time, ordain and establish. The judges, both of the supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services a compensation which shall not be diminished during their continuance in office.

Sec. 2. 1. The judicial power shall extend to all cases, in law and equity, arising under this constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the United States shall be a party; to controversies between two or more states, between a state and citizens of another state, between citizens of different states, between citizens of the same state claiming lands under grants of different states, and between a state, or the citizens thereof, and foreign states, citizens or subjects.

2. In all cases affecting ambassadors, other public ministers and consuls, and those in which a state shall be a party, the supreme court shall have original jurisdiction. In all the other cases before mentioned, the supreme court shall have appellate jurisdiction, both as to law and fact, with such exceptions and under such regulations as the Congress shall make.

3. The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the state where the said crimes shall have been committed; but when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed.

Sec. 3. 1. Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

2. The Congress shall have power to declare the punishment of treason, but no attainder of treason shall work corruption of blood or forfeiture, except during the life of the person attainted.

ARTICLE IV.

Sec. 1. Full faith and credit shall be given in each state to the public acts, records and judicial proceedings of every other state. And the Congress may, by general laws, prescribe the manner in which such acts, records and proceedings shall be proved, and the effect thereof.

Sec. 2. 1. The citizens of each state shall be entitled to all privileges and immunities of citizens in the several states.

2. A person charged in any state with treason, felony or other crime, who shall flee from justice, and be found in another state, shall, on demand of the executive authority of the state from which he fled, be delivered up, to be removed to the state having jurisdiction of the crime.

3. No person held to service or labor in one state, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

Sec. 3. 1. New states may be admitted by the Congress into this Union; but no new state shall be formed or erected within the jurisdiction of any other state, nor any state be formed by the junction of two or more states

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or parts of states, without the consent of the legislatures of the states concerned as well as of the Congress.

2. The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this constitution shall be so construed as to prejudice any claims of the United States, or of any particular state.

Sec. 4. The United States shall guarantee to every state in this Union a republican form of government, and shall protect each of them against invasion; and on application of the legislature, or of the executive (when the legislature cannot be convened), against domestic violence.

ARTICLE V.

1. The Congress, whenever two thirds of both houses shall deem it necessary, shall propose amendments to this constitution, or, on the application of the legislatures of two thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid, to all intents and purposes, as part of this constitution, when ratified by the legislatures of three fourths of the several states, or by conventions in three fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; *provided*, that no amendment which may be made prior to the year one thousand eight hundred and eight shall, in any manner, affect the first and fourth clauses in the ninth section of the first article; and that no state, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI.

1. All debts contracted and engagements entered into before the adoption of this constitution shall be as valid against the United States under this constitution as under the confederation.

2. This constitution, and the laws of the United States which shall be made in pursuance thereof, and all treaties made or which shall be made under the authority of the United States, shall be the supreme law of the land; and the judges in every state shall be bound thereby, anything in the constitution or laws of any state to the contrary notwithstanding.

3. The Senators and Representatives before mentioned, and the members of the several state legislatures, and all executive and judicial officers, both of the United States and of the several states, shall be bound, by oath or affirmation, to support this constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII.

1. The ratification of the conventions of nine states shall be sufficient for the establishment of this constitution between the states so ratifying the same.

Done in convention, by the unanimous consent of the states present, the seventeenth day of September, in the year of our Lord one thousand seven hundred and eighty-seven, and of the independence of the United States of America, the twelfth. In witness whereof, we have hereunto subscribed our names.

GEORGE WASHINGTON,
President, and Deputy from Virginia.

New Hampshire.
JOHN LANGDON.
NICHOLAS GILMAN.

Massachusetts.
NATHANIEL GORHAM.
RUFUS KING.

Connecticut.
WILLIAM SAMUEL JOHNSON.
ROGER SHERMAN.

New York.
ALEXANDER HAMILTON.

New Jersey.
WILLIAM LIVINGSTON.
DAVID BREARLEY.
WILLIAM PATERSON.
JONATHAN DAYTON.

Pennsylvania.
BENJAMIN FRANKLIN.
ROBERT MORRIS.
THOMAS FITZSIMMONS.
JAMES WILSON.
THOMAS MIFFLIN.
GEORGE CLYMER.
JARED INGERSOLL.
GOUVERNEUR MORRIS.

Delaware.
GEORGE READ.
GUNNING BEDFORD, JR.
JOHN DICKINSON.
RICHARD BASSETT.
JACOB BROOM.

Maryland.
JAMES MCHENRY.
DANIEL OF ST. THOMAS JENIFER.
DANIEL CARROLL.

Virginia.
JOHN BLAIR.
JAMES MADISON, JR.

North Carolina.
WILLIAM BLOUNT.
RICHARD DOBBS SPAIGHT.
HUGH WILLIAMSON.

South Carolina.
JOHN RUTLEDGE.
CHARLES PINCKNEY.
PIERCE BUTLER.
CHARLES COTESWORTH PINCKNEY.

Georgia.
WILLIAM FEW.
ABRAHAM BALDWIN.

Attest: WILLIAM JACKSON, *Secretary.*

The constitution was ratified by the conventions of the several states, as follows:

Delaware, Dec. 7, 1787; Pennsylvania, Dec. 12, 1787; New Jersey, Dec. 18, 1787; Georgia, Jan. 2, 1788; Connecticut, Jan. 9, 1788; Massachusetts, Feb. 6, 1788; Maryland, April 28, 1788; South Carolina, May 23, 1788; New Hampshire, June 21, 1788; Virginia, June 26, 1788; New York, July 26, 1788; North Carolina, Nov. 21, 1789; Rhode Island, May 29, 1790.

The following are the articles in addition to and in amendment of the constitution of the United States of America, proposed by Congress, and ratified by the legislatures of the several states, pursuant to the fifth article of the original constitution.

[During the session of the First Congress of the United States in 1789 the first ten of the amendments were proposed. They were afterward ratified by the states in 1791. The Eleventh Amendment was proposed by the Third Congress in 1794 and ratified in 1798. The Twelfth Amendment was proposed by the Eighth Congress in 1803 and ratified in 1804. The Thirteenth Amendment was proposed by the Thirty-Eighth Congress in 1865 and ratified the same year. The Fourteenth Amendment was proposed by the Thirty-Ninth Congress in 1866 and ratified in 1868. The Fifteenth Amendment was proposed by the Fortieth Congress in 1869 and ratified in 1870.]

ARTICLE I.

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the government for redress of grievances.

ARTICLE II.

A well-regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed.

ARTICLE III.

No soldier shall, in time of peace, be quartered in any house without the consent of the owner, nor in time of war, but in a manner to be prescribed by law.

ARTICLE IV.

The right of the people to be secure in their persons, houses, papers and effects against unreasonable searches and seizures shall not be violated; and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

ARTICLE V.

No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service in time of war or public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb; nor shall be compelled, in any criminal case, to be a witness against himself; nor be deprived of life, liberty or property without due process of law; nor shall private property be taken for public use without just compensation.

ARTICLE VI.

In all criminal prosecutions the accused shall enjoy the right to a speedy and public trial, by an impartial jury of

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the state and district wherein the crime shall have been committed, which district shall have been previously ascertained by law; and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor; and to have the assistance of counsel for his defense.

ARTICLE VII.

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved; and no fact tried by a jury shall be otherwise re-examined in any court of the United States than according to the rules of the common law.

ARTICLE VIII.

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

ARTICLE IX.

The enumeration, in the constitution, of certain rights shall not be construed to deny or disparage others retained by the people.

ARTICLE X.

The powers not delegated to the United States by the constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people.

ARTICLE XI.

The judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by citizens of another state, or by citizens or subjects of any foreign state.

ARTICLE XII.

The electors shall meet in their respective states, and vote by ballot for President and Vice-President, one of whom, at least, shall not be an inhabitant of the same state with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which lists they shall sign and certify, and transmit, sealed, to the seat of the government of the United States, directed to the president of the Senate; the president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted; the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such a majority, then, from the persons having the highest numbers, not exceeding three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in case of the death, or other constitutional disability, of the President. The person having the greatest number of votes as Vice-President shall be the Vice-President, if such number be a majority of the whole number of electors appointed; and if no person have a majority, then, from the two highest numbers on the list, the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States.

ARTICLE XIII.

Sec. 1. Neither slavery nor involuntary servitude, except as a punishment for crime, whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

Sec. 2. Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV.

Sec. 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States, and of the state wherein they reside. No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any state deprive any person of life, liberty or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

Sec. 2. Representatives shall be apportioned among the several states according to their respective numbers, counting the whole number of persons in each state, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, Representatives in Congress, the executive and judicial officers of a state, or the members of the legislature thereof, is denied to any of the male inhabitants of such state, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such state.

Sec. 3. No person shall be a Senator or Representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any state, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any state legislature, or as an executive or judicial officer of any state, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two thirds of each House, remove such disability.

Sec. 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any state shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave, but all such debts, obligations and claims shall be held illegal and void.

Sec. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

ARTICLE XV.

Sec. 1. The right of citizens of the United States to vote shall not be denied or abridged by the United States, or by any state, on account of race, color or previous condition of servitude.

Sec. 2. The Congress shall have power to enforce this article by appropriate legislation.

CONSTITUTIONS OF CLARENDON. See CLARENDON, CONSTITUTIONS OF, in these Supplements.

CONSUBSTANTIATION (Lat. *con*, together; and *substantia*, being substance); a name often given to the Lutheran doctrine of the real presence of Christ in the Lord's Supper. The doctrine is, that the body and blood of Christ are really present in and under the bread and wine, so that the communicant partakes of them, while yet the bread and wine are not changed into them, and while no new substance is formed by a union of the bread and wine with them. The name has never been used by the Lutherans to designate their doctrine; on the contrary, they repudiate it, on the ground that it more naturally designates the doctrine held by John of Paris, that there is a substantial conjunction of the bread and wine and the body and blood. Those who ap-

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ply the name to the Lutheran doctrine do not use it in this sense, however, and do not misunderstand the position of the Lutherans; they use it simply for want of a better term. It seems to them well adapted to distinguish the Lutheran doctrine from that of the Roman Catholic Church called "transubstantiation." See LUTHER, Vol. XV, p. 83.

F. JOHNSON.

CONSUETUDINARY OR CUSTOMARY LAW, an unwritten law established by usage, and derived by immemorial custom from remote antiquity. When universal, it is called common law; when particular, it is called custom, in a narrower sense, as the custom of a trade, or of a district.

CONSUMPTION. See PHTHISIS, Vol. XVIII, p. 869; and see also PATHOLOGY, Vol. XVIII, pp. 415, 416.

CONTARINI, the name of a noble family of Venice. Domenico, the most important member of the house was doge of Venice from 1043 to 1073. Vincenzo, the last of the family, who died in 1617, was a famous scholar. Others of the family were soldiers, painters, and diplomats.

W.M.C.

CONTINENTAL SYSTEM, Napoleon's fatuous project for ruining England by ruining her trade. He first announced this plan on Feb. 9, 1801, and on Nov. 21, 1806, issued the notorious Berlin Decree. By its five terms,—1. The British Isles were declared to be in a state of blockade; 2. All commerce and correspondence with Great Britain were forbidden; 3. Every Englishman found on the continent of Europe was declared a prisoner of war; 4. All British goods and merchandise were to be considered lawful prizes; and 5. All vessels coming from England or an English colony were to be refused admission into any continental harbor. The folly of boycotting England was this: As Great Britain was the best customer of these continental nations, they ruined their own commerce at the Corsican despot's bidding, and to gratify his personal malice and revenge. Austria acceded to the system, Nov. 24, 1807; Sweden, Sept. 17, 1809; and the petty Roman states, in December, 1809. Russia withdrew from the alliance in 1810, though Napoleon tried to enforce the system in 1812, but after the retreat from Moscow it was abandoned wholly.

CONTINGENT REMAINDER, an estate in expectancy in law. See REMAINDER, Vol. XX, p. 384.

CONTINUITY OF THE GERM-PLASM. See HEREDITY, in these Supplements.

CONTINUITY, LAW OF. See PSYCHOLOGY, Vol. XX, pp. 47, 50.

CONTINUOUS POTENTIAL DIFFERENCE. See ELECTRICITY, Vol. VIII, p. 23; and see also ELECTRICITY, § 39, in these Supplements.

CONTRAYERVA ("counter-poison"), an aromatic bitterish root of different species of *Dorstenia*, of the family *Urticaceæ;* used as a stimulant and tonic. *Dorstenia* is a tropical American genus closely related to the mulberries, and is of interest as showing a transitional form to the fig in its flat, open inflorescence.

CONTRIBUTION, in law, is the payment of the proportionate share of a loss by each or any one of several persons, who were liable in common in some transaction, to such one or more of the others who, being also liable, may have been compelled to discharge the entire liability. When one person has been compelled to discharge a liability with which he was charged in common with others, he has a right to contribution, from each of the others, of his proportionate share of such loss, and may bring suit to enforce such right. The occasion for exercising this right frequently arises between sureties, where one of several sureties has been compelled to make good the default of the principal, or more than his share of such loss, in which case contribution can be enforced. The right of contribution also exists in favor of one partner who has borne more than his share of the losses or expenses of the partnership, as against the other members of the firm. In the case of joint owners of property, or tenants in common, contribution will be enforced where one has paid more than his share of the expenses for the common benefit. Suits to compel contribution are generally brought in chancery, especially when in partnership matters.

CONVENTIONAL, IN ART. See DRAWING, Vol. VII, pp. 386, 387.

CONVENTION PARLIAMENT, a name given to two English Parliaments. The first, in 1660, after the Restoration, consisted of both houses, was not called together by the sovereign, but was merely convened by General Monk. It passed an act restoring the ancient general constitution of kings, lords and commons, and was legalized by Charles II. It was the most bloodthirsty and infamous of all the Parliaments in the annals of English history, even condemning the immortal John Milton to death. It first met April 25, 1660, and dissolved Dec. 29, 1660. The second Convention Parliament met Jan. 22, 1689, and dissolved Jan. 29, 1691. It conferred the crown on William and Mary.

CONVERSION, IN LAW. See TROVER, Vol. XXIII, p. 626.

CONVEYANCE is a general term embodying all the various methods for the transfer of the title to real estate. The word is used to indicate the act and also the instrument by which title is passed. A deed, mortgage, release, lease, will or any other instrument by which any interest in real property is transferred is a conveyance. The expense of the conveyance is usually to be paid by the purchaser, unless there is an express agreement to the contrary.

CONVEYANCING is the science of the transfer of title to real estate from one to another. It includes, also, the examination of the title of the grantor.

The question of simplifying the system of conveyancing has been largely discussed throughout the United States during the past few years,

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and in some states legislation has been attempted with the view to reach that result. The delay and expense necessary to the transfer of real estate has become exceedingly vexatious since the chain of title to property has become more drawn out and involved, and especially is this true in large cities, where many transfers occur, and where frequently the proper care is not given by those who examine the abstract of title. The most feasible system which has yet been introduced into the United States with a view to avoid these difficulties is that familiarly known as the "Torrens Land Title System," and it has met with much favor in many states within the last few years. The essential feature of this system is the registration of titles. The public registrar, when once the title has been examined by public examiners appointed for that purpose, and found to be valid, places the description of the property on the registration books, and issues a certificate of ownership to the party entitled thereto. All mortgages or valid liens must be noted on the register and on the certificate, and no claim can defeat the title as shown on the register. Abstracts of title are practically avoided, as all valid claims against the property are shown on the register. Clouds cannot be placed upon the title by means of some other transfer made under an error in description; because only the person legally authorized to make a conveyance can interfere with the title, and before he can have the title transferred he must produce his certificate, which will be canceled, and another issued to the party entitled thereto, containing the notation of all liens and mortgages. No judgment can become a lien upon real estate except by filing a transcript thereof and having same noted on the page of the register devoted to that tract. Thus the difficulty of having a judgment recorded against the land of every person having the same name as the one against whom the judgment is rendered is avoided. The chief virtue of this system is the simplicity and absoluteness of the title which is given. The certificate of title is absolute, and subject only to the conditions noted upon it. If the register shows a mortgage canceled, it is not necessary to examine the instrument to see if it is in proper form, as the certificate which shows that it is canceled is absolute, and the duty is upon the registrar alone to see that the release is in proper form. The title is kept clear by this method continually, and an examination of the page of the register containing the title of the last owner is sufficient to obtain all information required to pass safely upon the title. The registrar does not enter an instrument in the register unless it is properly drawn, and the party executing the instrument can legally do what he thereby undertakes. The fact of its entry makes an instrumeut absolute in effect.

This system of land titles was first introduced in 1858 by Sir Robert Torrens in South Australia, and has been in operation continually since that time. It was adopted in Great Britain in 1875, and in various provinces of British Columbia between 1870 and 1888. Practically, the same system is now in operation in the German Empire. Bohemia has had a system of land titles quite similar in many respects for the last two hundred years, and Hamburg for one hundred years. Japan has also had a similar system for many years. The first state in the United States to adopt the Torrens system was Illinois, in which state a law was enacted, June 13, 1895, but it was declared unconstitutional in November, 1896, for vesting the registrar with judicial functions. It was adopted in the state of Ohio early in 1896. Many other states have given much consideration to the subject. In Massachusetts, New York and Kentucky, bills have been introduced providing for the Torrens system, but for various reasons have not been adopted. The law was declared unconstitutional by the Illinois Supreme Court, Oct. 9, 1896.

Another method which has been tried in various portions of the United States is that of the guaranty of titles by private individuals or corporations organized for that purpose. A number of title guaranty companies have been organized, which, upon application of the owner, examine the title to real estate, and if found to be good, these companies will issue a written guaranty of the title somewhat in the nature of a policy of insurance. These policies are issued for a consideration, and have been a source of some benefit. The difficulties which stand in the way of good titles, however, are not effected by these companies, and the benefit is only extended to the particular title which they guarantee.

CONVOLVULUS, a genus of the family *Convolvulaceæ*, to which it has given its name. The species commonly are called bindweeds, and are related closely to the morning glory (*Ipomœa*), from which it differs chiefly in its two linear stigmas. The funnel-form flowers are colored variously as in the morning glory, and the plants are spreading or twining. There are no native species of *Convolvulus* proper in the United States, but the European *C. arvensis* has become a naturalized weed. The old genus *Calystegia*, however, is now included in *Convolvulus*, characterized by its large leafy bracts surrounding the calyx, and is represented in the United States by several species.

CONVULSIONISTS, a term applied in 1632 to the persons afflicted by the convulsion epidemic which broke out in the nunneries about Bordeaux, France, especially in the Ursuline convent of Loudun. In 1686 the French refugees, driven from house and home by the infamous dragonnade expeditions, were affected by a similar epidemic. In 1882 the term was used in France to denote an extreme democrat or radical, whose platform was the convulsion or plucking up the established order of all things by the roots.

CONVULSIONNAIRES, a term given to certain fanatical Jansenists of France, who met in St. Medard's churchyard, in the suburbs of Paris, where was the tomb of a certain Abbé François de

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Paris, who had died in 1727, where numberless miracles were alleged to have been done. There these fanatics threw themselves into the most violent contortions. Louis XV ordered them to be imprisoned in 1733, but was unable to stamp out the fervor entirely.

CONVULSIONS. See PATHOLOGY, Vol. XVIII, p. 400.

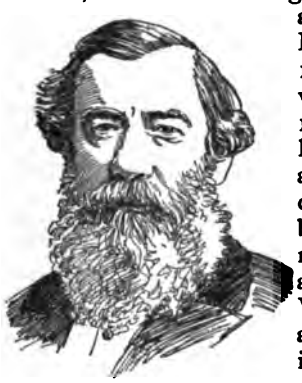
CONWAY, Arkansas, the seat of the north-central Faulkner County, 32 miles northwest of Little Rock on the Little Rock and Fort Smith division of the St. Louis, Iron Mountain & Southern railroad. It has two sectarian colleges, and carries on an active corn and cotton trade. Population, 1900, 2,003. C.L.S.

CONWAY, a town and a river in North Wales. See CONWAY, Vol. VI, p. 293; CARNARVON, Vol. V, p. 105.

CONWAY, a village and the capital of Horry County, eastern South Carolina, about 100 miles N.N.E. of Charleston on the Waccamaw River, at the head of navigation, and a terminus of the Atlantic Coast Line railroad. It has several lumber-mills and a depot for naval supplies. Population 1900, 705.

CONWAY, HUGH, pseudonym of FARGUS, FREDERICK JOHN; q.v., in these Supplements.

CONWAY, MONCURE DANIEL, clergyman and author, was born in Virginia on March 17, 1832, and was graduated from Dickinson College in 1849 and from the Harvard Divinity School in 1854. He also studied law. In 1850–52 he was a minister of the Methodist Episcopal Church, but then became a Unitarian, and was minister of a Unitarian Church in Washington in 1854–56 and of one in Cincinnati in 1856–61. He was for a time editor of *The Dial* in Cincinnati, and of the Boston *Commonwealth*. He was at first a strong supporter of pro-slavery ideas, his work in the Methodist ministry having been chiefly in the South. But on entering the Cambridge Divinity School and the Unitarian ministry he came under the influence of Boston abolitionists, with the result that he joined the anti-slavery movement before the Civil War, and wrote some books and pamphlets in advocacy of emancipation. Early in the Civil War he went to England on a lecturing tour, and became minister of a Unitarian Church in London from 1863 to 1884. He has been a member of the staff of the London *Daily News* and of the *Pall Mall Gazette*, and has written much for various English and American magazines and reviews. His published books include lives of Edmund Randolph, Thomas Paine, Nathaniel Hawthorne, and Thomas Carlyle, *Emerson at Home and Abroad*, *The Earthward Pilgrimage*, *Idols and Ideals*, *Demonology and Devil Lore*, *The Wandering Jew*, *The Sacred Anthology*, *George Washington and Mount Vernon*, *Pine and Palm*, *Republican Superstitions*, *Barons of the Potomac and Rappahannock*, *Prisons of Air*, and *Solomon and Solomonic Literature*. W.F.J.



MONCURE D. CONWAY.

CONWAY, THOMAS, an American soldier; born in Ireland about 1730. He was educated in France, and in 1777 came to America with the expectation of being made major-general, but was disappointed at receiving only a brigadiership. He entered into intrigues to promote Gen. Gates to the supreme command of the army. In November, 1777, he had been promoted inspector-general with the rank of major-general over Washington's protest, and he endeavored to undermine the General's position by anonymous and forged letters. "Conway's Cabal," as it was termed, ultimately became known to Congress and to the army, and Conway's position became so unpleasant that early in 1778 he sent his resignation to Congress, which promptly accepted it. On July 4, 1778, he was shot in a duel by Gen. Cadwallader, but recovered and returned to France. E.E.T.

CONY, a rabbit, especially the European rabbit (*Lepus cuniculus*). See RABBIT, Vol. XX, p. 199. The cony of the Old Testament is supposed to be the Syrian hyrax, or daman (*Hyrax Syriacus*). See HYRAX, Vol. XII, p. 633.

CONYBEARE, WILLIAM JOHN, clergyman, teacher and author; was born in England on August 1, 1815, the son of an eminent geologist and Dean of Llandaff. He was educated at Cambridge and became a fellow of Trinity College there. In 1842 he was made principal of the Liverpool Collegiate Institution, and later retired to the vicarage of Axminster. He wrote a novel, a volume of essays, and, in conjunction with Dean Howson, the well-known *Life and Epistles of St. Paul*. He died in 1857. W.F.J.

CONYERS, Georgia, the seat of Rockdale County, a town 31 miles southeast of Atlanta on the Georgia railroad. The Yellow River supplies power for flour milling and cotton raising interests. Population, 1900, 1,605. C.L.S.

COOK, ALBERT STANBOROUGH, an American educator; born in Montville, New Jersey, March 6, 1853. He was graduated from Rutgers College in 1872 and studied at Göttingen and Leipsic. In 1880 he was professor of English in the University of California and in 1882 became professor in Yale University. He has written *The Phonological Investigation of Old English* (1888); *First Book in Old English* (1894); *Glossary of the Old Northumberland Gospel* (1894); *Biblical Quotations in Old English Prose Writers* (1898); *Select Translations from Old English Poetry* (1902). W.M.C.

COOK, CLARENCE CHATHAM, art critic, was born at Dorchester, Mass., on September 8, 1828, and was graduated from Harvard College in 1849. He studied architecture, was a teacher for twenty years, and then became a member of the staff of the New York *Tribune*, serving that paper with distinction for a number of years as art critic and as

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Paris correspondent. In 1884 he founded and for some years edited *The Studio*, an art magazine. He wrote *Central Park*, *The House Beautiful*, *Stools and Candlesticks*, *Essays on Beds and Tables*, etc., and edited Viardot's *Wonders of Sculpture* and Lübke's *History of Art*. He was also the author of some poems of merit, and was a keen critic and controversialist. He died on June 1, 1900. W.F.J.

COOK, Edward Dutton, an English dramatic critic and novelist; born in London, January 30, 1820. He was educated at King's College and became dramatic critic for the *Pall Mall Gazette*. His books include *The Trials of the Tredgelds* (1864); *Hobson's Choice* (1865); *Art in England* (1869); *Nights of the Play* (1883) He died in London, Sept. 11, 1883. W.M.C.

COOK, Edward Tyas, a British journalist and man of letters. He was born at Brighton, May 12, 1857; educated at Winchester School and New College, Oxford. In 1890–92 he was editor of the *Pall Mall Gazette* in succession to W. T. Stead, and in 1896 editor of the *Daily News*. In 1893 he became first editor of *The Westminster Gazette*. He is the author of *A Popular Handbook to the National Gallery* (5th ed. 1896); *Studies in Ruskin* (1890); and *Popular Handbook of the Tate Gallery* (1898).

COOK, Eliza, a favorite minor English poetess, daughter of a London tradesman; born at Southwark Dec. 24, 1812. She contributed poetical pieces to various magazines from an early age, and issued *Lays of a Wild Harp* (1835); *Melaia, and Other Poems* (1840); and from Sept., 1849, to 1854 successfully conducted *Eliza Cook's Journal*. She wrote verses such as *The Old Arm Chair;* also, *Jottings from My Journal* (1860); *New Echoes* (1864); and *Laconics* (1865). She died Sept. 24, 1889.

COOK, Francis Augustus, American naval officer, was born in Massachusetts in 1843. On Sept. 20, 1860, he was appointed from that state to the Naval Academy, where he remained till 1863. In October, 1863, he was made ensign, and for about two years was attached to the steam-sloop *Seminole*, of the West Gulf blockading squadron. On Nov. 10, 1866, he was promoted to be master, and in 1867–68 was attached to the North Atlantic squadron. He gained his commission as lieutenant on Feb. 21, 1867, and as lieutenant-commander on March 12, 1868, and served successively on the *Independence*, *Richmond*, *Sabine*, and *Plymouth*, obtaining his promotion as commander in October, 1881. In 1883–86 he was light-house inspector; in 1890–93 inspector of ordnance at the Navy Yard, Boston; and in 1893–95 assistant at the Bureau of Navigation. On Feb. 28, 1896, he was made captain. During the war with Spain (April–August, 1898) he was captain of the first-class armored cruiser *Brooklyn*, Commodore Schley's flagship, and did splendid service at the battle off Santiago de Cuba (July 3), the speed of the *Brooklyn* enabling her to overhaul and head off, and so prevent the escape of, the *Cristobal Colon*, the fleetest of the Spanish vessels, and thereby make the victory complete.

COOK, Joseph, lecturer, was born at Ticonderoga, N. Y., on January 26, 1838, and was educated at Yale and Harvard (1865) and Andover Theological Seminary, and preached occasionally for some years, but never was ordained. He began in 1875 a series of Boston Monday Lectures on the relations of religion and modern civilization. These courses were continued in the Park Street church and in Tremont Temple, Boston, until 1881, and were renewed in 1883 and in some later years. He died on June 24, 1901. W.F.J.

COOKE, George Frederick, an English actor; born in Westminster, April 17, 1756. He made his first public appearance at Brentford in 1776 and between 1784 and 1800 became very popular in the English provinces and in Ireland. From 1801 to 1810 he played at Covent Garden. His best characters were *Richard*, *Shylock*, *Iago*, *Sir Giles Overreach*, and *Sir Pertinax Mac-Sycophant*. In 1810 he visited the United States and appeared in the chief cities. He died in New York city, September 26, 1811. W.M.C.

COOKE, George Willis, an American clergyman and author; born in Comstock, Michigan, April 28, 1848. He was graduated from Olivet College, and studied for the Unitarian ministry. He was ordained in 1872 and held Unitarian pastorates in Wisconsin, Michigan, Indiana, and Massachusetts. He has published *Ralph Waldo Emerson, His Life and Writings* (1881); *Life of George Eliot* (1883); *Poets and Problems* (1887); *The Spiritual Life* (1893); *History of Unitarianism in America* (1903). W.M.C.

COOKE, Jay, financier, was born at Sandusky, Ohio, on August 10, 1821. At the age of twenty-one he became partner in a banking house which during the Mexican War was prominent in the negotiation of government loans. In 1861 he formed the banking house of Jay Cooke & Co. for the purpose of handling the government's loans, and thus supplied the national treasury with more than $2,000,000,000, and rendered the nation incalculable service. When Lincoln was assassinated Mr. Cooke averted a disastrous financial panic by instantly ordering his agents at all points to raise the price of United States securities. In 1873 his house failed, but with splendid energy he paid all his creditors and restored his fortune. In the later years of his life he invested largely in mining lands in Montana and Idaho, and farming lands in Utah and Southern California, and became interested in half a dozen railroads. He died at his home at Ogontz, Pennsylvania, on February 16, 1905. W.F.J.

COOKE, John Esten, author and soldier; was born at Winchester, Virginia, on November 3, 1830, was educated for the bar, and practiced law for a few years. Then finding literature more to his taste, and being successful with his first tales, he devoted himself to novel writing. Before the Civil War he had written half a dozen novels, and then he relinquished the pen for the sword, and served through the war in the Confederate army. At the end of the war he was inspector-general of horse artillery in Lee's army.

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After the war he resumed literary work, producing admirable biographies of General Lee and General "Stonewall" Jackson, and a number of novels and short stories, chiefly depicting phases of Virginian life. All his writings were marked with exquisite refinement and romantic charm, with mingled comedy and pathos; but he never brought himself into harmony with the "realism" of the later school of American novelists. Among his best works of fiction were *The Virginia Comedians; The Last of the Foresters; Leather and Silk; The Youth of Jefferson; Henry St. John; Survey of Eagle's Nest*, and *Stories of the Old Dominion*. He died at his home in Clark County, Virginia, on September 20, 1886.

W.F.J.

COOKE, JOSIAH PARSONS, chemist, was born in Boston on October 12, 1827, and was educated at Harvard, with which university he was afterward identified all his life as tutor, instructor in chemistry, professor of chemistry and mineralogy, and director of the chemical laboratory. He was the author of a number of important works on chemistry, and also of several on the relations of religion and science, the last and perhaps most noteworthy of them being *The Credentials of Science the Warrant of Faith*. He received honorary degrees from Harvard and from the University of Cambridge, England, for his achievements. His death occurred on September 3, 1894. W.F.J.

COOKE, MORDECAI CUBITT, botanist; was born in Norfolk, England, on July 12, 1825, and was chiefly self-educated. He was appointed to the India Museum in 1860, from which he was transferred to the herbarium of the Royal Gardens at Kew. He has written more than forty botanical works, has received the Victoria Medal of Honor from the Royal Horticultural Society, and the Linnæan Gold Medal from the Linnæan Society, and several honorary degrees from American universities. W.F.J.

COOKE, PHILIP ST. GEORGE, soldier, was born in Virginia on June 13, 1809, and was graduated from West Point in 1827. He served in the Black Hawk War and was at the battle of Bad Axe. In 1846 he conducted the "Mormon brigade" to California, and was conspicuous in some Indian fighting there. In 1855 he was in command at Fort Union, New Mexico, and fought the battle of Cineguilas, with the Comanches. During the "civil war" in Kansas he had an important command in the field, being entrusted with the execution of the policy of the national administration. He was an officer in the Utah expedition and made a notable march across the plains in midwinter. At the outbreak of the Civil War he was commissioned a brigadier-general of volunteers, served in the chief battles of the Peninsular campaign, in Virginia, and rose to the rank of brevet major-general "for gallant and meritorious conduct during the war." He was retired for age in October, 1873. In addition to his military career, ne practiced law and wrote a number of books, including *Scenes and Adventures in the Army*, *The Conquest of New Mexico and California*, and several works on military tactics. He died at Detroit, Mich., on March 28, 1895. W.F.J.

COOKE, ROSE (TERRY), an American author and poet; born in West Hartford, Connecticut, February 17, 1827. She was graduated from the Hartford Female Seminary and in 1873 was married to Rollin H. Cooke. A volume of her complete poems was first published in 1888. *The Two Villages* was her best known poem. Her short stories of New England life appeared originally in the *Atlantic Monthly* and in *Scribner's Magazine*. Her published books include *Poems* (1860); *Happy Dodd* (1878); *Somebody's Neighbors* (1881); *The Sphinx's Children and Other People's* (1886); *Complete Poems* (1888); *Steadfast*, a novel, (1889); *Huckleberries*, a collection of short stories (1891). She died in Pittsfield, Massachusetts, July 18, 1892.

W.M.C.

COOLEY, THOMAS MCINTYRE, jurist, was born at Attica, N. Y., on January 6, 1824, studied in private schools, taught school, and in 1846 was admitted to the bar. He practiced law and edited a paper at Adrian, Michigan, and in 1857 was chosen by the legislature to compile the general statutes of that State. The next year he became reporter of the decisions of the supreme court. Upon the organization of the law department of the University of Michigan in 1859 he became its professor of law. In 1864 he was elected a justice of the supreme court of the State, and became its chief justice, remaining upon the bench twenty-eight years. He was lecturer on law at Johns Hopkins University in 1877–79, arbitrator between various railroads, receiver of the Wabash railroad system, and Commissioner of Interstate Commerce, and ranked among the foremost jurists of his time. He died on September 12, 1898. W.F.J.

THOMAS M. COOLEY.

COOMBE, THOMAS, clergyman and author, was born in Philadelphia on October 21, 1748, and was graduated from the College of Philadelphia in 1766. He became a clergyman of the Church of England and was rector of a parish in Philadelphia. In 1775 he preached a sermon in favor of the colonial cause, but a year later became a Tory on ecclesiastical grounds. He scon went to England, and became a chaplain to the King. He was a friend of Oliver Goldsmith, and wrote a poem entitled *The Peasant of Auburn*, which he dedicated to Goldsmith and which was apparently an attempt to continue the latter's *Deserted Village* to scenes in America. He died in London on August 15, 1822. W.F.J.

COON, HENRY CLARKE, physician and educator, was born at West Edmeston, N. Y., on

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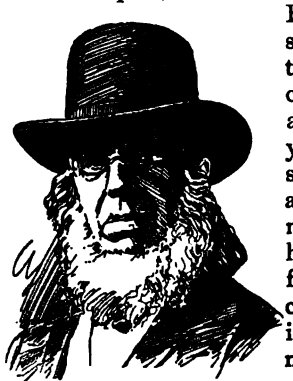
January 28, 1828. He became a Homœopathic physician, and was also a minister of the Seventh Day Baptist Church. From 1872 to 1898 he was professor of physics and chemistry in Alfred University, at Alfred, N. Y. He was a member of the American Association for the Advancement of Science and other learned bodies, and was the author of an admirable *Manual of Civil Government*, widely used as a text-book. He died on May 9, 1898. W.F.J.

COOPER, MYLES, an American educator; born in England, about 1737. He was educated at Oxford, emigrated to New York in 1762, and at the instance of the Archbishop of Canterbury was appointed professor of moral philosophy in King's College, New York, now Columbia University. In 1763 he succeeded Dr. Samuel Johnson as president. In 1775 the course of political events compelled him to return to Great Britain, where he became one of the ministers of the Episcopal chapel of Edinburgh. He published a volume of *Poems* (1758); a *Fast Sermon* (1776); a *Sermon on Civil Government* (1777); and wrote on the subject of an American Episcopate. To his pen is ascribed *A Friendly Address to All Reasonable Americans on Our Political Confusions, and the Necessary Consequences of Violently Opposing the King's Troops*, etc. (1774), which gave much offence to the Whigs. He died in Edinburgh, May 20, 1785. E.E.T.

COOPER, PETER, inventor, manufacturer, and philanthropist, was born in New York City on February 12, 1791, the son of a hat manufacturer. His schooling was confined to a half day's attendance for a single year, and at the age of seventeen years he was apprenticed to a coachmaker, whose business he afterward followed for a time on his own account. He also engaged in the manufacture of machines for shearing cloth, in the manufacture of cabinet ware, and in the grocery trade. Finally he began the manufacture of glue and isinglass, in which he was highly successful and in which he continued for many years. About 1830 he became interested in the manufacture of iron, established a mill near Baltimore, and another in New York, in which he first successfully employed anthracite coal in puddling. In 1845 he removed his works to Trenton, N. J., where he erected what was then and for many years the largest rolling-mill in America. There he manufactured railroad rails, and was the first to roll wrought-iron beams for fireproof buildings. His business was extended to the ownership of mines and blast furnaces. At his Baltimore works Mr. Cooper built, from his own plan, the first railroad locomotive engine ever built in America, which was used with success on the Baltimore and Ohio railroad. He was intimately connected with the development of telegraphy, investing much capital in the early lines, and at one time being president of companies owning most of the telegraph lines on this continent. He was also president of the New York, Newfoundland and London Telegraph Company, and an honorary director of the Atlantic Telegraph Company, and thus one of the promoters of the first ocean telegraphic cable. While engaged in these various enterprises he invented many valuable mechanical devices, including a machine for mortising the hubs of carriage wheels, a machine for grinding iron plates of any size to a perfect plane, another for puddling iron, and yet another for using condensed air as a motive power. He took a keen interest in all public affairs, and served for some years in the New York common council, and as a school commissioner. About 1850 his solicitude for popular education led him into the work with which his name is most identified and which forms the best basis for his lasting fame. This was the erection and endowment of the noble institution in New York City known as "The Union for the Advancement of Science and Art," but popularly called the Cooper Institute. He bought the block of land at the junction of the Bowery and Third and Fourth Avenues, and in 1853 began the erection of a stately and commodious fireproof building, which took five years to complete and which cost more than $700,000. The purpose of this institution was to provide for the people free instruction in the arts and sciences, a free reading room and library, and free lectures on various topics. He provided it with an endowment of $150,000, and arranged for the renting of stores and offices in the building to provide a further income. On April 20, 1859, he turned the splendid property over to a board of trustees named by the legislature, to be held in trust forever for the use of the people of New York. For more than half a century that institution has been one of the most potent forces for popular enlightenment in the American metropolis, affording to a multitude of students admirable educational advantages which they could not have had elsewhere. Mr. Cooper was nominated for the Presidency in 1876 by the "Greenback" party. He was the author of *Political and Financial Opinions* and *Ideas for a Science of Good Government*. His name was among the first to be placed in the Hall of Fame of New York University. He died in New York on April 4, 1883. W.F.J.



PETER COOPER.

COOPER, SUSAN FENIMORE, author; was the second daughter of JAMES FENIMORE COOPER (q.v., Vol. VI, p. 299), and was born at Scarsdale, New York, in 1813. During the closing years of her father's life she was his secretary and amanuensis. A year before his death she published her first book, *Rural Hours* (1850), and it was followed with *Country Hours; or, Journal of a Naturalist* (1852); *Fields Old and New* (1854); *The Shield, a Narrative* (1858); *Mount Vernon to the Children of America* (1858);

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Rhyme and Reason of Country Life, and some others. She founded an orphange at Cooperstown, New York, in 1873, and later organized a benevolent society of women to care for its inmates. She was a woman of fine benevolence, of shrewd observation, and of a degree of literary culture and talent which should give her works greater permanence of popularity. She died on December 31, 1894. W.F.J.

COOPER, THOMAS, an English and American scientist; born in London, Oct. 22, 1759. He studied and practised law, but devoted much time to science. Being unsuccessful in a bleaching and calico-printing business in Manchester, he emigrated to America and practised law in Pennsylvania. He was professor of chemistry successively in Dickinson, Pennsylvania, and Columbia (S.C.) colleges, and became president of the latter in 1820. He retired in 1834, and then revised the State statutes. He died in South Carolina, May 11, 1840. E.E.T.

COOPER, THOMAS, the poet and one of the leaders of CHARTISM (q. v., Vol. V, p. 375); was born at Leicester, England, in March, 1805, was apprenticed to a shoemaker, taught himself Latin, Greek, Hebrew and French, and at the age of twenty-three became a school-teacher and a local preacher of the Methodist Church. He also engaged in newspaper work in the midland counties. There he became interested in industrial and social reforms, and in 1841 became a leader of the Chartists of Leicester. He wrote and edited many Chartist tracts, made speeches, and was a leader in the riots of August, 1842, on which account he was sent to jail for two years for conspiracy and sedition. While in jail he wrote a long poem in Spencerian stanzas, called *The Purgatory of Suicides*, and also a number of tales. Afterward he wrote much in prose and verse, largely on social reforms. In 1855 he began lecturing in support of the evidences of Christianity, in 1872 he published his *Autobiography* and in 1878 his collected poems appeared. He died on July 15, 1892. W.F.J.

CO-OPERATIVE BANKS. See BUILDING AND LOAN ASSOCIATIONS, in these Supplements.

COOPERSTOWN, New York, the seat of Otsego County, and a summer resort on Otsego Lake, 92 miles west of Albany, in a region immortalized by James Fenimore Cooper after whom the town is named. It is the terminus of the Cooperstown & Charlotte Valley railway, has benevolent institutions, knitting and other mills, and an agricultural trade. Pop., 1900, 2,568. C.L.S.

COOSA, a river of Alabama with its headwaters in Georgia; it enters Alabama in Cherokee County and flows south with a westerly trend to Montgomery, where it joins the Alabama River after a tortuous course of about 240 miles. It is navigable to Wetumpka, about 30 miles above the confluence with the Alabama. C.L.S.

COOS BAY, Oregon, an inlet of the Pacific Ocean, in Coos County, with northern, eastern, and southern reaches, forming a good harbor with a narrow entrance. Coos River and its tributary Marlow Creek enter from the east. Marshfield is the principal town on its shores whence a railway penetrates south to Myrtle point affording an outlet for a lignitic coal region. C.L.S.

COPAIBA, BALSAM OF. See BALSAM, Vol. III, p. 253.

COPAIS, also called Lake of Topolia, a marshy low land in Bœotia, Greece. It formerly discharged the waters received from the Kephiso and other small streams through subterranean channels, but so unequally that during the winter months its entire surface was covered with water, while during the hot season the water receded to such a degree that large tracts could be used for agricultural purposes. Since 1883 it has been systematically drained by a tunnel. G.A.S.

COPE, CHARLES WEST, an English artist; born at Leeds, 1811. His subjects were historical and domestic, and from the poets. He was elected a Royal Academician, 1848, and professor of painting to the Academy, 1867; and was an original member of the Etching Club. He worked eight remarkable frescoes for the peers' corridor of the Houses of Parliament; while his *Life-Class* is a famed etching. His works include *Hagar and Ishmael* (1836); *The Cronies* (1837); *Edward the Black Prince Receiving the Order of the Garter* (1845), and, as a private order from Prince Albert, *The Last Days of Cardinal Wolsey;* etc. He died at Bournemouth, August 21, 1890. R.C.A.

COPE, EDWARD DRINKER, an American naturalist and anatomist; born in Philadelphia, Penn., July 28, 1840. His great-grandfather was Caleb Cope and his grandfather Thomas Pym Cope, both celebrated in early American history. His father, Alfred Cope, was at the head of a large linen house in Philadelphia. He was educated at the University of Pennsylvania and studied comparative anatomy at the Philadelphia Academy of Sciences. After two years of study in Europe he became professor of natural science in Haverford College, and was for many years curator and corresponding secretary of the Academy of Natural Sciences. In 1871 he explored the cretaceous formations of Kansas and in 1872 the Eocene of Wyoming. In 1873 he explored the Tertiary beds of Colorado, and in 1874 was employed by the United States Geodetic and Geological Survey in New Mexico; in 1875 in northern Montana; in 1877 in Oregon and in Texas. He had charge of several parties exploring the western regions in 1878. He made a collection of over 600 species of extinct vertebrate animals, of which he made known to science at least 400 species. Many of these animals he described in numerous papers, read before the scientific socie-

E. D. COPE.

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ties of Philadelphia, or published in the reports of the United States Geological Survey. He was a member of the National Academy of Science and was one of the editors of the *American Naturalist*. He received the Bigsby gold medal of the Geological Society of London in 1879, in recognition of his services in the field of vertebrate palæontology. Among his other publications not already mentioned are *On the Origin of Genera* (1866); *The Origin of the Fittest* (1866); *The Energy of Life Evolution* (1885); *Report upon the Extinct Vertebrata Obtained in New Mexico in 1874* (1877); *The Short Footed Ungulata of the Eocene of Wyoming* (1873); *Hypothesis of Evolution, Physical and Metaphysical* (1870); *Evolution and Its Consequences* (1872); *Origin of Man and Other Vertebrates* (1885); *The Primary Factors of Organic Evolution* (1896), and *The Snakes and Lizards of North America* (1896). He died in Philadelphia, April 12, 1897.

W.M.C.

COPEHAN INDIANS. See *California Indians*, under INDIANS, Vol. XII, p. 866.

COPELAND, RALPH, astronomer royal for Scotland and professor of practical astronomy in the University of Edinburgh. He was born at Woodplumpton, Lancashire, in 1837, and studied at the University of Göttingen, assisted at the observatory there, and in 1876 became connected with Lord Crawford's observatory at Dun Echt. In order to observe properly the transit of Venus, he visited Mauritius and Jamaica, and traveled extensively in Peru and Bolivia. Died Oct. 27, 1905.

COPENHAGEN, the capital of Denmark, and a progressive, important commercial city. Where the ramparts of the city formerly stood are some new public buildings, notably the Royal Library, Mineralogical Museum, Polytechnic School and Town Hall. The last named has a tower whose spire rises to the height of 330 feet. Copenhagen's university has about 80 professors an 1,900 students. There are also many other institutions affording ample facilities for all branches of education. It has a large establishment for the construction of iron steamers and engines, and some other factories but it is more of a commercial than an industrial city, and, in 1899, 284 sailing vessels above four tons, with an aggregate tonnage of 18,145 tons belonged to Copenhagen, together with 292 steamers whose total tonnage was 219,055 tons. The cargoes which arrived from foreign ports was 1,580,002 tons, of which 750,257 tons were carried by Danish vessels. Population of city 1901, 491,340.

COPEPODA. See CRUSTACEA, Vol. VI, p. 587.

COPPÉE, FRANCIS EDOUARD JOACHIM, sometimes known as François Coppée, a French author; born in Paris, Jan. 12, 1842, and educated at the St. Louis Lyceum. His first laurels were won as a poet, and while young. Romantic verse for recitation soon made him famous. Then he wrote several popular dramas. Napoleon III appointed him one of the librarians in the Luxembougg Palace. In 1878 he was chosen archivist of the Comédie Française, was elected to the French Academy, Feb. 24, 1884, and in 1888 was made an officer of the Legion of Honor. Among his most successful plays may be mentioned *Le Passant* (1869); *Fais ce que Dois* (1871); *Le Luthier de Crémone* (1877); *La Guerre de Cent Ans* (1878); *Madame de Maintenon* (1881); *Les Jacobites* (1885); *For the Crown* (1895). His collected plays were published in four volumes in 1886.

COPPEE, HENRY, soldier and educator, was born at Savannah; Georgia, on October 13, 1821, and was educated at Yale and at West Point (1845). He served in the Mexican War, and was an instructor at West Point. From 1855 to 1866 he was professor of English literature in the University of Pennsylvania, from 1866 to 1876 he was president of Lehigh University, and after 1876 he was professor of English literature at Lehigh. He was the author of numerous works. During the Civil War he was editor of *The United Service Magazine*. He also edited the Count of Paris's history of the Civil War. For the last twenty-one years of his life he was a regent of the Smithsonian Institution. He died on March 22, 1895.

W.F.J.

COPPERHEAD (*Ancistrodon contortrix*), a venomous serpent of the rattlesnake family, found in eastern North America. It possesses no rattles. The name refers to the bronze-colored head. The body is reddish brown above, with dark-brown transverse stripes and scattered spots; below, it is flesh-colored and spotted. Like its allies, it is viviparous. The term *copperhead* had a political significance during the stormy period of the Civil War. From the stealthy advance of the copperhead-snake, which, unlike the rattlesnake, gives no notice of its approach, the word was applied to the Northern sympathizers with slavery, secession and the South, who by secret organizations endeavored to impede the due prosecution of the war. Previously it had been first applied to the Indians, and later to the Dutch colonists.

COPPERMINE RIVER, a stream in Canada, which enters a bay of the Arctic Ocean, northeast of the Great Bear Lake, after a course of about 300 miles. See also HEARNE, SAMUEL, XI, 492.

COPPER-MINING IN THE UNITED STATES. The copper-production in the United States in 1900 amounted to 600,830,000 pounds, and was chiefly confined to five or six states and territories. Montana came first, with a production of 254,460,713 pounds; Michigan second, with 144,227,340 pounds; Arizona third, with 115,403,846 pounds; California, with 29,639,987 pounds; Utah, with 10,504,726 pounds; and Colorado, with 7,826,949 pounds.

The United States if by far the largest producer of copper in the world, and possesses at least two of the greatest copper-mines in the world, the Anaconda of Montana being the first in size and the Calumet and Hecla of Lake Superior the third in size and importance in the world. The second place is held by the Rio Tinto mines of southern Spain, which produced about 50,000,000 pounds in 1895.

Of the United States ores, the richest in quality are those of Arizona, being oxides yielding about

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ten per cent of metallic copper, and are easily reduced. The Montana ores yield about seven per cent of copper and a large amount of both silver and gold.

The Lake Superior ores are chiefly of native copper, and nearly pure, but the cost of production is not materially less than the Arizona or Montana ores.

Notwithstanding the disturbances and vicissitudes of the commercial world, the copper output in the United States in 1900 exceeded that in 1899 by about 20,000,000 pounds, and the market price of copper remained firm, even showing some advance. These facts are owing to the large extension of the uses into which the metal is coming. The chief demand is for electrical uses and appliances; but, besides this, there has been an increased demand for the brass and yellow-metal trade, as well as for the manufacture of weapons and cartridges, and in ship-building.

COPPER OR ATNA RIVER, a river of southeastern Alaska, which rises at the foot of Mt. Wrangell, at about lat. 62° 20′ N., long. 144° W., and flows west-northwest till it reaches the valley of the Alaskans; then along their southern slopes, then turns south and flows into the Pacific Ocean, where it has formed a delta. Its course is tortuous, and its length is about 400 miles. Its name comes from the copper found at points in its course.

COPPER OR CUIVRE RIVER, a stream of eastern Missouri, which rises in Audrain County, flows southeast, and empties into the Mississippi, 50 miles above St. Louis. It flows through a fertile, undulating agricultural and forest district. It is 130 miles long, and affords considerable motive power.

COPPER OXIDE CELL. See ELECTRICITY, § 105, in these Supplements.

COPRA, the native name for the dried kernel of the cocoanut, broken into small pieces for better stowage.

COPTIC CHURCH. See EGYPT, Vol. VII, pp. 631, 648, 649; see also ROMAN CATHOLIC CHURCH, Vol. XX, p. 647.

COPTIC LANGUAGE AND LITERATURE. See EGYPT, Vol. VII, p. 625.

*COPYRIGHT. The article on COPYRIGHT, Vol. VI, pp. 316–325, brought the subject of protection to the reproduction of literary and art work down to 1877, and since that time the subject of international copyright has entered upon new phases, as well in Europe as in the United States. This is the only important part of the legislative system that needed much modification, and it was the one through which the greatest injustices were wrought. While most European states were well disposed to accord protection to pure mental productions, without regard to boundary lines, differences of speech lowered the value of such protection, except as to translations and dramatic, musical and art works, without the author's consent. Between the United Kingdom and the United States the condition of affairs was quite different, for together they comprised the largest reading constituency using one speech in the world. It has generally been represented that the United States most obstructed provisions for fair adjustments, owing to an enthusiasm there for cheap books, obtained in whatever way, a respect for protective principles of trade and the peculiar greed of American publishers. There is no real ground for this invidious distinction between the two countries. If piracy was not equally common, it was because literary fecundity was greater in Great Britain than in America, and her authors enjoyed the wider celebrity. That insular realm thought no good could come out of the Transatlantic Nazareth, and when it did come, publishers were more careful to suppress the knowledge of its origin than to forego the profits of its reproduction. American books were garbled, their scenes and names changed until they had the appearance of British authorship, and American authors were compelled to witness the filching, not only of their property, but of their renown.

For years there were prolonged discussions on this subject in literary and secular papers on both sides of the sea, and repeated essays were made by both nations to come to some agreement on a reciprocal basis by treaty, but if the American publisher wished to get his literary wares for nothing, England, too, was reluctant to be just without compensation. So long as the publishers could influence their governments, all treaty negotiations were doomed to failure. The British publisher wished the American market opened to his expensive three-volumed editions without competition, and would approve of no copyright which would not secure him that boon. On the other hand, the American publisher was perhaps no less reluctant to be obliged to pay royalties on books that he heretofore had obtained freely by piracy. It is true that Parliamentary statutes made provision for copyright reciprocity, and the legislation of the United States did not. But it gradually became manifest that nothing would be accomplished by negotiation, and that the solution of the problem must be sought in Congressional legislation alone.

A movement began in 1878, in Paris, to promote greater security for authors and artists, and its promoters took the name of the Literary and Artistic International Association, and after seven years succeeded in organizing, at Berne, Switzerland, the International Copyright Union. The Berne conference of 1885 comprised representatives from Britain, Germany, France, Spain, Switzerland and Sweden and Norway, and it drafted a convention which gradually extended to Belgium, Italy, Portugal, Denmark and Mexico, and it now regulates the copyright reciprocity of those nations.

An act of Congress approved on the 3d of March, 1891, committed the United States to reciprocal international copyright, and went into operation on the following July 1st. Among the causes contributing to the revolution in a policy that had lasted for a century, the most potent

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was the union of organizations of authors, publishers and typographers to effect it.

From time to time, bills had been introduced into Congress to establish international copyright, but they had been smothered under the pretext that the public did not demand any change of legislation. It was necessary, therefore, to create a sentiment strong and definite enough to command respect at Washington. Abandoning all hope from treaty negotiations, an Authors' International Copyright League was organized on the 13th of April, 1883, to agitate for a reform on the moral ground of observing the sixth commandment. This association eventually became known as the American Copyright League, and it soon found allies in local organizations of like character.

American authors claimed that the production of pirated books was fatal to the welfare of their craft, because it enabled publishers to supply the reading demand of the public by cheap editions of foreign authors, on which they had no royalties to pay. Who would buy at a fair price an American manuscript, when he could reproduce, without other charge than the cost of manufacture, the best books of the best-known foreign writers?

There had also sprung up among the older publishers a usage known as the "courtesy of the trade." Under it an American publisher who bought advance sheets of any work from a British publisher, or made engagements with him for the reproduction of one of his books, was permitted by his American competitors to enjoy the monopoly of reproducing that publication in the United States. It was a usage that began with Matthew Carey and Sons of Philadelphia, who first bought advance sheets of the *Waverley Novels*, and it grew into an imperious custom of certain great houses. No profit accrued to authors, for they were not in the trade. When Anthony Trollope complained that his books were republished in the United States, from which he received not a penny of advantage, the American publisher of his novels publicly replied that he had uniformly remitted money proportionate to his sales to the English publisher. But there the money remained, leaving Trollope no richer. The usage had the peculiar merit that the American republisher could make his own terms, for, of course, the foreign house could not sell the American market, to which he had no legal title. The arrangement only operated to protect one American publisher against those of his competitors in this country who respected the "courtesy of the trade." But the gentility of this modified piracy could not obscure the lucrative character of the business, and new houses sprang up that did not observe the usage. To repress these cheap Ishmaelites of the trade, the older houses came at last to think an international copyright desirable. Hence, at the suggestion of the Authors' League, the American Publishers' Copyright League was organized in 1887, in New York. The two associations co-operated, and drew to their support two of the leading typographical unions in the country. After several bills upon which this federation was agreed had failed in Congress, but by decreasing majorities, the Chase bill, so named from its author, a Senator from Rhode Island, reached the President on the last day of the Fifty-first Congress, when his signature made it a law.

Under this act, copyright was opened to any author, without regard to nationality, with this restriction:

"That this act shall only apply to a citizen or subject of a foreign state or nation when such foreign state or nation permits to citizens of the United States of America the benefit of copyright on substantially the same basis as its own citizens, or when such foreign state or nation is party to an international agreement which provides for reciprocity in the granting of copyright, by the terms of which the United States of America may, at its pleasure, become a party to such an agreement. The existence of either of the conditions named shall be determined by the President of the United States by proclamation made from time to time, as the purposes of this act may require."

In 1896 the United States had entered into agreements of reciprocal copyright with Belgium, France, Germany, Great Britain and her possessions, Italy, Portugal, Spain, Switzerland and Denmark. An American may secure copyright in Belgium by registering his work at the Department of Agriculture, Industry and Public Works in Brussels. In France it is given upon the deposit of two copies of the work with the Minister of the Interior in Paris. In Great Britain the title must be entered at Stationers' Hall, London, and a fee of five shillings paid, with an equal additional sum if a certified copy of the entry is demanded. The work must be published simultaneously in the realm and in the United States, and five copies deposited at the Hall for four libraries and the British Museum. In Canada the work must be registered, and two copies deposited with the Minister of Agriculture at Ottawa, and a fee of one dollar paid, fifty cents being required for a certified copy of the entry. In Switzerland nothing is required, but the owner may register his work at Berne, in the Department of Commerce and Industry, and deposit a copy there, paying a fee of two francs.

A long mooted question as to whether one may reproduce anything one can memorize from the public representation of a drama or musical composition, not copyrighted, is definitely settled. Every unauthorized reproduction of a manuscript renders the perpetrator liable to action for damages. Copyrights are still assignable and heritable, and no change is made in the proprietary rights of renewal. Copyrightable works must be manufactured in the United States, and all piratical copies of them are to be destroyed at the custom-house, except that any person may purchase for use, and not for sale, not more than two copies of a foreign duplication of a copyrighted work, subject to tariff duties. Copyright covering only translations does not forbid the importation of copies of the original text. The Secretary of the Treasury is directed to make

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up lists of copyrighted books from reports of the Librarian of Congress, and furnish them to custom-house officers weekly, in order to suppress the importation of duplicates, and for five dollars annually any one is entitled to receive these weekly statements. Amended editions of foreign works already published in the United States are subject to copyright, but no serial work, except magazines and other periodicals, of which the reproduction in the United States had begun before this act went into operation could be copyrighted as to their still unpublished parts. Publication must be at least simultaneous in the United States and any other country. Various penalties are provided for violations of copyright laws, from forfeiture of all unauthorized copies and damages to the injured party to fines divisible between the government and the copyright proprietor. The penalty for falsely printing on any work notice of copyright is one hundred dollars, to be divided between the United States and the complainant; for an unauthorized reproduction of any painting, statue or statuary a penalty of ten dollars for each discoverable copy may be collected.

The fees for copyright to a person resident in the United States are fifty cents for recording title or description, fifty cents for a certified copy of the record, one dollar for record of assignment, and one dollar for certified copy thereof. Foreigners must pay one dollar for orignal entry, and fifty cents for an official copy of it. All publications must be delivered to the librarian of Congress free of charge, and he has no authority to refuse any application for copyright for works not immoral, nor to decide questions of priority or infringement. The copyright jurisdiction is in the hands of the United States courts; the common-law rights to literary property still belong to state courts. Authors and assigns have exclusive right to translate or dramatize their own works, after having copyrighted the original. No copyright is valid unless notice thereof is in some way stamped or inscribed upon the work thus protected. In all other respects the provisions of the law of 1874 are in force. Amendments further desired by authors and artists, as represented in the Literary and Artistic International Association of Europe in the autumn of 1895 are: That the right of reproduction shall inhere in the author, and exist for the benefit of his heirs or assigns for fifty years after his death; that the sale or transfer of a material work, as a manuscript, picture or design, shall not, by implication, carry with it the right of reproduction; that the author who has parted with his copyright shall retain the right to supervise reproductions of his work and to prosecute piracies or unauthorized changes in it; that in encyclopædic work, while the director of the compilation remains in legal possession of the copyright for the whole work, individual contributors to it shall be entitled to reproduce their contribution, if by so doing they do not injure the entire publication; that works of art belonging to public museums shall not be reproduced without the consent of the original artist, or his heirs or assigns; and that anonymous, pseudonymous and posthumous works shall be entitled to protection for fifty years from the date of their first publication. The present tendency is to carry to its logical amplitude the doctrine that copyright shall recognize an author's or artist's work as personal property as much as if it were in its original form of manuscript, composition or design, save that a time-limit of protection is still respected, its extension, rather than abolition, being sought.

D. O. KELLOGG.

COQUELIN, BENOIT CONSTANT ("Coquelin Aîné"), a French actor; born at Boulogne-sur-Mer, Jan. 23, 1841; the son of a baker. Evincing a great aptitude for the stage, he went to Paris and was admitted to the Conservatoire on Dec. 29, 1859. He made his *début* at the Théâtre Français on Dec. 7, 1860, in the character of Gros-René in the *Dépit Amoureux*. He afterward played with success in the *Fourberies de Scapin*, *Le Mariage de Figaro*, *Don Juan*, and other classical pieces; Lupin in *La Mère Confidente*, the Marquis in *Le Joueur*, Don Hannibal in *L'Aventurière* etc. He created the *rôle* of Anatole in *Une Loge à l'Opéra*, John in *Trop Curieux*, Gagneux in *Jean Baudry*, Vincent in *L'Œillet Blanc*, Aristide in *Le Lion Amoureux* Gringoire in a play of that name, Beaubourg in *Paul Forestier*, Eucrate in *Le Coq de Mycille*, etc. Coquelin obtained great success in society by reciting in private and at public meetings, and has also added to the reputation of new poets, particularly of Eugène Manuel and François Coppée. In a professional visit to America he met with a most enthusiastic reception. He has, to the great regret of all admirers of French comedy, persisted in his intention of keeping away from the Théâtre Français.—His books comprise several valuable contributions to the history of the stage and the art of acting.—His brother, ERNEST ALEXANDRE HONORÉ COQUELIN (Coquelin cadet), also a noted French actor, was born at Boulogne-sur-Mer, May 16, 1848. He also was intended for a baker, but preferred the risks attendant upon the duties of a railroad employee. Irresistibly attracted to the theater, he began a careful training at Paris in 1864, and made his initial appearances at the Odéon Théâtre. In 1868 he joined the Comédie Française and earned the applause of Parisian audiences by the side of his elder brother. When the Germans besieged Paris, Ernest Coquelin left the boards to follow the bugle, and won the Military Medal for his valor at the battle of Buzenval. His favorite *rôles* are those of Ulrich in Octave Feuillet's *Le Sphinx*, Frippesauce

M. COQUELIN.

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in *Tabarin*, Isidor in *Le Testament de César Girodot*, Frederick in Erckmann-Chatrian's *L'Ami Fritz*, and Basil in *Le Barbier de Séville*. Like his elder brother, he has made several valuable contributions to the literature of the French stage.—The son of Coquelin Aîné, JEAN COQUELIN, has also distinguished himself as an actor. Born Dec. 1, 1865, he was destined for the stage from his earliest years. Attached to the Comédie Française, he has frequently, and with much success, filled the *rôles* so famous by his father's creation of them.

COQUILLA-NUTS. See NUT, Vol. XVII, p. 684; and ATTALEA, in these Supplements.

COQUIMBO, a province and city of central Chile. The province is bounded by Aconcagua on the south and Atacama on the north, with the Andes and the sea on the east and west. Its area is 12,873 square miles; population 1895, 160,898; capital, Serena; population 1895, 15,712. The city is on the coast, seven miles S.W. of Serena, and separated from it by a bay; has smelting-works, a large trade in copper and ores; chief industries, hay-raising, copper-smelting, and cattle-raising. The country is of little use for agriculture, except where it is irrigated.

COQUIMBO OWL. See BURROWING OWL, in these Supplements.

COQUINA. See ST. AUGUSTINE, Vol. XXI.

CORAL ISLAND AND REEFS. See POLYNESIA, Vol. XIX, pp. 432–435.

CORALLIGENA OR SEA-ANEMONE. See ACTINOZOA, Vol. I, pp. 120–122.

CORALLINES, a name given to a highly organized group of red algæ with branching bodies, and so encrusted with carbonate of lime that the plant becomes very hard and of a coral-like appearance. As a consequence of this structure, they occur as fossils. Common genera are *Corallina*, *Lithothamnion*, and *Lithophyllum*.

CORAOPOLIS, a post borough in Allegheny Co., Pa., 13 miles W. by N. of Pittsburg; has 3 churches, a newspaper office, oil-wells and refineries, lumber-mills, and tool-factories. Pop. 1900, 2,555.

CORATO, a town in province of Bari, Italy, 14 m. S. E. of Barletta. Pop. 1901, 41,573.

CORBET, RICHARD, an English poet and bishop; born at Ewell, Surrey, 1582. He was educated at Westminster School, Broadgates Hall (now Pembroke College), and Christ Church, Oxford. He took orders and in 1620, he was made dean of Christ Church. In 1624 he was appointed to the see of Oxford, and translated to that of Norwich in 1632. Corbet's poetry reflects the genial temper and wit for which he was famous. His longest work is *Iter Boreale*, an account of the holiday tour of four students, written in a light, easy strain of descriptive humor; the best, as well as the best known, is the *Fairies' Farewell*. He died in Norwich, July 28, 1635.

CORBIN, AUSTIN, banker and railroad president; was born at Newport, New Hampshire, on July 11, 1827, studied at the Harvard Law School, and was admitted to the bar in 1849. In 1854 he became a banker at Davenport, Iowa, and in 1865 opened a banking house in New York city. In 1873 he became interested in the eastern part of Coney Island (q. v.), and purchased it, and there created the great resort known as Manhattan Beach. Turning his attention also to railroads he became the president of several lines in the west, and also of the Long Island railroad, comprising all the lines on Long Island. He did a great work for the development of villages, towns and summer resorts on Long Island. He also took the lead in rehabilitating the great New Jersey Central and Philadelphia and Reading railroads. He had a fine estate of 12,000 acres in New Hampshire, which he stocked with game of various kinds and maintained as a forest park and as a select preserve for sportsmen. He died from the effects of an accident at Newport, New Hampshire, on June 4, 1896. W.F.J.

CORCORAN, WILLIAM WILSON, banker, was born at Georgetown, D. C., on December 27, 1798, and was educated at Georgetown College. From 1828 to 1836 he was agent for two Washington banks for the care of their real estate, and in 1837 himself became a banker and broker. Three years later he formed a partnership with George W. Riggs, a banker of Washington, and the firm soon rose to the foremost rank among bankers in that city and amassed great wealth. In 1854 Mr. Corcoran retired from active business, though he continued to give advice in important financial affairs. The Washington Soldiers' Home corporation invested some of its trust funds in Virginia state bonds, upon his advice, and when those bonds fell in value at the outbreak of the Civil War he voluntarily made good the loss from his own pocket. He gave to Washington the Corcoran Art Gallery, the Louise Home, and other institutions, and was the benefactor of various colleges, hospitals and charities, his gifts aggregating upwards of $5,000,000. For many years he was one of the most honored citizens of Washington, and is remembered as one of its chief benefactors. He died there on February 24, 1888.

WM. W. CORCORAN.

W.F.J.

CORCYRA, the ancient name of CORFU; q.v., Vol. VI, p. 351.

CORDER, FREDERICK, a British musical composer; born in London, England, Jan. 26, 1852. He showed a strong inclination for music from his earliest years, and, released from business by the failure of a firm, he entered the Royal Academy of Music at the age of eighteen. Here, in eighteen months, he won the Mendelssohn scholarship, and was sent to Cologne to pursue his studies. In four years' time he returned to England as conductor at the Brighton Aquarium. In the judgment of Sir George Grove, he is one of

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the foremost of rising young composers. His romantic opera, *Nordisa*, is the most popular of some twenty published works.

CORDILLERAS (Sp., "chain of mountains"), a term occasionally used of the mountains in the region west of the great plains of North America, and frequently of the Andean chain of South America. See AMERICA, Vol. I, p. 595; ANDES, Vol. II, p. 16; ECUADOR, Vol. VII, p. 558; PERU, Vol. XVIII, p. 685; HONDURAS, Vol. XII, p. 133; MEXICO, Vol. XVI, p. 223; PARAGUAY, Vol. XVIII, p. 247; and UNITED STATES, Vol. XXIII, p. 844.

CORDITE. See GUNPOWDERS, in these Supplements.

CORDOVAN LEATHER is largely manufactured in Germany, Scotland, and in more recent years in America. It is produced from the skins or hides from horses, asses, mules and colts.

The process is as follows: After removal of the hide from the animal it is customary to cut it into two parts, measuring from the root of the tail 18 inches forward on the backbone. The hide is cut, at right angles to the backbone, directly across; the part so cut off is termed a "butt," and as such becomes a distinct article of commerce. The forward part of the hide is termed a "front," and is used, after being divided on the line of the backbone, for various purposes, principally, after being tanned, for use as glove-leather, or, blackened, to be used in the tops of shoes. These fronts are tanned so as to be finished on the grain side. The thinness of the shoulder and flanks renders this leather not altogether desirable for many purposes. The grain of the fronts, however, is particularly fine, and by careful manipulation can be made to closely represent that of genuine kangaroo. As a substitute for the latter it finds ready sale for shoe purposes. The butts, after undergoing a special tanning process, tending to produce a pliable and at the same time non-stretching leather, are passed through a splitting-machine which removes the grain, or hair side, revealing what is termed the "shell." This shell is found to lie on either side of the backbone, never, except in mule-hides, extending over the backbone. In appearance it is almost black, the line of demarcation being distinct and vivid between it and the other portions of the butt. In nature, the shell is exceptionally close-fibered, and makes, when properly blackened and finished, a leather impervious to water, and so smooth and pliable that it is used only in the manufacture of fine shoes for both men and women.

The term *Cordovan leather*, in trade circles, applies to the product both of the tanned fronts and tanned butts, but is especially used in connection with the term *galoshes*, meaning the vamps or boot-fronts cut from the shell of the butt. There are few, if any, other than the above-named animals whose hides present this peculiar region or so-called shell. In form it is elliptical, and extends well back upon the hips of the animal, and forward, covering the region of the vital organs which are not protected by the ribs.

As above stated, there are two distinct shells upon each butt, separated, except in case of asses and mules, by a strip four to six inches in width, lengthwise of the backbone. In area each shell contains from three to five square feet, according to the size of the animal. The remainder of the butt, in its nature and in its products, is identical with that of the so-called fronts.

COREA (CH'AO-HSIEN) or KOREA. In addition to the description given under COREA, Vol. VI, pp. 346–350, a more extended knowledge has been gained of the statistics, people and topography of the "Hermit Kingdom" by the events of the Yellow War. In 1894 China and Japan became involved in hostilities from their conflicting claims to regulate the affairs of Corea. In 1876 Corea had concluded a treaty with Japan, in 1882 with China (Trade and Frontier Regulations) and the United States, in 1883 with Germany and Great Britain, in 1884 with Italy and Russia, in 1886 with France, and in 1892 with Austria. An overland trade convention has also been concluded with Russia. In these treaties Corea was treated with as an independent state, and by virtue of them, Seoul and the three ports of Jenchuan, Fusan, and Yuensan were opened to foreign commerce. In 1894 violent internal disturbances occurred. The Coreans, split into Chinese and Japanese factions, and appealed to each power for aid. When China sent troops to quell the riots, Japan protested against a violation of the treaty of 1876. Then Japan landed five thousand men on the west coast, June 3, 1894, under the pretext of escorting the Japanese minister in safety from the country. The army having seized strategical positions, the Mikado's ambassador, Mr. Otori, made a demand for five immediate reforms in Corean affairs. China demanded the withdrawal of the Japanese troops, invoked in vain the aid of Russia, but secured an appeal by the European representatives for mutual concessions. Then the Japanese seized the Corean king, July 23d, and compelled him to appoint Tai Wen Kun as regent. Hostilities began with a naval engagement in Prince Gerome Gulf, July 25th, and a sea battle between cruisers, on the same date, off Fontao Island. In each case the Japanese were victorious. The formal declaration of war was made August 1st, and by the 26th of the same month Mr. Otori had concluded a treaty of alliance between Japan and the Corean government. Then the "Yellow War," as it has been well termed, began in good earnest on land. Its whole burden fell on Li Hung Chang, the Viceroy of China. His army was not one quarter the strength of the Japanese. Deficient and antiquated in equipment, with poltroons for commanders, the land forces were on a par with a navy crippled by the resignation of all the English engineers (in accordance with neutrality proclamations), and commanded by cowardly mandarins. Under Field-Marshal Count Yamagata the Japanese soon landed 10,000 troops at Fusan, 3,000 at Gensan, near Port Lazareff, and 30,000 at Chemulpo. To oppose these, some 30,000 Chinese

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troops were concentrated at Wiju, whence, with some reinforcements, they were marched 100 miles southward to confront the victorious Japanese at Ping Yang. In this vicinity strategic movements and skirmishes occurred for some time, generally resulting in favor of the Japanese. The Japanese commanders were graduates of the first military schools of Germany, the soldiers armed with modern rifles, and the entire army drilled in European methods. To confront these were venal and ignorant mandarins, supported by a barbarian horde, more suited, as to arms and equipment, for an encounter with crusaders of a long past age. On September 16th, the Japanese, attacking the Chinese lines at Ping Yang in front, at the same moment that a second column came into action on the flanks and in rear, routed their opponents with terrific slaughter. The Chinese loss was over 16,000, as against a Japanese casualty list of 30 killed and 270 wounded. Four Chinese generals, many thousand rifles, immense military stores and three million dollars fell into the victors' hands. Disaster on sea followed the next day, and at the sea fight of the Yalu River the Chinese navy was almost entirely destroyed or captured. The only vessel which did fight in earnest for the honor of the Flowery Kingdom was, it may be said, commanded by an American graduate of Annapolis. After the capture of Ping Yang and the whole of the Chinese invading force, the Japanese marched to invade Manchuria. Victorious at Wiju, and carrying Hu-Shan by vigorous assault on October 25th, the Japanese columns marched through Manchuria and proceeded to invest Port Arthur. Here the demoralized remnants of the Chinese army made a desperate stand, until panic-stricken by repeated assaults, and, deserted by their commanders, they fled in disorder, and Port Arthur fell on November 22d into the hands of the Japanese, with 80 guns and immense stores.

With the fall of Port Arthur the reserves of Japan were called to the colors, and a second army mobilized and landed on the Chinese coast, near Kinchow, in the Gulf of Liao. Marching through Manchuria, in the direction of Ninchang, though retarded by the severe cold, the Japanese fought at Kungwasai, on December 19th, the most stubbornly contested battle of the war. Four charges were necessary to carry the Chinese works, and these cost the Japanese 450 men. The victors advanced to To Chung Su and occupied a position of great strategic value, preparatory to a march on Pekin in the spring. On February 16th the naval station of Wei-Hai-Wei fell into the invaders' hands, and China hurried a peace embassy to Tokyo to beg for terms. By the treaty of Shimonoseki, signed April 17, 1895, and ratified at Chefoo, May 8th, the independence of Corea was proclaimed and declared, and the southern part of the Chinese province of Feng Tien, being the part of Manchuria occupied in the war, was ceded to Japan, with a war indemnity of 200,000,000 kuping taels (i.e., $150,000,000). Formosa was also ceded to Japan. At the request of Russia, and in consideration of an increased war indemnity, Port Arthur was evacuated by the victors.

The present ruler of Corea is Yi Hiung (Li-Hi in Chinese), born in 1852, succeeded to the throne in 1864, and is the twenty-ninth in succession since the founding of the present dynasty. The constitution may be briefly described as follows: The king is an independent sovereign, but his power is limited by the cabinet, which originates laws for the king's ratification. The central government consists of nine departments, each presided over by a minister of state. The eight old provinces have been abolished, 23 pu, or counties, subdivided into 336 kün, or districts, being substituted. Revenue is derived from the land tax, the maritime customs and the sale of ginseng.

An embryo army of 2,000 men is under Japanese instructors, a naval school has been formed, with English instructors, and a police force of 1,500 men organized under a special department.

The total value of the trade at the three ports was in 1900: Imports, $5,505,000; exports, $4,720,000; the imports, consisting of cotton goods, chiefly shirtings and muslins, $2,379,980; woolen goods, $45,009; metals, $164,060; sundries, $3,253,340; the exports, beans, $515,310; cowhides, $329,440; rice, $1,210,150. The export of gold, which is found in considerable quantities in the country, but is not well worked, was $749,699 for 1890. Area of Corea, 80,000 square miles. Population, 10,500,000. Capital, Seoul. Population, 200,000. See RUSSO-JAPANESE WAR.

CORELLI, MARIE, English novelist, was born of Italian parents and adopted when a child by the late Dr. Charles Mackay, and at his death became the ward of his son, Eric S. Mackay, author of *The Love Letters of a Violinist*. Her writings are pervaded by an element of mysticism. Among her writings are *The Romance of Two Worlds* (1886); *Vendetta* (1887); *Thelma* (1888); *Ardath* (1889); *Wormwood* (1890); *Soul of Lilith* (1892); *Barabbas* (1893); *The Sorrows of Satan* (1894); *The Mystery of an Atom* (1895); *The Murder of Delicia* (1896); *Ziska* (1897); *Jane* (1897); *The Master Christian* (1900); *Temporal Power* (1902).

CORENTYN, a river of Guiana, South America, separating the British and Dutch possessions. It rises in the Acara Mountains and flows generally northward, emptying into the Atlantic at long. 57° W. It has four large cataracts, the lower two being of great beauty. It is about 500 miles long, and is navigable for vessels of light draft for 150 miles.

COREOPSIS, a large genus of the family *Compositæ*, abundant in North and South America and in South Africa. The involucre is double, the rays are mostly yellow and the flat akenes (fruits) have generally two or three teeth or awns, but not barbed, as in the closely related *Bidens*. The species are generally known as "tickseeds," and several of them are cultivated on account of their showy flowers. The most common cultivated form is *C. tinctoria*, the common Coreopsis or Calliopsis of the gardens, with the large yellow rays brownish purple at base,

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or even brownish throughout. See Vol. XII, p. 258.

CORFIELD, WILLIAM HENRY, an English physician and sanitary expert; born at Shrewsbury in December, 1843. Studying medicine, hygiene and natural science, he took many honors and degrees, was appointed professor of hygiene and public health at University College, London (1869), and has written *Dwelling Houses: Their Sanitary Construction and Arrangement* (1879); *The Treatment and Utilization of Sewerage;* and *The Water Supply of Ancient Roman Cities.* He is chairman of the Council of the Sanitary Institute of Great Britain.

CORINTH, the capital of Alcorn County, northeastern Mississippi, and the most prominent city of the northern part of the state, is situated on the Memphis and Charleston and the Mobile and Ohio railroads, about 93 miles from Memphis, Tennessee. During the Civil War it was occupied successively by the Union and Confederate armies, being regarded by the commanders of the contesting forces as a point of the greatest strategical importance. After the battle of Pittsburg Landing, the Confederate army fell back upon Corinth. On May 30th following, General Beauregard evacuated the place, and it was taken possession of by the Union army under General Halleck. The command of the district was intrusted to Gen. W. S. Rosecrans, who made his headquarters at Corinth. On the night of October 3d of the same year, the place was attacked by the Confederate army under General Earl Van Dorn, consisting of the forces commanded by Generals Lovell, Price, Villepigue, Rust and others, and numbering, in the aggregate, about thirty thousand men. The attack was repulsed, but on the succeeding morning Van Dorn renewed hostilities, directing the movements of his army in person. For a brief period success crowned the efforts of the Confederates, but finally they were hurled back, and before noon were in full retreat. They were pursued by the commands of Generals Hurlbut and Ord, but ultimately escaped beyond the Hatchie River. Their losses amounted to 1,423 killed, and 2,225 wounded and prisoners. The Union army sustained a loss of 315 killed, 1,812 wounded and 232 missing. Since the close of the war, Corinth has experienced a substantial and permanent growth. It now contains ten churches, schools and other institutions of learning, several weekly papers, many stores, and manufactures of lumber, woodenware, brooms, etc. Pop. 1890, 2,111; 1900, 3,661.

CORINTH SHIP CANAL. See CANAL, in these Supplements.

CORINTO, a port of the department of Chinandega, western Nicaragua, 12 miles by rail S. of Chinandega City. It is on a fine harbor, and consequently has an important trade. In the year 1893–94, its exports amounted to 3,642,997 pesos, over two-thirds of which was coffee. Pacific Mail steamers touch here. Population, about 2,000.

CORLISS, GEORGE HENRY, engineer, was born at Easton, New York, on June 2, 1817, and early in life manifested inventive talent. His first device was a machine for sewing boots and shoes. In 1844 he settled in Providence, R. I., and became the head of a firm engaged in the manufacture of steam engines and other machinery. Here his talent found full scope, and in 1848 he completed the original form of what has since become known the world over as the "Corliss engine." This invention largely revolutionized the use of stationary engines everywhere, and was of inestimable importance to the industrial world. One of his monster engines was used to move all the machinery at the Philadelphia Centennial Exposition of 1876. Medals and diplomas of honor were bestowed upon him in America and in Europe, and his engine works at Providence became one of the greatest in the world. He died at Providence on February 21, 1888. W. F. J.

CORNACEÆ, a small family of dicotyledonous plants, chiefly trees and shrubs, of the northern temperate regions. The most common genera of the United States are *Cornus*, whose numerous species are called "cornals" or "dogwoods"; and *Nyssa*, the "tupelo," "pepperidge," or "sour gum tree." The fruit is a drupe or berry, and in some cases edible.

CORN-APHIS (*Aphis granaria*), a plant-louse which is often injurious to corn and wheat crops. See WHEAT, Vol. XXIV, p. 565.

CORN-BEETLE (*Cucujus testaceus*), a minute beetle, whose yellow-colored larva is very destructive to wheat in granaries.

CORNBRASH, a coarse, shelly limestone of the Lower Oölite group in geology. See GEOLOGY, Vol. X, p. 315.

CORN-COCKKLE OR CORN-ROSE (*Lychnis Githago*), a tall weed of the family *Caryophyllaceæ* ("pink family"), a native of Europe or the west of Asia, but now found in many countries. It is a frequent weed among crops of grain, and is well known on account of its large purple flowers, long linear leaves and black seeds.

CORNCRAKE OR LANDRAIL, a bird. See CRAKE, Vol. VI, p. 481; and RAIL, Vol. XX, p. 229.

CORNELL, ALONZO B., financier, was born at Ithaca, New York, on January 22, 1832, the son of Ezra Cornell (q. v.). He became a telegraph operator and afterward one of the managers of the Western Union Telegraph Company. He also acquired a large interest in steamboat lines and railroads, and became a bank officer. In 1869–73 he was surveyor of customs at the port of New York, from 1876 to 1878 naval officer at that port, and from 1880 to 1883 was governor of the state of New York. He also served as member and speaker of the state assembly, and as chairman of the state Republican central committee. His home was at Ithaca, N. Y., where he was deeply interested in the university of which his father was the founder. Died Oct. 15, 1904. W. F. J.

CORNELL, EZRA, founder of Cornell University, was born in Westchester County, New York, on January 11, 1807, and learned his father's trade as a potter. Later he worked in various industries until 1843, when he became interested in Morse's invention of telegraphy, and began the building of the first telegraph lines. It was he who devised the use of poles for carrying the wires. In this business he greatly prospered and

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grew rich. In 1862 he was chosen president of the New York State Agricultural Society and gave $50,000 for a public library at Ithaca, where he made his home. In 1864 he was a state senator, and while in that office conceived the scheme of founding a university "where any person can find instruction in any study." He financed the Federal land grant so as to make it enormously profitable, added to it from his own fortune, and thus established Cornell University, at Ithaca, to the promotion of which he gave the rest of his life. He died on December 9, 1874. W.F.J.

EZRA CORNELL.

CORNELL COLLEGE, an educational institution at Mount Vernon, Iowa, founded in 1857 under the auspices of the Methodist Episcopal Church. There are five college buildings, including a Gothic chapel, art and science halls, the Bowman Hall and the main college building. The institution has a fund of $405,000, over 25,000 volumes in the library, and in 1904 there were 40 instructors and 763 students. William F. King was president of the college in 1905. The grounds and buildings are valued at $225,000. The college has productive funds of $188,813 and an annual income of $36,875. There are classical, scientific, philosophical and civil-engineering courses of study, and normal, art, musical and preparatory departments. W.M.C.

CORNELL UNIVERSITY, a non-sectarian, educational institution at Ithaca, New York, the grounds of which cover a tract of 270 acres. It owes its origin to the Land Grant Act of Congress of 1862 "donating public lands to the several states and territories which may provide colleges for the benefit of agriculture and mechanic arts." It was named after Ezra Cornell, who gave it upwards of $750,000 with which to erect buildings. Other bequests were made by Henry W. Sage, John McGraw, Hiram Sibley, Andrew D. White, Dean Sage, A. S. Barnes, and Oliver H. Payne. In 1904 the university had 435 professors and instructors; 3,428 students and a library containing 249,583 volumes. It has funds to the amount of $8,000,000. There are 36 university undergraduate scholarships good for two years each, 18 of which are annually granted upon competitive examination to members of the freshman class. The university annually grants free tuition to 600 students of New York state, also to students in agriculture and to New York state students in forestry and veterinary medicine. The grounds, buildings, equipment and other property used by the university were estimated at $3,092,715.81 in 1902, not including the valuation of the new Medical College in New York, estimated at $1,000,000. The president of the university in 1905 was Jacob G. Schurman. W.M.C.

CORNELL UNIVERSITY.

CORNER. In the vernacular of the commercial world, a corner is an existing shortage in any particular stock or commodity, brought about by the preconcerted purchase, by one or more parties, of such stock or commodity in such quantities as practically to preclude others from buying on the open market. The result of this is to place all outsiders at the mercy of the cornerer, who thus is enabled to dictate his own terms of sale.

CORNET, a wind-instrument. See ZINCKEN, Vol. XXIV, pp. 826, 827.

CORN-FLOWER, a name given to *Centaurea Cyanus*, a star-thistle of the family *Compositæ*. It is a native of Europe, but is cultivated in gardens and runs wild in the United States. It is cottony, with linear stem leaves, a solitary long-stalked head of large blue flowers, varying to white and rose-color. It also is called "bluebottle."

CORN-HARVESTERS. See HARVESTING MACHINERY, in these Supplements.

CORNIFEROUS, a period in geology to which belongs the corniferous limestone. This latter extends from near the Hudson, in eastern New York, westward through the state, and at the Niagara River forms the rapids at Black Rock. It also occurs in Ohio, northern Michigan, Illinois, Kentucky, eastern Iowa and Missouri. The limestone is commonly light gray to bluish or buff; occasionally it is blackish and rough, from the abundance of hornstone masses which are left projecting by surface wear. See also GEOLOGY, Vol. X, p. 306.

CORNING, Iowa, the seat of Adams County on the Nodaway River, and on the Chicago, Burlington & Quincy railroad, 21 miles west of Creston. It is in a coal-mining, farming and fruit raising region, the products of which supply local manufactures, and a growing export trade. Population, 1900, 2,145. C.L.S.

CORNING, an important town of Steuben County, western central New York, and one of the capitals of the county, pleasantly situated on the Chemung River, about 17 miles W. of Elmira, on the Fall Brook and New York, Lake Erie and Western

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railroads. It has excellent educational facilities, and contains a variety of manufactories, including flint-glass and railroad cars. Pop. 1900, 11,061.

CORNISH DIALECT. See CELTIC LITERATURE, Vol. V, p. 258.

CORN, MAIZE OR INDIAN CORN. Corn, as usually applied, is a generic name for all seeds used in making bread, especially the seeds of cerealia. In England, corn means wheat, rye, oats or barley; in Scotland, oats; and in the United States, maize. SEE AGRICULTURE, Vol. XXV, and MAIZE, Vol. XV, p. 311.

CORN-MOTH (*Tinea Granella*), a small species of moth, very destructive to grain-sheaves in the field and stored grain, among which it lays its eggs. The larva, which, for its voraciousness, is known as "the wolf," eats into the grain and joins it together by a web. Frequent turning is resorted to for the destruction of the eggs and larva, and salt is mixed with grain for the same purpose.

CORNPLANTER, an American Indian chief, head of the Six Nations; born in 1732. He was a half-breed of the Seneca tribe, his father being a French-Canadian. With his followers he aided the French in the war with the colonists and was active during the campaigns on the frontier. After peace was declared he became friendly with the United States. He was an Indian of more than ordinary intelligence, and after his death, which occurred in Warren County, Pennsylvania, February 18, 1836, the state erected a monument to his memory. W.M.C.

CORNSNAKE, a large harmless snake (*Coluber guttatus*) of North America. R.W.C.

CORNO, MONTE OR GRAN SASSO D'ITALIA, a mountain in southern Italy, the culminating peak of the Apennines. See APENNINES, Vol. II, p. 150; and ITALY, Vol. XIII, p. 447.

CORNS. See SKIN DISEASES, Vol. XXII, p. 129.

CORNU, MARIE ALFRED, a French scientist; born March 6, 1841. In 1867 he was appointed professor of physics at the École Polytechnique, and succeeded Becquerel as member of the Academy of Science; received the Rumford medal of the Royal Society of London. He was president of the French Association for the Advancement of Science, and was decorated with the Legion of Honor. Professor Cornu's researches have chiefly been devoted to optical subjects. He gave to measurements of the velocity of light a precision which was previously impossible. His principal experiments upon this subject are recorded in the annals of the Paris Observatory; many of his other papers are in the *Comptes Rendus*, and deal with crystalline reflexion, the reversal of the lines in the spectrum of metallic vapors, the spectra of the aurora borealis and the normal solar spectrum.

CORNWALL, the county seat and a port of entry of Cornwall and Stormont County, in the eastern part of Ontario, Canada. It lies on the St. Lawrence River, just above St. Francis Lake, about 75 miles southeast of the city of Ottawa. It has a large commerce by way of the river, and is also reached by the Grand Trunk railway. Its population in 1900 was more than 6,500. W.F.J.

CORN-WEEVIL, a wheat-pest. See WHEAT, Vol. XXIV, p. 566.

CORN-WORM (*Heliothis armigera*), a name applied to the larva of a moth, also known as boll-worm. The larva feeds on corn, cotton, tomato and other plants. Some years almost one-fourth of the cotton-crop in the southern United States has been destroyed by this worm. It is called boll-worm because it begins its ravages by destroying the young bolls, or fruit, of the cotton-plant.

CORŒBUS, a Phrygian hero who fought in the Trojan war on the side of the Trojans. He was one of the suitors of Cassandra. See CHRONOLOGY, Vol. V, p. 711. W.R.B.

CORONA BOREALIS, the constellation known as the Northern Crown, lying between Bootes and Hercules, containing three double stars of 4th, 5th, 6th magnitudes. W.R.B.

CORONADO, a celebrated summer and winter resort of San Diego County, California, situated on the Pacific Coast, near San Diego, and just north of the Mexican boundary line. It is noted for its medicinal spring, its fine bathing facilities, its exhilarating climate and its magnificent scenery. The springs are sulpho-carbonated sodic.

CORONADO, FRANCISCO VASQUEZ DE, a Spanish explorer; born in Salamanca, Spain. He organized an expedition which left Culiacan, on the Pacific coast, in April, 1540, and traversed what is now the state of Sonora to the river Gila. Crossing this, he came to the Little Colorado (which he called the Rio del Lino) and visited the cities of Cibola (probably India pueblos) which had been mentioned by Cabeçade Vaca and De Niza. Thence he travelled eastward to the Rio Grande, and beyond to the city of Quivira, in the course of which journey he encountered herds of buffalo, which he described as "a new kind of oxen, wild and fierce," and as "crooked-back oxen," of which "the plains are as full . . . as the mountain Sereña in Spain is of sheep." The journey resulted disastrously to Coronado, as at Tiguex, near the Rio Grande, in March, 1542, he fell from his horse, and "with the fall fell out his wits, and he became mad." E.E.T.

CORONATION GULF, an inlet of the Arctic Ocean, in B.N.A., forming the S.E. part of the land-locked and isle-studded bay that receives the Coppermine River. Lat. 68° 30′ N., long. 46° 52′ W.

CORONELLA, a genus of small, non-venomous serpents of the family *Colubridæ*, having a somewhat compressed and pentagonal body, and long, conical tail. Inhabits warm and temperate zones.

CORONER. The gradual progress of codification and revision of statute law in England brought the office and duties of a coroner within the contemplation of Parliament in 1890. A Coroner's Act was passed, abolishing many useless and obsolete incidents of the office, clearly defining the duties of a coroner, and codifying, within the brief limits of a single statute, the common-law decisions in relation to the office, which previously had reposed in the midst of hundreds of dusty volumes evolved by 850 years of English jurisprudence and its proverbially slow progress. See CORONER, VI, 381.

CORPANCHO, MANUEL NICHOLAS, a Peru-

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vian patriot and poet; born in Lima, December 5, 1830; died there September 13, 1863. W.M.C.

CORPUS CHRISTI, a city and the capital of Nueces County, southern Texas, on the Mexican National railroad. It is on Corpus Christi Bay, and has a harbor unsurpassed by any on the coast. It is the terminus of the San Antonio and Aransas Pass railroad, and is the center of a large and growing commerce. Population 1890, 4,387; 1900, 4,703.

CORPUSCULAR THEORY OF LIGHT. See LIGHT, Vol. XIV, p. 584.

CORPUS DELICTI, a term used in criminal law, signifying the substance of a crime, or the actual fact that a crime has been committed as charged. Thus in the case of murder, the fact of the death of the victim and that the crime charged against the accused had actually been committed by some one, is called the *Corpus Delicti;* and without proof of this fact, no matter how suspicious the other circumstances, such as the disappearance of the victim, the known hatred of the accused toward him, or other actuating motives, the opportunity for the commission of the crime, or the innumerable other incriminating circumstances, a conviction of murder would not be justified. The fact that the person was killed as charged must always be proved. The fact that, after the accused has been convicted and put to death, the supposed victim has in several instances made his appearance alive, makes the wisdom of the rule apparent. The rule that the *corpus delicti* must be proved applies to other crimes.

CORRIGAN, MICHAEL AUGUSTINE, third Catholic Archbishop of New York; born in Newark, N. J., on August 17, 1839, of Irish parentage. He was educated at St. Mary's College, Wilmington, Del., and at Mount St. Mary's College, Emmitsburg, Md., where he graduated in 1859. As one of the twelve original scholars enrolled on the foundation of the American College in Rome, he completed his academic studies there and graduated D. D. in 1864. The year previously, he had been ordained priest. From 1864–1868 he was professor of dogmatic theology and sacred scripture, and from 1868 president of Seton Hall College, Orange, New Jersey, until appointed bishop of the diocese of Newark in 1873. In 1880 he was made titular Archbishop of Petra and coadjutor to the Archbishop of New York, succeeding to the metropolitan dignity upon the death of Cardinal McCloskey in 1885. Archbishop Corrigan died on May 5, 1902.

C. L. S.

CORRY, a city of Erie County, northwestern Pennsylvania, 26 miles E.S.E. of Erie, on the New York, Lake Erie and Western, the Pennsylvania and the Western New York and Pennsylvania railroads. It has a large number of manufactories, among them boring-machine factories, locomotive and car shops, boiler-works and numerous other machine-shops. The town has electric lights, water and gas works. Pop. 1890, 5,677; 1900, 5,369.

CORSE, JOHN MURRAY, soldier, was born at Pittsburg, Penn., on April 27, 1835, studied at West Point, and was admitted to the bar. He did fine service in the Civil War and rose to the rank of Maj.-Gen. of volunteers. At Allatoona Pass, on Sherman's march to the sea, he was the hero of the "Hold the fort" incident. In 1886 he was postmaster of Boston. He died on April 27, 1893. W.F.J.

CORSICANA, a city and the county seat of Navarro County, Texas, in the northeastern part of the state. It is 52 miles south by east from Dallas, and is an important railroad and commercial center, being reached by the Houston and Texas Central and the St. Louis Southwestern roads. Population, 9,313 in 1900. W.F.J.

CORSITE. See CORSYTE, in these Supplements.

CORSNED OR CORSNÆD. See ORDEAL, Vol. XVII, p. 843.

CORSON, HIRAM, educator, was born in Philadelphia in 1828, filled various professorships, and has been professor of English literature at Cornell University since 1870. He is the author of a great number of books on English literature, Shakespeare, Chaucer, etc. W.F.J.

CORSYTE, a term in geology to describe eruptive rocks in Corsica and the Shetland Isles. It also is called Orbicular Dioryte, and consists of anorthite and hornblende, with some quartz and biotite.

CORTELYOU, GEORGE BRUCE, Secretary of Commerce and Labor, was born in the city of New York, July 26, 1862; was educated at public and private schools; graduated at Hempstead (L. I.) Institute and State Normal School, Westfield, Mass.; received the degree of LL. B. from Georgetown and that of LL. M. from Columbian University, and, on June 10, 1903, the degree of LL. D. from the former University; in 1883 was a general law and verbatim reporter in New York; was principal of preparatory schools in New York from 1885 to 1889; in the latter year entered the public service, and was private secretary to various public officials, among them the post-office inspector in charge at New York, the surveyor of the port of New York, and the Fourth Assistant Postmaster-General; November, 1895, was appointed stenographer to President Cleveland; February, 1896, executive clerk; July 1, 1898, assistant secretary to President McKinley; April 13, 1900, secretary to the President; reappointed March 15, 1901, and September 16, 1901, reappointed by President Roosevelt; was appointed secretary of Commerce and Labor, Feb. 16, 1903, which position he resigned, July 1, 1904, to accept the chairmanship of the Republican National Committee. He was appointed Postmaster-General, March 6, 1905.

GEORGE B. CORTELYOU.

CORTLAND, a railroad junction and the county seat of Cortland County, New York, 37 miles S. of Syracuse. It has a state normal school, an academy and numerous manufactories, among them factories for wire-drawing and wire-weaving, carshops, etc. Pop. 1890, 8,590; 1900, 9,014.

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CORUMBA, Brazil, a fortified town in the state of Matto Grosso, near the Bolivian frontier, and at the head of navigation on the west bank of the Paraguay River, about 350 miles S.E. of Matto Grosso, the state capital. It is the port of entry and outlet for an extensive region, including southern Bolivia. Pop., with Larida, 7,000. C.L.S.

CORUNDUM. See EMERY, Vol. VIII, p. 157.

CORUNNA, a city and the county seat of Shiawasse County, Michigan, in the central part of the state. It lies on Shiawassee River, 28 miles from Lansing, and is reached by the Toledo, Ann Arbor and Northern Michigan, and the Detroit, Grand Haven and Milwaukee railroads. Its population was 1,510 in 1900. W.F.J.

CORVALLIS, a city and the county seat of Benton County, Oregon, near the center of the seacoast of that state. It lies on the Willamette River, 28 miles south of the city of Salem, and is reached by the Oregon Pacific and the Southern Pacific railroads. It has a considerable commerce in lumber, fish, and other products. Its population was 1,819 in 1900. W.F.J.

CORVIDÆ. See CROW, Vol. VI, p. 545.

CORWEN ("the white choir"), a town in Merionethshire, North Wales, on a height overlooking the Dee, 10 miles W. of Llangollen. It is said to be the place to which Owen Glendower retreated when Henry IV invaded and overran Wales, and tradition points out his tomb in the parish churchyard. It has a railway station. Pop., 2,646.

CORWIN, THOMAS, an American statesman; born in Bourbon County, Ky., July 29, 1794. In 1798 his father settled in Warren County, Ohio, where Thomas was brought up on a farm. He was largely self-taught, but in 1815 he began to study law, and in 1818 was admitted to the bar. He distinguished himself in chamber practice and as a pleader. In 1822 he was elected to the lower House of the Ohio legislature, where he remained for seven years, and in 1830 he was sent to the national House of Representatives. He was a prominent supporter of the Whigs, and in 1840 was elected by that party governor of Ohio. In 1844 he was elected to the United States Senate, and when the Mexican War broke out he distinguished himself by the oft-quoted speech in which he denounced the intentions of the party in power to seize Mexican territory which it had failed to purchase by treaty. In 1850 he vacated his seat on being appointed Secretary of the Treasury. In 1853 he resigned this office; sat in the House of Representatives, 1859–63; was minister to Mexico, 1861–64; and then retired to Washington, D. C., where he died, Dec. 18, 1865. E.E.T.

THOMAS CORWIN.

CORYDON, a town and the capital of Harrison County, southeastern Indiana, and former capital of the state, situated on Indian Creek, 115 miles S. of Indianapolis, and on the Louisville, New Albany and Corydon railroad. It is the seat of an academy, contains various manufactories, and is noted for its sulphur spring. Pop. 1900, 1,610.

CORYDON, a town and the capital of Wayne County, central southern Iowa, 61 miles S. of Des Moines, on the Keokuk and Western railroad. Population 1890, 962; 1900, 1,477.

CORYMB. See BOTANY, Vol. IV, p. 110.

CORYMBUS, a mode of dressing the hair among the Greeks by tying it in a cluster or knot on the top of the head. The hair often was covered with a sort of open ornamental work. The name was also given to the cluster of ivy leaves, garlands or berries with which Greek vases were encircled, and to the high sterns of ships.

CORYPHA, a genus of tropical fan-leaved palms found in Ceylon and Molabor, whose leaves are made into fans, helmets and tents. W.R.B.

CORYPHENE (*Coryphæna*), a genus of fishes of the family *Coryphænidæ*. This family comprises the fishes known as dolphins, related to the mackerels. Most of them exhibit brilliant, iridescent colors. Some of them are excellent as food. Two species have been found along the Atlantic coast of the United States.

CORYPHODON. See MAMMALIA, Vol. XV.

COSCINOMANCY, a form of divination practiced in early times by suspending a sieve from the point of a pair of shears. See DIVINATION, VII.

COSEGUINA OR COSIGÜINA. The mountain is three thousand feet in height, and occupies a promontory on the south side of the Gulf of Fonseca, in the department of Chinandega. See NICARAGUA, Vol. XVII, p. 490.

COSHOCTON, the capital of Coshocton County, eastern central Ohio. It lies on the Muskingum River, and on the Ohio canal, 26 miles N. of Zanesville, on the C. C. & S. and P. C. C. & St. L. railroads. It has a paper-mill and iron and steel works. Pop. 1890, 3,672; 1900, 6,473.

COSTA, ISAAC DA, a Dutch poet and religious writer; born at Amsterdam in 1798; died in 1860. In his twentieth year he acquired the degree of LL.D., and, embracing Christianity, was baptized. This subjected him to considerable persecution, which, however, subsided as his genius gradually gained recognition. The most interesting of his writings are his translation of Byron's *Cain; Harmony of the Gospel;* etc. His *Battle of Nieuwpoort*, the last of his poems, is one of his masterpieces.

COSTA, SIR MICHAEL, musician; was born in Naples on February 4, 1810, studied in his native city, and went to England at an early age. He produced his ballet, *Kenilworth*, in 1831; his masterpiece, the oratorio *Eli*, in 1855; *Naaman*, in 1864, and the operas, *Malek Adhel*, in 1838, and *Don Carlos*, in 1844. He conducted the Handel festivals for 20 years, was knighted in 1869, and died on April 29, 1884. W.F.J.

COSTANOAN INDIANS. A name sometimes applied to the coast tribes of California converted by the Jesuits. See CALIFORNIA, Vol. IV, p. 615.

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COSTA RICA (República de Costa Rica), the southernmost republic of Central America. (See COSTA RICA, Vol. VI, pp. 397–399.) The legislative power is vested in a single chamber of 21 representatives—one for each ten thousand inhabitants—the members of which serve for four years, one half retiring every two years. The President is elected for four years in the same manner, the present occupant of the office being Señor Don Rafael Iglesias, whose term expires May 8, 1902. Official statistics make the area of the republic 23,000 square miles, but geographers deny that it exceeds 20,980 square miles. The census of Feb. 18, 1892, showed a population of 243,205, of whom 122,480 were males and 120,725 females. In Dec., 1899, the population was put at 309,683. In 1896, the republic took the unusual course, for a South American republic, of declaring against a silver monetary standard, and of adopting a gold standard. As regards commerce, the development of the coffee industry has made Costa Rica one of the richest countries, for its size, in the world. The revenue of the republic in 1900 was $4,000,000, and the expenditure $4,200,000; foreign debt, $10,400,000. The chief exports are coffee, bananas and sugar. Valuable metals exist in various parts of the country, and the mining industry is making progress. In 1900, there were 220 miles of railway and 880 miles of telegraph. Education is compulsory and free. In 1897, there were 327 primary schools with 21,913 pupils, besides 90 private schools with 2,500 pupils. The army consists of 600 men in time of peace, and on a war-footing commands 35,000 militia, as every male between 18 and 50 is bound to serve. The imports for 1900 amounted to $6,084,895, and the exports to $6,321,192. To facilitate agricultural operations and immigration, a concession has been granted for an agricultural bank with a capital of $5,000,000. The bank makes advances on the security of lands and produce, and will bring out colonists and settle them on lands ceded to the company. In 1896 Costa Rica adopted the single gold monetary standard.

COSTMARY ("plant of Mary") *Tanacetum Balsamita*), a perennial plant of the family *Compositæ*, a native of the south of Europe, long cultivated in gardens for the agreeable fragrance of its leaves.

COSTROMA OR KOSTROMA, a town and the capital of the province of Costroma, central European Russia, situated at the confluence of the Costroma with the Volga. It has manufactories of linen, leather, soap and Prussian blue. Population, 27,178.

COSWAY, RICHARD, a noted English artist; born at Tiverton, Devonshire, in 1740. As a miniature-painter he was particularly famous, and gained the patronage of most of the nobility of his time. Many of his works were distinguished by great delicacy of treatment and correctness of detail. He died in London, July 4, 1821.

COTA-CACHI, Ecuador, a snow-capped and extinct Andean volcano, in the western Cordillera, 16,301 feet high. It is 58 miles north of Quito and at its base is the small town of Cota-Cachi, with cotton and other manufactures and a population of 5,000. The ascent of the mountain is difficult; its crater, 10,000 feet above sea-level on the southern slope, is occupied by one of the highest lakes in the world, locally known as Cuycocha. C.L.S.

COTES, MRS. EVERARD (pen name, SARA JEANNETTE DUNCAN), a Canadian novelist and writer of travels and descriptive sketches; born in Brantford, Ontario, Canada, in 1863, and educated at the Collegiate Institute of that city. She was the daughter of Charles Duncan, a merchant of Brantford, and made her *début* as a writer in the *Canadian Monthly* of Toronto. During the years 1883–88 she wrote largely for the Canadian newspaper and periodical press, including the Toronto *Globe*, *The Week* and the Montreal *Star*, and was for a time a newspaper correspondent at Washington, District of Columbia. She early developed a felicitous prose style, which gave charm to her social and literary contributions, which at this period appeared under the *nom de plume* of "Garth Grafton." In 1888 she made a tour of the world in the interest of a Canadian literary syndicate, accompanied by a fellow-journalist, Lilian Lewis, a young lady of Montreal. The result of this tour is embodied in her first production, *A Social Departure; or, How Theodocia and I Went Round the World.* The work, which appeared simultaneously in England and America in 1890, was first contributed to the London *Ladies' Pictorial*, by whose artist staff it was delightfully illustrated. This was quickly followed (for *A Social Departure* was a gratifying success) by *An American Girl in London* (1891). In 1893 appeared *The Simple Adventures of a Mem-Sahib*, and in the following year *A Daughter of To-day* and *Vernon's Aunt.* In 1895 two further works came from her pen, *The Story of Sonny Sahib* and *His Honor and a Lady.* The latter, a clever, realistic novel of Anglo-Indian life, appeared serially in the *Pall Mall Magazine*, and in book-form was also issued on both sides of the Atlantic. All of Mrs. Cotes's productions show the working of a bright and original mind. She is gifted with a fine perception of the eccentricities and weaknesses of human nature, and a pervasive humor. She has also great facility in portraying character and sketching lightly scenes and incidents in social life. In 1890 she married Everard Cotes, a scientist in the East India Company's service, and made her home in Calcutta, India. G. MERCER ADAM.

COTGRAVE, RANDLE, an English lexicographer, of whose life little is known save that he was a native of Cheshire, and was admitted scholar of St. John's College, Cambridge, in 1587; became secretary to William Cecil, Lord Burghley, and was living as late as 1632, and died probably in 1634. He was author of our earliest French dictionary (1611), a remarkable book for its time, and still of value to the philologist, as it fixes the actual forms of French words at the time when they were borrowed.

COTINGA, a genus of birds of the family *Cotingidæ*, found in tropical regions of America. They are remarkable for their splendid and bright-colored plumage and curious ornamentation.

COTONEASTER, a genus of hardy ornamen-

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tal shrubs, of the order *Pomaceæ*, closely allied to the hawthorn, medlar and quince. The name is derived from *Cotoneum*, a quince tree, in reference to the downy leaves of this genus being similar to the quince. They are common mountain plants of central Europe and Asia, and are especially useful for covering walls and rock work. They bear small, unpalatable but bright-colored fruit, persistent in winter. W.R.B.

COTTA, BERNHARD VON, German geognost; born Oct. 24, 1808, at Kleinen Fillbach, near Meiningen; studied at the mining academies of Freiburg and at Heidelberg. In 1842 he was appointed professor of geology at Freiburg, where he died, Sept. 14, 1879. He prepared a geonostical map of Saxony and Thuringia. He wrote *Anleitung zum Studium der Geognosie and Geologie* (1839); *Gesteinlehre; Geologie der Gegenwart*, etc. G.A.S.

COTTAGE CITY, Massachusetts, a town of Dukes County, Martha's Vineyard, on Nantucket Sound, six miles N. of Edgartown. Pop., 1900, 1,100. C.L.S.

COTTBUS, town in Brandenburg province, Prussia. Pop. 1900, 39,327. See KOTTBUS, XIV, 145.

COTTEREAU, JEAN, the leader of the CHOUANS; which see, Vol. V, p. 596.

COTTIDÆ, a family of shore fishes inhabiting the Arctic regions. See ICHTHYOLOGY, Vol. XII, p. 728.

COTTON. See COTTON, Vol. VI, pp. 427–451; and AGRICULTURE, in these Supplements.

COTTON, CHARLES STANHOPE, naval commander, was born at Milwaukee, Wis., on February 15, 1843, and entered the U. S. navy in 1858. He served throughout the Civil War, on the *St. Lawrence*, on the *Monitor* in the duel with the *Merrimac*, and on the *Oneida* in Mobile Bay. He was on active duty in the war with Spain in 1898, and in 1900 was promoted to be real-admiral and was put in charge of the navy yard at Norfolk, Va. W.F.J.

COTTON, JAMES SUTHERLAND, an English writer and editor; born in the Madras presidency, July 17, 1847; educated at Winchester and Oxford; called to the bar in 1874; assistant to Sir W. W. Hunter, the great English authority on Indian affairs; the author of several Indian blue-books; contributed to this ENCYCLOPÆDIA and *Leslie Stephen's Dictionary of National Biography;* edited *The Academy*, and conducted an annual containing important acts of Parliament, entitled *Paterson's Practical Statutes.*

COTTON, JOHN, an American clergyman; born in Derby, England, Dec. 4, 1585. He was educated at Trinity College, Cambridge, and became a fellow of Emmanuel College. About 1612 he was appointed vicar of St. Botolph's Church, Boston, Lincolnshire, where he remained twenty years, noted as a preacher and controversialist and inclining toward Puritanism. This attitude brought him into conflict with Archbishop Laud, and he fled to Boston, Mass., where he arrived Sept. 4, 1633. Here he was ordained colleague with Mr. Wilson, the pastor of the first church established in Boston, and in this connection he remained for 19 years. He had a high reputation for learning, and published many theological works, the most celebrated of which were in defence of the interference of the civil power in support of "the" truth. He died in Boston, Mass., Dec. 23, 1652. E.E.T.

COTTON-GRASS, a popular name for the genus *Eriophorum*, plants of the family *Cyperaceæ*, common in swampy land. It has spikes resembling tufts of cotton, and the cottony substance has been used for stuffing pillows, making candle-wicks, etc.

COTTON-RAT (*Sigmodon hispidus*), a rodent resembling the Norway rat, common it the cotton-fields of the southern United States.

COTTONSEED AND COTTONSEED-OIL, one of the most important industries in the United States and other countries is the manufacture of cottonseed-oil and its bye products from cottonseed. After having been thrown aside for centuries, as a waste article, cottonseed was first used as a fertilizer, then as a source of oil and cattle food. It is now made to yield nutritious table food and useful articles of industrial pursuits. No portion of the seed is wasted. After the oil, which is its main product, is extracted, the residuum makes the best cattle food, while the hulls are used as bran, for making paper, as fuel, and as a fertilizer. The seed is first of all separated from the cotton wool by the process known as "ginning." The seed is a gray farinaceous kernel, enveloped in a hard black hull. The seed is first of all separated from the lint that still adheres to it in a linting machine, and then passes to a hulling machine in which a cylinder covered with knives cuts the seeds into small bits, which are conveyed to the revolving screens that separate the kernels from the hulls. The kernels go to the crushing rolls. The new steel plate hydraulic press has 15 plates on top of each other, and each plate makes a cake about 14 by 30 inches, weighing, after the oil is expressed, about 12 pounds. A ton of seed yields 40 gallons of oil.

The oil as it runs from the presses is mahogany-colored, known commercially as "crude oil," and to fit it for industrial and domestic purposes, it must be subject to two treatments: purging and refining. For the first of these caustic soda has a special adaptability, and is universally employed. An aqueous solution of soda of about 72 per cent purity, is prepared, and about 24 gallons of this liquor, per ton of oil, will separate the grosser impurities as a mucilaginous deposit, involving a certain percentage of oil. This is a desirable material for soap-making and for this purpose it finds an extensive outlet. The "purged" oil still contains a remnant of foreign matters, dark color, foul odor, rough taste and a rancidity, all of which must be removed. Acids and chemical bleaching agents of various kinds are resorted to, their effect being either to mask such impurities as they are incapable of removing, or remove them altogether. The favorite bleaching agents are chloride of lime dissolved in water, supplemented by sulphuric acid, the ratio being 6½ lbs. of chloride of lime, plus 5 lbs. of sulphuric

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acid, to one ton of oil. Fuller's earth is sometimes used as a cleanser and sweetener, also a solution of 98 per cent of pure caustic soda, as alternative methods of purification. Finally, powdered whiting is used to still further purify the oil. Pure cottonseed-oil is of a bright golden tint; the pale, or lemon-colored oils, have been chemically bleached. The natural flavor is sweet and nutty. The refined oil boils at about 600° F. and congeals at 50° for summer, and 32° for winter pressed.

The American seed yields a clearer oil than the Egyptian, or the Indian; and that from our seacoast is a darker oil than that from the uplands. The oil made in Great Britain is not so clear as the American oil, because the seed treated is Egyptian, or Indian, and is not decorticated owing to the difficulty of picking it. The present consumption of cottonseed for oil-making purposes is about three million tons a year, from which there are made about 100,000,000 gallons of oil worth about 30 cents per gallon in the refined condition. The principal use to which it is put, is for food purposes. It is not only nutritious and healthful, but the fact that it is more easily digested than almost any other article of food, accounts for the rapid increase of its use for culinary purposes. Nine-tenths of the 100,000,000 gallons made each year enter into the composition of food products, principally refined lard, and salad and cooking oil. At first employed to temper down hogs' lard intended for sale in cold climates, and which, for this reason, required its stiffening point lowered, it was afterwards used in lard for temperate climates, its extreme fluidity being corrected by the use of a sufficient proportion of pure caul fat of beef. This admixture is sold as "cottolene." Three-fourths of all lard made and used contains cottonseed-oil, in proportions from ten to twenty-five per cent; most of it avowedly, although for years, leading houses used it secretly, for fear of popular prejudice. At present the tide of public opinion is setting in favor of its use, which extends to butterine, oleomargarine and other products. The principal refiners not only admit that they use it, but take pains to have the fact known, as an argument in favor of the purity of the product. In point of fact, when it is considered that under sworn testimony it has been proven that, in the manufacture of "prime lard," many diseased, crushed and smothered animals are used, as well as the feet, hoofs, entrails and other objectionable parts of healthy hogs, the cottonseed-oil is frequently the only pure ingredient in the combination. Many, who have no scruples against eating hog products, avoid hog's lard on account of its revolting suggestions.

As an illuminant the cotton oil ranks between sperm, which has the highest illuminating power of all burning oils, and lard, which is about the next best. Alone it may be burned in any of the ordinary lamps used in burning either sperm or lard oils. It is not, however, of special value as a lubricant. Much of the oil is exported to various Mediterranean ports and not only sold as olive-oil, but is mixed with olive-oil, or otherwise "prepared," and sold as olive-oil. Much of the "olive-oil" exported from Genoa, Nice, Naples and Marseilles to the United States is only cottonseed-oil with a new label.

The cakes, after the oil is expressed, are sometimes ground into fine meal and sometimes left whole for export to England and Scotland, where they are coarsely ground, or broken up for feeding sheep or cattle. In Germany the demand is for the finest meal that can be produced. About ten per cent of the oil still remains in the cake. Cottonseed meal as a food for cattle largely increases the flow of milk, makes richer milk, gives butter and cheese, more and better meat, and richer manure. Its main value is that it supplies the albuminoids and fat, which in hay, straw and corn-stalks are lacking.

A ton of cottonseed, that is 2,000 lbs., will yield of lint 20 lbs.; of crude oil 289 lbs.; of cake, or meal, 800 lbs.; of hulls, 891 lbs. The crude oil becomes purified oil, salad oil, lard, cottolene, miner's oil, stearine and soap stock and soaps. The hulls are made into high grade paper, bran, fertilizing fuel ashes and fertilizer.

The figures that indicate the growth of this great industry are immense. Given an average cotton crop of 10,000,000 bales, there will be 2,500,000 tons of seed to be crushed valued at $25,000,000. This will yield close to 100,000,000 gallons of crude oil and nearly 900,000 tons of cotton-oil cake and meal. In 1902, from some 400 mills, 736,000 tons were exported. W.R.B.

COTTONWOOD FALLS, a city and the capital of Chase County, eastern central Kansas, 66 miles S.W. of Topeka, on the Cottonwood River, and on the Atchison, Topeka and Santa Fé railroad. The vicinity is a forest and grain-raising district, and the river gives good power for flour and lumber mills. Population, 1900, 842.

COTTONWOOD SPRINGS, a popular health and pleasure resort of Chaffee County, central Colorado, about six miles S.W. of Buena Vista. It is noted for its medicinal springs and for its charming scenery.

COTTONWOOD TREE. See POPLAR, Vol. XIX, p. 526.

COTTON-WORM, the caterpillar of an owlet-moth (*Aletia xyliria*) which is in some years very destructive to the cotton crop of the United States. The caterpillar is green with yellow stripes and black dots and grows to a length of an inch and a half. W.R.B.

COTULLA, a town and the capital of La Salle County, southern Texas, 86 miles by rail S.S.W. of San Antonio, on the Nueces River, and on the International and Great Northern railroad. Industry, grazing. Population, 1,016.

COUCH-GRASS (*Triticum repens*), a species of grass common in Europe and North America, known to farmers as a troublesome weed; it spreads over the field with great rapidity, and on account of its tenacity of life is eradicated with difficulty. The roots are sweet and mucilaginous, and are collected at Naples for feeding horses.

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COUCY, Renaud, Châtelain de, a court poet belonging to the north of France, who flourished in the latter part of the twelfth century. He became a Crusader; it is supposed that he accompanied Philippe Auguste and Richard Cœur de Lion to the Holy Land, probably in the service of Raoul Sieur de Coucy, with whom he often is confounded. His poems were songs of passion, distinguished for their ardor and animation. They are preserved in the *Chansons du Châtelain de Coucy*, by F. Michel, Paris.

COUDERSPORT, an organized borough and the county seat of Potter County, Pennsylvania, in the "northern tier" of that state. It is in an agricultural and oil region, and is reached by the Coudersport and Port Allegheny railroad. Its population was 3,217 in 1900. W.F.J.

COUES, Elliott, naturalist, was born at Portsmouth, N. H., on September 9, 1842, and was graduated from Columbian University, Washington, in 1861, and from its Medical Department in 1863. He served for many years as an army surgeon, and as surgeon and naturalist of the U. S. northern boundary survey. In 1876 he became geologist and naturalist to the U. S. geological and geographical survey of the territories. His work, his official reports, and his own writings on zoölogical and other topics, attracted wide attention, and Darwin, Huxley, and other eminent scientists joined in an invitation to him to remove to London and become connected with the British Museum. Instead of accepting this flattering invitation he remained in America. Finding his scientific work hampered by military duties and by the petty jealousies of his fellow-officers, he resigned his commission and thereafter devoted himself to work at the Smithsonian Institution and in the chair of anatomy in the National Medical College at Washington. He was the author of numerous books and magazine articles, and one of the editors of *The Century Dictionary*. He died on December 25, 1899. W.F.J.

ELLIOTT COUES.

COULANGES, Numa Denis Fustel de, a French essayist; born in Paris, March 18, 1830. He became a professor of history in the University of Strasburg in 1859, and in 1879 a professor at the Sorbonne. His published essays are principally on historical subjects. His history of serfdom in France, *Recherches sur Quelques Problèmes d' Histoire*, is the best authority on the subject extant, and its discussions throughout are founded on original sources.

COULDOCK, Charles Walter, an English actor; born in London, April 26, 1815. He made his first appearance on the stage in London in 1835. He made remarkable success in the English provinces supporting Macready and Kean, and in 1849 visited the U. S. He returned to New York in 1869 and took up his permanent residence there. He was best known as Dunstan Kirk in *Hazel Kirk*. He excelled in old men's parts. He died in New York city, Nov. 27, 1898. W.M.C.

COULTER, John Merle, an American educator and botanist; born in Ningpo, China, of American parentage, November 20, 1851. He was graduated from Hanover College in 1870. Until 1873 he was botanist with the United States Geological Survey in the Rocky Mountains. From 1874 to 1879 he was professor of natural sciences at Hanover College; from 1879 to 1891 professor of biology at Wabash College, and from 1891 to 1893 president of the University of Indiana. From 1893 to 1896 he was president of the Lake Forest University and in the latter year became professor of botany at the University of Chicago. In 1875 he founded the *Botanical Gazette*. His works include *Manual of Rocky Mountain Botany; Manual of Texan Botany; Handbook of Plant Dissection*, and Gray's *Manual of Botany* (revised edition). He wrote the botanical articles in these Supplements. W.M.C.

COUNCIL BLUFFS, a city of southwestern Iowa and capital of Pottawattamie County. The city was incorporated in 1853 and is now the largest city in the western part of the state. It contains a fine courthouse and other county buildings, a Roman Catholic seminary, a high school, several graded schools, and a state institution for deaf mutes, founded in 1855. Two iron railway and wagon bridges, each about a mile in length, span the Missouri and connect the city with Omaha. Its manufactories produce iron, paper, agricultural implements, machinery, carriages, etc., and it has an extensive wholesale trade. The population, was in 1900, 25,802. See Council Bluffs, Vol. VI, p. 455.

COUNCIL GROVE, a city and the county seat of Morris County, Kansas, in the east central part of that state. It is in a rich agricultural and cattle country, and is the seat of mills, canning factories and other establishments, chiefly tributary to agriculture, as well as a center of commerce. It lies on the Neosho River about 50 miles southwest of Topeka, and is reached by the Missouri Pacific and the Missouri, Kansas and Texas railroads. Its population was 2,221 in 1890 and 2,265 in 1900. W.F.J.

COUNCILMAN, William Thomas, an American physician; born in Pikesville, Maryland, January 2, 1854. He was graduated from the University of Maryland, became assistant professor in Johns Hopkins University and in 1900 was appointed professor of pathological anatomy at Harvard. He has written a *Contribution to the Study of Inflammation* (1879); *On the Etiology of Malaria* (1884); *Syphilis of the Lungs* (1890). W.M.C.

COUNCIL OF THE INDIES was a partly political partly ecclesiastical body, organized by King Ferdinand of Spain in 1511, at the suggestion of Bishop Fonseca, for the advice and assistance of the crown in the administration of colonial

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affairs. Its jurisdiction extended over the Spanish settlements in the Americas, and also over those in the Philippine Islands and elsewhere. Composed of statesmen and ecclesiastics who remained at home in Madrid, and who knew little or nothing about colonial affairs, its measures were often ill-advised, and it was frequently in conflict with Columbus and others who had discovered and explored the new lands, and who knew their real condition and needs. Much of the failure of Spain's colonial policy may be attributed to this body, which reached the summit of its power under Charles V. W.F.J.

COUNTERFEITING is the act of imitating or copying anything with the intent of fraudulently passing off the copy as original and genuine. Under the provisions of the Revised Statutes of the United States many illegal acts are classed as counterfeiting. Counterfeiting the signature of any person to obtain the approval, allowance or payment of a claim against the government, when done by a person in the military or naval service of the United States, subjects the convicted person to such punishment as a court-martial may fix. Counterfeiting any instrument in writing concerning lands, mines or minerals within the state of California is also made a felony, punishable by imprisonment for not less than three years or more than ten years, and a maximum fine of $10,000, or both. It is also made an offense to counterfeit, alter or reuse the revenue stamps designed to be placed on packages of fermented liquor or wine made in imitation of sparkling wine or champagne, as well as stamps for use on proprietary medicines. Sections 5414–5416 provide that every person who, with intent to defraud, falsely makes, forges or counterfeits any obligation or security of the United States shall be punished by a fine of not more than $5,000, and imprisoned at hard labor for not more than 15 years; counterfeiting the circulating notes used by any banking association, a penalty of from 5 to 15 years' imprisonment and a maximum fine of $1,000; counterfeiting letters patent, a maximum fine of $5,000 and imprisonment not to exceed 10 years. The counterfeiting of any certificate of entry required by any officer of the customs is punishable by a fine of not more than $10,000 and imprisonment for not more than three years. To counterfeit any bid, proposal, guaranty, official bond, public record, affidavit or other writing, for the purpose of defrauding the United States, subjects the convicted person to a fine of not less than $1,000 and imprisonment for not more than ten years, or both. The seal or signature of an official of the United States is protected from being counterfeited by the provisions of section 5419, which imposes a penalty of from $500 to $5,000 fine and not more than five years' imprisonment. Other subjects of counterfeiting are military bounty land-warrants, power of attorney, order, certificate or receipt, and protection is also given to ship's papers, custom-house documents, naturalization papers and other papers pertaining to the naturalization of aliens, the penalties being very heavy. The coin of the United States and foreign countries is protected under section 5457, which provides against the counterfeiting of any coin or bars in resemblance or similitude of the gold or silver coins current. It also provides against the bringing into the United States of any such counterfeit money. The maximum penalty is $5,000 fine and ten years' imprisonment. Section 5458 provides against the counterfeiting of the minor coins; one, two, three and five cent pieces are additionally protected by section 5462, the penalty on conviction being a fine of not more than $1,000 and imprisonment for not more than five years. Section 5463 prohibits the counterfeiting of postal money-orders; 5464 covers the counterfeiting of postage stamps, and 5465 protects foreign stamps. Counterfeiting any key suited to any lock adopted by the post-office department subjects the offender to imprisonment at hard labor for a period of not more than ten years. The statutes also provide that any person who makes, aids in making, or causes to be made, or has in his possession with fraudulent intent, or permits to be used, any die, hub or mold of any substance whatever, in likeness of any die, hub or mold, used for coining United States coins, shall be fined not more than $5,000, or imprisoned at hard labor for not more than ten years, or both. In the case of foreign coins, the fine is $2,000 and the imprisonment five years, or both. All counterfeits and implements are confiscated by the government, and officers, when authorized by United States judges or commissioners, may enter any place, in the daytime only, to search for the same. For the purpose of keeping the counterfeiting of money as much in check as possible, the territory of the United States is divided into ten districts, and experienced secret-service officers are constantly engaged in ferreting out counterfeiters and suppressing the business. Congress provides for the support of the service by annual appropriations, which are expended under the direction of the Secretary of the Treasury. The South and West are the sections most infested with counterfeiters, and much more work is done in counterfeiting coin than bank or treasury notes. The vigorous crusade of the government officials in recent years has done much to stamp out this nefarious business, and but little counterfeiting is now done in the United States.

COUNTER-IRRITANT, a substance used to produce local inflammation or congestion upon the surface of the body, for the purpose of relieving some internal inflammation or congestion. It is generally applied to a part of the surface at some distance from the diseased organ. The counter-irritant causes the blood to flow in increased quantities to the part to which it is applied, which results in lessening the flow of blood through the diseased part, thus reducing its congestion or inflammation. Counter-irritants that simply redden the skin are called rubefacients, as mustard, red pepper, turpentine; those that blister, epispastics, as cantharides, ammonia, croton-oil; and those that actually destroy the tissues with which they come in contact, caustics, as silver nitrate, caustic potash, caustic soda, etc. The cautery, in the form of a red-hot iron, or a wire heated by passing through it a current of electricity, is also used.

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COUNTY COUNCILS, a system of local government established in England and Wales by the Local Government Act of 1888, by which all duties relating to strictly local matters that were formerly performed by the justices in quarter sessions were transferred to the county councils, which were brought into existence by the act. For the purpose of the establishment of these councils, what are termed administrative counties were formed. The powers and duties of the councils refer to county finance, rating and assessment, county buildings, bridges, lunatic asylums, reformatories, registration and polling of Parliamentary electors, cattle diseases, the appointment of coroners, the maintenance of highways, preventing the pollution of rivers, and many other matters of minor importance. The police is under the joint management of the councils and the courts of quarter sessions. In regard to finances, the councils have the power of levying county and other rates, and they receive a share in certain licenses collected by the imperial government, and also a proportion of the probate duties.

The most interesting of all the councils is the London county council. London is an administrative county, covering an area of 121 square miles; and has absorbed, so far as ratable value is concerned, about seven eighths of Middlesex, about two thirds of Surrey and about one third of Kent counties. In it the city of London is an electoral division. The administrative county of London includes within its limits the county of the city of London and the county of London—that is, the metropolis outside the city of London proper—the two latter being counties for such non-administrative purposes only as quarter sessions, justices, etc. Such matters as require the consideration of both the administrative and non-administrative county are referred to the "standing joint committee" of the London county council and the London quarter sessions. In that the administrative county of London has no jurisdiction over the police, it differs from other county councils. The council comprises a chairman, 19 aldermen and 118 councilors—in all, 138. The term of office for each alderman is six years, and nine or ten retire every three years. The councilors are elected for three years. The functions of these two classes of members are the same except as to term of service. The councilors are elected directly by the rate-payers; the councilors elect the aldermen. Among some of the more important works accomplished by the council are the clearing of large, unhealthy areas and rebuilding thereon suitable artisan houses. The council has established a model lodging-house, capable of accommodating 324 men, located at Parker Street, Drury Lane. The most important work has been the Thames tunnel at Blackwell (see BINNIE, ALEXANDER R., in these Supplements). The free ferry at Woolwich and the rebuilding of the Vauxhall bridge are other improvements undertaken by the council. See also LOCAL GOVERNMENT, ENGLAND AND LONDON, in these Supplements.

COUPLE, the name given in statics to a pair of equal forces acting on the same body in opposite and parallel directions. The effect of a couple is to rotate the body about a certain definite line (the axis) perpendicular to the plane in which the forces constituting the couple lie.

COURBET, GUSTAVE, a French painter; born at Ornans, in Franche-Comté; died at Vevay, Switzerland, Dec. 31, 1877. The son of well-to-do farmers in the Jura region, he manifested early dispositions toward art; he received his education at Besançon, and when 20 years old, was sent to Paris to study law. But he abandoned everything for painting. He soon showed himself refractory to the influence of any of the leading teachers of his time, and struck boldly forward on the road toward realism, open-air art and impressionism. His first attempts to present his views of nature as he saw it, with an exuberance of light-and-shade effects unknown up to his day, were mockingly received, and in 1855, at the time of the first Paris exposition, he had to build his own exhibition-rooms close to the main entrance to the world's fair grounds. He was quite well known already, and admired by many, but his fame was of slow growth. He joined the Paris Commune, in hopes of helping the triumph of socialism. In a foolish moment he urged the pulling down of the Colonne Vendôme. For this act of vandalism he was sentenced to prison and a heavy fine, the amount of which was used to rebuild the column, every fragment of which was recovered. His recognition as one of the masters of modern landscape-painting is not discussed any longer. Two of his masterpieces adorn the National Museum of the Luxembourg, and the influence of his truthful, vivid and intensely original representation of nature is strongly felt among the present generation of landscape-painters. A list of his more prominent works include *After Dinner at Ornana* (1849); *The Interment at Ornans* (1850); *The Stone-Breakers* (1851); *Woman with a Parrot, and Deer at the Brook of Plaisirs-Fontaine, Doubs* (1866); *The Charity Beggar; Deer, Springtime* (1868); *The Stag-Whoop; Siesta in the Haying Season* (1869); *The Stormy Sea; The Beach at Etretat After a Storm* (1870). Of his works that have been purchased and come to the U.S. are *La Curée; Rocks on the Coast; Woman with a Parrot; Young Woman of the Seine;* and *Doe Run Down in the Snow.*

GUSTAVE COURBET.

COURBEVOIE, a town in the department of Seine, France, 5 m. N.W. of Paris. It has manufactures of wagons and awnings. Its port traffic in 1899 amounted to 88,074 tons. It has some attractive buildings. Pop. 1901, 25,330.

COURG OR CURG, a province of south India. See COORG, Vol. VI, p. 302.

COURLAN OR LIMPKIN, the common names of the rail-like birds of the family ARAMIDÆ; q.v., in these Supplements.

COURTHOPE, WILLIAM JOHN, man of letters; was born in Sussex, England, on July 17, 1842, the son of a country clergyman, and was

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educated at Harrow and at New College, Oxford, from which latter he was graduated with double first honors, with also the Newdigate prize for poetry and the chancellor's prize for English essay. He became a civil service commissioner in 1887, and first civil service commissioner in 1892, an honorary fellow of New College in 1896, and professor of poetry in the University of Oxford in 1895–1901. He was for a time one of the editors of the *National Review*, and has contributed much to that and other leading English reviews. His bibliography is extended and notably varied, comprising light and brilliant humor and profound and philosophical criticism. It includes *The Tercentenary of Shakespeare* (Newdigate prize poem, 1864); *The Genius of Spenser* (chancellor's prize essay, 1868); *Ludibria Lunæ* (1869); *The Paradise of Birds* (1870); *Life of Addison* (English Men of Letters Series, 1882); a *History of English Poetry*, a monumental work, of which Vol. I appeared in 1895, Vol. II in 1897, and Vols. III and IV in 1903; *Life in Poetry, Law in Taste* (1901), and some minor works. He has edited the works of Alexander Pope and has written a biography of that poet. He has received the honorary degrees of Litt. D. from Durham and LL.D. from Edinburgh. W.F.J.

W. J. COURTHOPE.

COURT JESTER. See FOOL, Vol. IX, p. 320.

COURTLAND, a town of Lawrence County, northwestern Alabama, 45 miles W. of Huntsville, on the Memphis and Charleston railroad. It is the seat of two academies and contains a number of steam-mills. Population 1900, 488.

COURTNEY, LEONARD HENRY, a British statesman; born at Penzance, Cornwall, July 6, 1832; educated privately, and for a while was in a bank, but went to Cambridge and graduated at St. John's College in 1855, where he was a distinguished scholar and fellow. He was called to the bar at Lincoln's Inn in 1858, was appointed to the chair of political economy in University College, London, in 1872, and retired in 1876. He was elected to Parliament in 1876 for Liskeard, which constituency he continued to represent until 1892, and afterward sat for Bodmin, as a Liberal-Unionist. He was Under-Secretary for the Home Department in 1880 and for the Colonies in 1881, and Financial Secretary to the Treasury in 1882, succeeding Lord Frederick Cavendish. He contributed regularly to *The Times*, and extensively to the magazines and reviews. He was made a privy councilor in 1889. His pamphlet on *The Finances of the United States* (1861–67) was published in the *Journal of the Statistical Society*.

COURT OF PRIVATE LAND CLAIMS, a Federal tribunal, constituted by act of Congress on March 3, 1891, to exist until June 30, 1904, when it was to "cease and determine." Its jurisdiction was established over the claims to lands in the territory acquired by the United States from Mexico, the appeal from its decisions being to the Supreme Court of the United States. Its seat was at Santa Fé, New Mexico, and it was composed of a Chief Justice and four Associate Judges, who received salaries of $5,000 a year. Its members were appointed by the President, and approved by the Senate. W.F.J.

COURTS are such tribunals as are established by law for the public administration of justice. Courts are composed of one or more judges or justices, together with such other officers as the law prescribes. In the United States, courts may be classed as civil, or those courts where private rights may be enforced or private wrongs redressed; and criminal courts, or those established for the punishment of public offenses, as crimes and misdemeanors. Civil courts may again be divided into,—

1. Courts of general original jurisdiction, or those which have general power to enforce the laws of a certain municipality, as the United States, a state or a city. The courts of general jurisdiction of the United States are the United States circuit courts and the United States district courts. The state courts of general or final jurisdiction are usually called circuit or county courts.

2. Courts of appellate jurisdiction, or those which obtain jurisdiction only through appeal from some court where the matter has formerly been tried; as, the supreme court of the United States and the United States court of appeals. The state courts having only appellate jurisdiction are the supreme, and in some states an intermediate, court, called court of appeals or appellate court.

3. Courts of limited jurisdiction, or those courts which have jurisdiction over certain specified controversies only, such as justice of the peace courts, whose jurisdiction is limited to controversies of certain kinds, and where a small amount only is involved. Other courts of limited jurisdiction are the court of claims of the United States, where claims against the government are determined; admiralty courts, where maritime causes are heard; probate courts, which have jurisdiction over the estates of deceased persons; courts of chancery in some states, which have an equity jurisdiction; courts of inquiry and courts-martial, which have jurisdiction in military controversies, and other special courts of the various states. Courts may be courts of record, or those which keep a record of all proceedings independent of the magistrate presiding over them; or courts not of record, as where all proceedings need not be recorded.

COUSIN, JEAN, a French painter and sculptor; born 1501 at Soucy, near Jens. Among his most noted works are *The Last Judgment*, painted on glass for the church of St. Romain, and reproduced by him in oil for the town of Vincennes (now in the Louvre); *The Marriage in Cana*, now in the Museum of Rennes; *Christ Preaching in the Desert*, and the *Tiburtinic Sybil*. One of his most famous sculptures, the figure of Admiral de Chabis in a lying position, is now in the

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Louvre. He wrote *Régles de l'Art de Perspective* (1560, new edition 1900), and *Livre de Portraiture* (1571). He died about 1590. G.A.S.

COUSIN, SAMUEL, engraver; was born on May 9, 1801, at Exeter, England, and studied under S. W. Reynolds, the mezzotint artist, in many of whose prints he had a hand, and of whose reputed prints after Sir Joshua Reynolds, fifty-five in number, Cousin was the real author. He also produced, early in his career, many admirable portraits in pencil. He began engraving in mezzotint on his own account in 1826, and soon won a great reputation with a series of fine plates after Reynolds, Lawrence, Landseer, Leslie, Millais, Leighton, and other painters. He considered his best work to be *Marie Antoinette in the Temple*, after the painting by E. M. Ward. He was elected engraver to the Royal Academy and he left to the academy a fund of $75,000 for the aid of poor artists. He died on May 7, 1887. W.F.J.

COUTRAS, a town of southwestern France, in the department of Gironde, situated on the west bank of the Dronne, 26 miles, N.E. of Bordeaux. Here, on Oct. 20, 1587, Henry of Navarre gained a bloody victory over the forces of the League. It has considerable trade in flour, and the district produces red wine. Population 1891, 4,231.

COUTURE, THOMAS, a French artist, born in Senlis, Dec. 21, 1815, who very early attracted attention and admiration, and whose famous painting, *La Décadence des Romains* (1847), now at the Luxembourg, inaugurated an era in the art of Paris. Influenced by the classicism of David, but still more by the new era that succeeded the return of the house of Orleans, Couture took a classic subject, and treated it with the glowing spirit, the free brush, and the unbridled license of a Rubens. What was ostensibly a moral lesson was in reality a seduction to the pure. His *Troubadours* (1844) realized 55,000 francs at the Gsell sale. Among his other works are *The Return of the Troops from the Crimea; The Baptism of the Prince Imperial;* and *Two Volunteers of the French Revolution*, which was exhibited at the Boston Art Museum. His *Idle Student* is in the Museum of Art, New York. He was a chevalier of the Legion of Honor, and died at Villiers-le-Bel, Seine-et-Oise, March 31, 1879.

COUVREUR, MARIE AUGUSTE, an English novelist; born at Highgate, London, of Dutch and French parentage; was taken to Tasmania in her infancy, where at an early age she commenced to write for the press, adopting the pseudonym of "Tasma." She became known as a public speaker, and made two trips to Europe, during the second of which she lectured before the Geographical Society of Paris, receiving therefrom the title of Officer of the Academy. She married M. Auguste Couvreur, the free-trader, and during her residence at Brussels was correspondent for the London *Times*. Her best-known novel is *Not Counting the Cost.* Among her works are *Uncle Piper of Piper's Hill* (1889); *In Her Earliest Youth* (1890); *A Sydney Sovereign* (1890); and *The Penance of Portia James* (1892). She has been called the Australian George Eliot.

COVENANT, in Biblical language, a compact or agreement between two parties. It more particularly refers to the covenants between God and man, as when God covenanted with Noah, after the flood, that a similar judgment should not again be inflicted. The principal Biblical covenants are: 1. The covenant of works—that is, the promise of God to save and bless men on a condition of their perfect obedience—which is called the old covenant, as contained in the Pentateuch (see PENTATEUCH, Vol. XVIII, p. 520); and 2. The covenant of grace—that is, God's promise to save and bless men through their faith in Christ—which is called the new covenant.

The federal system of theology was based on the analogy of such covenants. (See COCCEIUS, Vol. VI, p. 84; also THEOLOGY, Vol. XXIII, p. 287.)

The name is applied also to two Scottish historical agreements, the one called the National Covenant (q. v., COVENANTERS, Vol. VI, p. 470); and the other the Solemn League and Covenant (see HENDERSON, ALEXANDER, Vol. XI, p. 581; also SCOTLAND, Vol. XXI, p. 534).

COVENANT, in law, is an agreement between two or more persons, expressed in writing and under seal. It differs from an ordinary agreement, in that it must be under seal. Each specific undertaking or stipulation in an instrument under seal is also called a covenant. The term, in law, is used, also, to signify a form of action by which suit may be brought to recover damages for the breach of a contract.

COVENT GARDEN. See LONDON, Vol. XIV, p. 838; and in these Supplements.

COVENTRY, a rural town on the New England railway in Kent County, R. I. Pop. 1900, 5,279.

COVINGTON, a town of Georgia, capital of Newton County, about 40 miles E. of Atlanta. It has a Female College. Population 1900, 2,062.

COVINGTON, a city and the capital of Fountain County, northwestern Indiana, on the Wabash River, 72 miles W.N.W. of Indianapolis, on the Wabash and Erie canal, the Cleveland, Cincinnati, Chicago and St. Louis and the Wabash railroads. It has iron foundries, and ships coal, produce and live-stock. Population 1890, 1,823; 1900, 2,213.

COVINGTON, Kentucky, the seat of Kenton County, a northern city opposite Cincinnati, Ohio, with which it is connected by a fine suspension bridge, and in the trans-urban and interurban steam and electric railroad systems of which it shares, along with adjacent Kentucky towns and villages. Covington is a busy manufacturing city. Among recent buildings are a government court-house, post-office, and a handsome Roman Catholic Cathedral. See COVINGTON, Vol. VI, p. 471. Population, 1890, 37,371; 1900, 42,938. C.L.S.

COVINGTON, a town and the capital of St. Tammany Parish, eastern Louisiana, 36 miles N. of New Orleans, on the Bogue Falia River, and on the East Louisiana railroad. It is seven miles N. of Lake Pontchartrain, and is surrounded with pine forests. Population 1890, 976; 1900, 1,205.

COVINGTON, a town and the capital of Tipton County, southwestern Tennessee, 36 miles N.E. of Memphis, on the Chesapeake, Ohio and Western

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railroad. It has saw-mills, fertilizer-works and cotton-compresses. Population 1900, 2,787.

COW-BIRD, the name of several species of conical-beaked, long-winged, polygamous birds of North and South America, the one most known in the United States being *Molothrus pecoris*. They gather in flocks among cattle, lighting upon their backs; and have the peculiarity of laying their eggs in other birds' nests. Most of the species are of a lustrous black color. R.W.C.

COWELL, EDWARD BYLES, a Sanskrit scholar; born at Ipswich, in Suffolk, Jan. 26, 1826; he was from 1864–67 professor of Sanskrit at Calcutta, and from 1867 to the time of his death, Feb. 9, 1903, at Cambridge. His principal works are an edition and translation of *Vikramorvaçi;* of *Prâkrita-Prakâça;* of *Katha-Upanishad;* of *Maitri-Upanishad;* an introduction to *The Ordinary Prakrit of the Sanskrit Dramas.*

G.A.S.

COWEN, FREDERIC HYMEN, an English composer and conductor; born at Kingston, Jamaica, Jan. 29, 1852; studied under Benedict and Goss, and at Leipsic and Berlin. He was from 1888–92 conductor of the London Philharmonic Concerts, and succeeded, in 1896, Charles Hallé as conductor of the Manchester and Liverpool Philharmonic and Bradford Concerts, and was in 1900 re-elected conductor of the London Philharmonic Concerts. He composed *The Corsair*, cantata (1876); *Language of Flowers*, suite (1880); *Scandinavian Symphony* (1880), his best work; *Welsh Symphony* (1884); *Thorgrim*, opera (1890); *Signa*, opera (1897); *Ode to the Passions* (1898). G.A.S.

COWEN, JOSEPH, eldest son of Sir Joseph Cowen, was born at Blayden Brows, Durham, England, in 1831, and educated at the University of Edinburgh. In early life he was the intimate friend of Mazzini, Garibaldi, Kossuth, Herzen and other political exiles. He became unceasing in his advocacy of the cause of the oppressed European nationalities. To aid their propaganda he established a private press, at which their revolutionary manifestos were printed and then smuggled into Italy, Hungary and Poland. He was identified intimately and actively with the different Garibaldian expeditions to establish a free and united Italy, and with Langiewicz's unsuccessful effort for Polish independence. He was elected to Parliament for Newcastle-on-Tyne in 1873 (on the death of his father), representing that constituency until 1886. He was one of the pioneers of co-operation, and in Parliament brought forward many progressive measures. The proprietor of the Newcastle *Daily Chronicle*, an influential organ in the north of England, to which he himself has contributed, he did not seek, after 1886, to re-enter Parliament, but devoted himself to political writing.

COWHAGE OR COWITCH, a name primarily applied to the brittle barbed hairs that cover the pods of *Mucuna pruriens*, a West Indian leguminous plant. These hairs, suspended in syrup, are used as a vermifuge. The name has also been applied to other plants with hispid capsules, as *Acidoton urens*, of the family *Euphorbiaceæ*, and *Tragia volubilis*, of the same family, both West Indian plants.

COWLEY, HENRY RICHARD CHARLES WELLESLEY, EARL, was born on June 17, 1804; a nephew of the Duke of Wellington. He was British ambassador to France from 1852 to 1867, a period of great difficulty, a British member of the Paris Congress of 1856, and with Cobden negotiated the Anglo-French commercial treaty of 1860. He died on July 14, 1884. W.F.J.

COW-PARSNIP, the common name of species of *Heracleum*, a genus of *Umbelliferæ*, and growing in the north temperate regions of both hemispheres. They are tall, strong-scented plants, with compound leaves, white or pinkish flowers (unusually large for the family) and flat-winged fruits. *H. lanatum* is the common species of the United States, a very stout plant, growing in damp, rich ground.

COWPENS, a historic village of Spartanburg County, South Carolina, in the northwestern part of that state. It lies in the valley of the Broad River, in a picturesque and salubrious region. It is remembered as the scene of an American victory in the Revolutionary War, on January 17, 1781, won by General Morgan over the hitherto invincible British general, Tarleton. Its population was only 349 in 1890, and 692 in 1900. W.F.J.

COW-PLANT (*Gymnema lactifera*), a perennial plant of the family *Asclepiadaceæ*, a native of Ceylon. The milky juice is said to be used as a substitute for milk by the Singhalese.

COWPOX INOCULATION. See JENNER, Vol. XIII, p. 634.

COWSLIP. See PRIMROSE, Vol. XIX, p. 757.

COW'S MILK, in the United States. See AGRICULTURE, in these Supplements.

COW TREE, a name given to a number of trees of different families, the juice of which is used instead of milk. The most famous of these is the Palo-de-Vaca (*Brosimum galactodendron*), of the Cordilleras and Caracas, a plant of the family *Urticaceæ*. The milk is obtained by piercing the bark of the trunk or branches. It has an agreeable taste, somewhat like that of cow's milk, and its nutritive value is considerable. It is much used by the negroes and Indians.

COW-WHEAT, the common name of *Melampyrum*, a genus of plants of the family *Scrophulariaceæ*, having an oblong two-celled capsule, with a few seeds somewhat resembling grains of wheat.

COX, SIR GEORGE WILLIAM, an English clergyman and historian; born in 1827. He was ordained in 1850, and for several years was a curate. In 1860 he became assistant master in Cheltenham College. He has written several valuable histories and works on mythology, among which are *Tales of Ancient Greece; Mythology of the Aryan Nations; Lives of Greek Statesmen; Life of Bishop Colenso; History of Greece;* etc. He also contributed many articles to this ENCYCLOPÆDIA. He died in 1902.

COX, ISAAC N., a merchant of Ellenville, New York; born in Tallsburg, New York, Aug. 1, 1846. He received an academic education. A Democrat,

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he was elected a supervisor of his town in 1875 and 1883–86, being chairman of the board the latter year; was a member of the Democratic State Committee; in 1890 was elected a Representative from the seventeenth Congressional district of New York to the Congress of 1891–93.

COX, JACOB DOLSON, an American soldier; born in Montreal, Canada, Oct. 27, 1828. He graduated at Oberlin in 1851; Ohio Senator, 1859–61; brigadier-general of Ohio militia, serving in Virginia, Sherman's march to the sea, and in the Franklin and Nashville campaigns, and major-general of volunteers in December, 1864. He was elected governor of Ohio in 1865; practised law in Cincinnati, 1866–67; was Secretary of the Interior, 1869–70; president of the Wabash Railroad, 1873; in the United States House of Representatives, 1877–79; president of the Cincinnati University, 1885, and dean of the Cincinnati Law School, 1881–97. He died in Cleveland, Ohio, Aug. 4, 1900. E.E.T.

COX, KENYON, an American artist, son of the preceding; born at Warren, Ohio, Oct. 26, 1856; studied three years in Cincinnati; went to Philadelphia in 1876, and next year to Paris, where he was a student of Carolus Duran and of Cabanel and Gérôme at the École des Beaux Arts, where he remained three years, and then returned to America, locating his studio in New York City. He became a member of the American Society of Artists in 1882, and later its secretary, and won the second Hallgarten prize, National Academy of Design, in 1888. As an illustrator he is seen to advantage in his designs for Rossetti's *The Blessed Damozel.*

KENYON COX.

COX, PALMER, an American artist and author; born in Granby, Quebec, Canada, April 28, 1840. After graduating at the Granby Academy, he removed to San Francisco where from 1864 to 1875 he contributed to the *Golden Era* and *Alta-California.* In 1876 he removed to New York city, where he began to illustrate his own writings. He is best known by his "Brownie Books," a very popular series containing humorous pictures and verse for children. Other productions are *Hans von Petter's Trip to Gotham in Pen and Pencil* (1878); *How Columbus Found America* (1878); *That Stanley* (1878); *Queer People, Such as Goblins, Giants, Merry-Men and Monarchs, and Their Kweer Kapers* (1888); *Comic Yarns in Prose, Verse and Picture* (1889), and *Squibs, or Everyday Life Illustrated.* He is a member of various New York art clubs and since 1900 has made his home in Delaware. W.M.C.

COX, SAMUEL, an English Baptist minister; born at London, April 19, 1826. In 1851 he became pastor of the church in St. Paul's Square, Southsea, and in 1855 went to Ryde. After he had been at this last-named place about four years, his health failed him, and he virtually gave up preaching and devoted himself to authorship. In 1875 he founded the *Expositor*, which he edited till 1884. He also wrote numerous treatises and several books expounding the various books of the Bible. As a Bible expositor he had no superior. Among his publications are *The Secret of Life* (1866); *The Private Letters of St. Paul and St. John* (1867); *The Quest of the Chief Good* (1868); *The Resurrection* (1869); *An Expositor's Note-Book* (1872); *Biblical Expositions* (1874); *The Book of Ruth* (1876); *Salvator Mundi* (1877); *The Larger Hope*, a sequel to the preceding (1883); *Balaam* (1884); *Miracles* (1884); *The House and Its Builder* (1888). His best known work was *Salvator Mundi.* He died at Hastings, March 29, 1893.

COX, SAMUEL HANSON, an American clergyman and author; born in Rahway, New Jersey, August 25, 1793. He studied law for several years, then took up theology and was ordained by the New Jersey presbytery in 1817. In 1820 he became pastor of the Spring Street Presbyterian Church in New York city. He was pastor of the First Presbyterian Church in Brooklyn from 1837 to 1854, and was also professor of ecclesiastical history in Union Theological Seminary. He was a prominent member of the New School branch of Presbyterianism, and was a strong advocate of temperance reform. He published *Quakerism not Christianity* (1833); *Interviews, Memorable and Useful from Diary and Memory Reproduced* (1853); and edited Bower's *History of the Popes* (1847). He died in Bronxville, New York, October 2, 1881. W.M.C.

COX, SAMUEL SULLIVAN, an American statesman and author; born at Zanesville, Ohio, September 30, 1824. He was educated at the Ohio University, and at Brown University, Providence, Rhode Island, graduating at the latter institution in 1846. After leaving college he studied law and was admitted to the bar and began practice. In 1853 he became owner and editor of the *Columbus Statesman*, at Columbus, Ohio. In 1855 he was appointed Secretary of Legation to Peru. In 1865 he removed to New York city. He was elected to the Forty-first and Forty-second Congresses and was the candidate of the Democrats and Liberal Republicans for Representative-at-large to the Forty-third Congress, but was defeated. He was elected to the Forty-sixth Congress and re-elected to the Forty-seventh Congress as a Democrat. He was a popular lecturer and published *Eight Years in Congress* (1865); *Why We Laugh* (1876); *Diversions of a Diplomat in Turkey* (1887); *A Buckeye Abroad; Arctic Sunbeams; Orient Sunbeams; Search for Winter Sunbeams; Free Land and Free Trade*, and other books. He died in New York city, September 10, 1889. W.M.C.

COXALGIA. See HIP-JOINT DISEASE, in these Supplements.

COXE, ARTHUR CLEVELAND, an American clergyman and Episcopal bishop; born in Mendham, New Jersey, May 10, 1818. He was a son

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of Samuel Hanson Cox (q. v.), adopting an older spelling of his surname. He was educated at the General Theological Seminary of the Protestant Episcopal Church, received orders in 1841 and was made a priest in 1842. For a number of years he held rectorships at Hartford, Baltimore, and New York city and was consecrated bishop of western New York in 1865. He was a vigorous writer and his *Christian Ballads* (1840) became very popular. His other works include *Athanasion and Other Poems* (1842); *Saul, a Mystery and Other Poems* (1845); *Thoughts on the Services; Impressions of England* (1865); *The Criterion* (1866); *Apolos, or the Way of God* (1873); *Institutes of Christian History* (1887); *The Pascal*, a collection of Easter poems (1889), and other works. In 1885 he founded the Christian Literature Company, and for several years lectured at the University of Michigan and at Kenyon College. Died in Clifton Springs, New York, July 20, 1896. W.M.C.

BISHOP COXE.

COXE, JOHN REDMAN, an American physician; born in Trenton, New Jersey, in 1773. He was educated at the University of Pennsylvania and in Europe, and in 1796 began the practice of medicine in Philadelphia. He was physician to the Philadelphia Hospital for several years and also to the Philadelphia Dispensary. From 1809 to 1835 he was a professor at the University of Pennsylvania, holding the chairs of chemistry, pharmacy, and materia medica. He published a large number of medical works, including *The American Dispensatory* (1827). He died in Philadelphia, March 22, 1864. W.M.C.

COXE, TENCH, an American politician and political economist; born in Philadelphia, May 22, 1755. During the early part of the Revolution he sided with the Loyalists, and when Howe evacuated Philadelphia, Coxe was arrested, but was released on parole. Subsequently he became a Whig; was a commissioner to the Federal convention at Annapolis in 1786; delegate to the Continental Congress in 1788; assistant Secretary of the Treasury, 1790; revenue commissioner in 1792; and purveyor of public supplies from 1803 to 1812. He is prominent in the history of American industry by reason of his labors to introduce the cultivation of cotton and the Arkwright spinning-machine. He was the author of several important economic works, including *An Inquiry into the Principles of a Commercial System for the United States* (1787); *Thoughts on Naval Power and the Encouragement of Commerce and Manufactures* (1806); *Memoir on the Cultivation, Trade, and Manufacture of Cotton* (1807); etc. He died in Philadelphia, July 17, 1824. E.E.T.

COXEY, JACOB SECHLER, an American agitator, was born in Pennsylvania in 1854, and commenced life at the age of 13, in a rolling-mill. In 1881 he became owner of a sandstone-quarry at Massillon, Ohio, and extended his operations in 1889 by becoming a horse-breeder, purchasing a stock-farm near Lexington, Kentucky, afterward removing his stock to Massillon. He was formerly a Greenbacker in politics, but became a Populist, being present at the Populist convention in St. Louis in July, 1896, as a delegate. He claimed to be a "Christian Theosophist." Coxey adopted the advocacy of a scheme of the American Federation of Labor for the issue of five hundred million dollars in bonds (at the rate of twenty million dollars a month) by the Federal government, to be expended in constructing good roads, thus securing employment for those out of work. It was for the purpose of promoting this scheme that the "march to Washington" was designed. The "Commonweal Army," as it was called, started from Massillon, March 25, 1894, with 75 men, and increased as it marched, creating great interest, and Coxey, with his lieutenant, Carl Browne, made a peaceable entry into Washington at the head of 336 men, April 29th, and on May 1st paraded the streets of the capital. Coxey's purpose was to make a demonstration from the steps of the Capitol, which attempt was prevented, as illegal in the manner intended. He made an attempt to do so by trespassing on the grass to reach his desired goal. He was promptly arrested, fined and lodged in jail. The army melted away, though the movement was imitated in different parts of the country.

COXWELL, HENRY TRACEY, a famous English aëronaut, was born March 2, 1819, at Wouldham, near Rochester. He made his first ascent in 1844, and subsequent ascents with Hampton, Gypson and Gale. In 1848 he turned his attention to military aëronautics, and started from Brussels in a war-balloon to demonstrate a new plan for the dropping of torpedoes. About the time of the Crimean War he invented a system of signaling by semaphore arms. On Sept. 5, 1862, he made his famous ascent with James Glaisher, to make meteorological observations for the British association, the balloon attaining the unprecedented elevation of seven miles. In 1870 Mr. Coxwell was engaged in instructing the Prussians in the art of aëronautics for military purposes. His experiences of 28 years are contained in two volumes, which were published in London in 1889.

COYOTE OR PRAIRIE-WOLF. See PRAIRIE-WOLF, in these Supplements.

COYPU, a small aquatic rodent of South America, classified as *Myopotamus coipus* by Cuvier. It resembles the beaver in many respects, although it is smaller than that animal. R.W.C.

COZUMEL, Mexico, a low-lying, almost level island, 16 miles east of the coast of the Yucatan peninsula. It is about 25 miles long, with a maximum width of 7 miles, and is encircled by coral reefs. Bays on the northern and southwestern shores afford landing places. The island is used for grazing purposes. C.L.S.

CRAB-APPLE (*Pyrus malus*), a small wild, very sour species of apple, but the term is vaguely applied to any kind of sour and uncultivated

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variety of apple. It grows wild in Upper India, the Caucasus and Armenia, and was introduced into Rome in the time of Appius Claudius (449 B. C.) and into Britain by the Romans. Pliny the Younger speaks of 22 varieties of apples, mentioning crabs as small and sour. W.R.B.

CRABRO, a sting-bearing, burrowing, hymenopterous insect commonly known as the wood-wasp, and classified by some as *Crabro vulgaris*. R.W.C.

CRADDOCK, CHARLES EGBERT. See MURFREE, MARY NOAILLES, in these Supplements.

CRAFTS, WILBUR FISK, an American clergyman; born in Freyburg, Maine, January 12, 1850. He was graduated from the Wesleyan University in 1869 and from the Boston University School of Theology in 1872. He preached eight years as a Methodist Episcopal minister, and in 1880 joined the Congregational Church. Later he became secretary of the American Sabbath Union and superintendent of the International Reform Bureau, an association formed to secure moral legislation in the United States and Canada by lectures and literature. He has written a large number of works including the *Sabbath for Man; Successful Men of To-day; Social Progress; The Ideal Sunday School; Practical Child Study; Practical Christian Sociology; New Testament Helps; The Bible and Sunday School; The Civil Sabbath; Talks with Boys and Girls about Jesus*, and *Must the New Testament Go?* At one time he was editor of the *Christian Statesman*. Since 1889 he has resided in Washington and is well known as a leader in various reform movements. W.M.C.

CRAG AND TAIL, a term used to designate a peculiar hill formation, in which a bold and precipitous front exists on one aspect of a hill, while the opposite is formed of a sloping declivity. It is believed to have been caused by moving ice.

CRAIG, WILLIS GREENE, an American clergyman; born in Danville, Kentucky, September 24, 1834. He was graduated from Center College in 1851 and from the Danville Theological Seminary in 1860. For twenty years he was pastor of the Westminster Presbyterian Church at Keokuk, Iowa. In 1882 he became professor of church history at the Chicago Theological Seminary, and in 1891 was appointed to the chair of didactics and polemic theology. In 1893 he was chosen moderator of the Presbyterian General Assembly. He has published several volumes of lectures and sermons. W.M.C.

CRAIGIE, MRS. MARY E., an American authoress; better known by her pseudonym, "John Oliver Hobbes." Among her works are *Once Upon a Time: Stories of Ancient Gods and Heroes* (1876); *Some Emotions and a Moral; A Study in Temptations* (1893); *A Bundle of Life* (1894; 2d. ed. 1895); *The Gods, Some Mortals and Lord Wickenham* (1895); and *The Herb-Moon* (1896).

CRAIK, DINAH MARIA MULOCK, an English novelist; born at Stoke-upon-Trent in 1826. Her first novel, *The Ogilvies*, appeared in 1849, and received some favor, as did tales which immediately followed, particularly *Agatha's Husband* (1852); but it was not until the publication of *John Halifax, Gentleman*, in 1857, that she achieved a decided success. Her other works include *Mistress and Maid* (1863); *A Noble Life* (1866); *Hannah* (1871); etc. She also published a book of *Fugitive Poems* (1860). She received a pension in 1864, and married, in 1865, George Lillie Craik, nephew of the English historian. She died Oct. 12, 1887.

CRAIK, GEORGIANA MARION, an English novelist; born in 1831. In 1886 she married Mr. A. W. May. She wrote for various periodicals, and in 1857 appeared her first novel, *Riverston*, and afterward numerous other books, many of them for children. Among them are *Play-Room Stories* (1862); *Faith Unwin's Ordeal* (1865); *Cousin Trix and Her Tales* (1867); *The Cousin from India* (1871); *Without Kith or Kin* (1871); *Mark Dennison's Charge* (1880); *Twelve Old Friends* (1885); *A Daughter of the People* (1887); etc. Died in St. Leonard's, Nov. 1, 1895.

CRAIOVA OR KRAJOVA, a town in Rumania, the ancient capital of Little Wallachia and later the seat of the prefect of the district of Dolj. It is well supplied with churches and has an agricultural trade. Pop. 1900, 45,438. See KRAJOVA, XIV, 147.

CRAMBE, a genus of plants of the family *Cruciferæ*, natives of Europe and western Asia. They are used as a pot-herb, cooked like asparagus.

CRAMPTON'S GAP is a pass through the Blue Ridge Mountains, or that part of them known as South Mountains, in Frederick County, Maryland. It was the scene of a stubborn contest during the Civil War. W.F.J.

CRANBROOK, GATHORNE GATHORNE-HARDY, EARL OF, an English statesman; born in Bradford, October 1, 1814. His father was John Hardy, of Dunstall Hall. In 1856 he was elected to represent Leominster in Parliament. He had only been two years in the House when Lord Derby made him Under-Secretary for the Home Office. He then became Home Secretary, Secretary of State for India, and was Lord President of the Council from 1885 to 1892. He was created Earl of Cranbrook and Baron Medway in 1892. W.M.C.

CRANCH, CHRISTOPHER PEARSE, author and artist, was born at Alexandria, Va., on March 8, 1813, and was educated at Columbia College and the Harvard Divinity School, being graduated from the latter in 1835. For some years he was a preacher and teacher, and in 1842 adopted the profession of a painter. He studied in Paris, had a studio in New York, and exhibited at the Paris Salon with much success. He was a member of the National Academy of Design. His best work as an artist was done in landscape painting and in Venetian scenes. As early as 1844 he published a volume of poems, and thereafter wrote much in poetry and prose. Among his best-known works are a translation of Virgil's *Æneid*, *The Bird and the Bell*, *Ariel and Caliban*, translations of Virgil's *Eclogues* and *Georgics*, of Horace's *Odes*, and of many of the poems of Schiller, and *Kobboltozo* and *The Last*

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of the Huggermuggers, the last two being tales for children. He settled at Cambridge, Mass., in 1872, and spent the rest of his life there, dying on January 20, 1892. W.F.J.

CRANE, STEPHEN, an American novelist, son of Dr. J. T. Crane, a Princeton graduate and Methodist minister, descended from the first Stephen Crane of the family, who came to the United States in 1635. He was born in New York in 1872, and went to Syracuse University and Lafayette College, but studied only in a desultory manner, and drifted from college to newspaper life at the age of 16. At this he worked for several years, during which time he wrote and published, at his own expense, *Maggie, a Girl of the Streets*, which had no sale, but which came under the notice of some of the critics, who wrote of it in such a manner that it was republished after a time. It is a realistic novel of street and slum life. *The Red Badge of Courage* was written before the author had completed his majority, and was published originally by a newspaper syndicate, where it attracted no particular attention. Afterward, when issued by a house of standing, and reprinted in England, it came into notoriety. The story powerfully depicts the career of a raw recruit in battle from his first fear on confronting the foe, and nearing the whistle of shot and shell. This phase of a soldier's experience had never before been attempted by creators of character, and it has been done by Stephen Crane in an extraordinarily vivid manner. But this was not the only or whole charm of the author's work. He was able, besides, to describe the battle scenes and tactical evolutions in such a manner as to deceive the British critics, who declared that the descriptions referred to could only have been penned by a veteran scarred in war. The truth was, as the author declared, he had only imagined it all. It is such "imagination" that the reader wants more of. The author's career, which was one of great promise, was cut short by consumption; he died June 5, 1900.

STEPHEN CRANE.

CRANE, THOMAS FREDERICK, an American scholar and folk-lorist; born at New York City, July 12, 1844; graduated at the College of New Jersey in 1864, and received therefrom the honorary degree of Ph.D. in 1874; was professor of modern languages in Cornell University (1868); of Spanish and Italian in the same (1872); and of Romance languages there (1881). He was one of the founders of the American Folk-Lore Society. In the department of folk-lore he achieved success, his *Italian Popular Tales*, published in Boston and London in 1885, being at once recognized as the only English work to fully represent the folk-tales of Italy, which it does exhaustively. His *Exempla, or Illustrative Stories from the Sermones Vulgares of Jaques de Vitry*, was published in 1890 by the English Folk-Lore Society.

CRANE, WALTER, an English painter and decorative designer; born at Liverpool, England, Aug. 15, 1845; studied under W. J. Linton, the wood-engraver, and was appointed a member of the committee of the General Exhibition of Water-Color Drawings in 1879. He was elected a member of the Institutes of Painters in Water-Colors and Oils in 1882, but resigned in 1886. His principal pictures are *The Renaissance of Venus* (1877); *The Fate of Persephone* (1878); *The Sirens* (1879); *Truth and the Traveler* (1880); *Europa; The Laidley Worm* (1881); *The Roll of Fate* and *Dunstanborough Castle* (1882); *Diana and the Shepherd* (1883); *The Bridge of Life* (1884); *Freedom and Pandora* (1885); *The Chariots of the Hours* (1887); *Sunrise* (1888); *Flora* and *Pegasus* (1889); and *Neptune's Horses* (1892). Mr. Crane has written some attractive poetry, and has also made holiday books. He was instrumental in founding the Arts and Crafts Exhibition in 1888, and was its president. He delivered the Cantor lectures in 1889 on *The Decoration and Illustration of Books*, and was president of the section of applied art at the National Art Congress at Liverpool in the same year. He designed the seal for the London county council; and in 1892 was appointed director of designs at the Manchester Municipal School of Art. In 1892 an exhibition of his works was made in the United States, which he accompanied.

CRANE, WILLIAM HENRY, an American actor; born in Leicester, Massachusetts, in 1845. He joined an amateur theatrical organization, and made his first appearance on the stage at Utica, New York, July 13, 1863, in *The Child of the Regiment*. For eight years he played small parts with Harriet Holman's Company, and was four years with Oates Opera Company. In 1877 he appeared with Stuart Robson at the Park Theater, New York city, in *Our Boarding House*. This was followed by other successes, including *Our Bachelors; Forbidden Fruit; The Comedy of Errors*, and *The Merry Wives of Windsor*, ending with *The Henrietta*. His first starring tour after dissolving connection with Robson was undertaken in 1889, when he appeared in *The Senator; The American Minister; A Fool of Fortune; On Probation; Brother John; For Money; A Virginia Courtship*, and other plays. He played *David Harum* in 1900, and attained great popularity in that rôle. W.M.C.

CRANE, WINTHROP MURRAY, statesman, was born at Dalton, Mass., on April 23, 1853, and was educated in the public schools and at Williston Seminary. He became a paper manufacturer, and interested himself in various business enterprises. He also entered political life, and was lieutenant-governor of Massachusetts in 1897–99. In 1900 he was governor of Massachusetts, and he was re-elected for 1901 and 1902, displaying in that office a high quality of statesmanship and public service, and promoting the welfare of the Commonwealth. W.F.J.

CRANES. Traveling-cranes have come into very common use within the past twenty years, in large

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factories and workshops, for moving heavy articles. Usually they are mounted on overhead railways, and driven by individual electric motors. In a large shipyard at Wallsend-on-Tyne, England, a complete structure of traveling-cranes has been built over one of the docks, and what is virtually a new system of ship-building has been introduced. A steel framework 500 feet long, 68 feet wide and 80 feet high is made to bear two longitudinal tracks, 22 feet apart, on which the cranes run, traveling back and forth at a speed of 300 feet a minute. They are all electrically driven, and can be run the length of the framework. The work of building or repairing ships in the dock below is rendered very much simpler with these means of handling the heavy girders, timbers, spars, etc. The cranes each weigh 14 tons, and carry jibs with hoisting-gear so protected by springs that by no accident can a crane be injured by lifting more than it is designed to sustain. Very large cranes for lifting one hundred to two hundred tons often are made with a hydraulic cylinder and piston, in place of tackle, to do the lifting. Of course this involves much greater height, but it saves the friction on the tackle, which is something enormous, where such large weights are handled. One of these hydraulic cranes, erected at Leeds, England, in 1894, lifted 320 tons at a radius of 75 feet. The base of this machine is a large rotating platform, on which is mounted a boiler-house and three steam-engines, which assist in the counterpoising of the jib.

C. H. COCHRANE.

CRANESBILL. See GERANIUM, Vol. X, p. 395.

CRANEY ISLAND, a small island in Norfolk County, southeastern Virginia, W. of the mouth of the Elizabeth River. Government powder-magazines and a lighthouse are located here. Lat. 36° 53′ 28″ N., long. 76° 21′ W.

CRANSTON, EARL, an American clergyman, bishop of the M. E. Church; born in Athens, O., June 27, 1840. His education was obtained at the Ohio University, at Athens. He enlisted in the Union army, and rose to the rank of captain in the Sixtieth O. V. I. With the advent of Appomattox he exchanged the sword for the Bible, and for some time served pastorates in Ohio. His subsequent changes were at Evansville, Ind.; Jacksonville, Ill.; and Denver, Col., where he was presiding elder. In 1884 he was chosen to succeed Bishop Walden as one of the agents of the Western Methodist Book Concern, in Cincinnati. He held this position until May 18, 1896, when he was elected a bishop.

CRANSTON, a town in Providence county, Rhode Island. Population 1880, 5,940; 1900, 13,343.

CRATÆGUS. See HAWTHORN, Vol. XI, p. 479.

CRATER LAKE is, as its name implies, a lake occupying the crater of an extinct volcano. It is in Klamath County, Oregon, in the southwestern part of that state, and on the very ridge and watershed of the Cascade Mountains. The level of the lake is about 6,240 feet above the sea, and its depth in places is fully 2,000 feet. Its area is about 25 square miles. It is not known to have any outlet. W.F.J.

CRAVEN, ALFRED WINGATE, an American civil engineer; born in Washington, District of Columbia, October 20, 1810. He was graduated from Columbia College in 1829, studied law for several years, finally adopting civil engineering as a profession. From 1849 to 1868 he was employed on public works in New York city, his most important work being in connection with the city's sewerage, the supply of Croton water, and the improvement of Fourth Avenue. From the organization of the Croton Water Board in 1849, until 1868, he was its engineer, and planned and supervised the construction of the great works of that period. He was a founder and a director for many years and president from 1869 to 1871 of the American Society of Civil Engineers. He was largely employed in his later years in railroad construction. He died at Chiswick, England, March 29, 1879. W.M.C.

CRAVEN, ELIJAH RICHARDSON, clergyman, was born in Washington on March 28, 1824 and was graduated from Princeton in 1842 and from Princeton Theological Seminary in 1848. He was tutor in mathematics at Princeton in 1846–49, and then became a Presbyterian pastor, at Somerville, and at Newark, N. J. In 1878–84 he was chairman of the committee on revision of the Presbyterian Book of Discipline, and in 1885 he was moderator of the general assembly of that church. He has been a trustee of Princeton since 1859, a director of Princeton Theological Seminary since 1865, president of the directors of the German Theological Seminary, Newark, since 1889, and secretary of the Presbyterian Board of Publication since 1887. W.F.J.

CRAVEN, THOMAS TINGEY, an American naval officer; born in Washington, District of Columbia, December 30, 1808. He entered the navy in 1822, became a master in 1828, lieutenant in 1830 and was placed in command of the *Vincennes* in 1838. He subsequently commanded the *Ohio*, *Boxer*, *Fulton*, *Independence* and other vessels. He was promoted captain in June, 1861, and was given command of the *Brooklyn*, with which vessel he took part in the capture of New Orleans. In 1862 he was placed in command of the *Niagara*. He was promoted rear-admiral in October, 1866, and was retired in December, 1869, after having served as commander of the Mare Island Navy Yard. He died in Boston, Massachusetts, August 23, 1877. W.M.C.

CRAVEN, TUNIS A. M., naval commander, brother of Alfred Wingate Craven and Thomas Tingey Craven, was born in New Hampshire, and entered the United States navy as a midshipman in February, 1829, at the age of about fifteen years, and became a lieutenant in 1841. He saw much active service in the suppression of the slave trade, before the Civil War. At the outbreak of the latter he was made a commander, and was attached to Farragut's squadron. At the great battle of Mobile Bay, on August 5, 1864, he was in command of the *Tecumseh* monitor, and with splendid gallantry sought an engagement with the huge Confederate ironclad ram *Tennessee*. While on this quest, in eagerness for the conflict, he had

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the misfortune to run foul of a torpedo, which exploded and destroyed the *Tecumseh*. The latter sank quickly, with nearly all on board. The gallant Craven was lost, through his chivalry in insisting that others make their escape before him. W.F.J.

CRAWFISH OR CRAYFISH. See CRUSTACEA, Vol. VI, pp. 568, 569, 582.

CRAWFORD, FRANCIS MARION, an American novelist; a son of Thomas Crawford, the sculptor; born in Bagni di Lucca, Italy, August 2, 1854. His father died in 1857 in Italy, where his youth was spent. He studied under a French governess, and at 12 years of age was sent to America and went to Paul's School, Concord. Thereafter he studied in England, first with a clergyman in Hatfield Regis, and then at Trinity College, Cambridge. Then followed student days at Karlsruhe and Heidelberg from 1874 to 1876, then for two years at the University of Rome, where he had a tutor who taught him Sanskrit. Becoming interested, he went to India to learn more Sanskrit. He obtained an engagement on the *Allahabad Indian Herald*, an afternoon daily paper, of which he was editor. He acquired much about Buddhism and other Oriental lore, and at Simla met the original of Mr. Isaacs, a man whose name was Jacobs. In 1880 he returned to Italy and took passage for America early in 1881. He wrote book reviews, and articles on philosophical themes, and in 1882 wrote his first novel, *Mr. Isaacs*. His other books include *Dr. Claudius* (1883); *A Roman Singer* (1884); *An American Politician* (1884); *Zoroaster* (1885); *A Tale of a Lonely Parish* (1886); *Marzio's Crucifix* (1887); *Saracinesca* (1887); *Paul Patoff* (1887); *With the Immortals* (1888); *Griefenstein* (1889); *Sant Ilario* (1889); *A Cigarette-Maker's Romance* (1890); *The Witch of Prague* (1891); *Khaled* (1891); *The Three Fates* (1892); *The Children of the King* (1892); *Don Orsino* (1892); *Marion Darche* (1893); *Pietro Ghisleri* (1893); *The Novel; What Is It?* (1893); *Katherine Lauderdale* (1894); *Love in Idleness* (1894); *The Ralstons* (1895); *Constantinople* (1895); *Casa Braccio* (1895); *A Rose of Yesterday* (1897); *In the Palace of the King* (1898); *Via Crucis* (1899); *The Rulers of the South* (1900); *Marietta* (1901); *Cecelia* (1902); *Man Overboard* (1903). His work is marked by fine dramatic quality and imagination. W.M.C.

F. MARION CRAWFORD.

CRAWFORD, SAMUEL WYLIE, an American soldier; born in Franklin, Pennsylvania, November 8, 1829. He was graduated from the University of Pennsylvania in 1847, and five years later became an assistant surgeon in the army. At the outbreak of the Civil War he was stationed at Fort Sumter and was in command of a battery during the bombardment. In 1862 he was promoted to the rank of major and was assigned to the 13th New York Infantry. In 1863 he was made brigadier-general of volunteers and was promoted to brevet major-general in 1865. He was conspicuous at the battle of Cedar Mountain, Five Forks, the Wilderness, and other engagements, and was a prominent figure in the Shenandoah campaign. He was placed on the retired list in 1873 and died in Philadelphia, November 3, 1892. W.M.C.

CRAWFORD, WILLIAM HARRIS, an American statesman; born in Amherst County, Va., Feb. 24, 1772. He removed with his father to Columbia County, Ga., in 1783. In 1798 he was admitted to the bar, and in 1799 commenced practice in Lexington, Ga. He compiled the first digest of the laws of Georgia (published in 1802). He was a member of the State House of Representatives, 1803–07; and was United States senator, 1807–13, being elected president of the Senate, March 24, 1812. In this capacity he ultimately supported both the embargo and the War of 1812, and also supported Gallatin's measures for the renewal of the Bank charter. In 1813 he was appointed minister to France, and was influential in the negotiations for the Treaty of Ghent. In 1815 he was appointed Secretary of War, and in 1816 Secretary of the Treasury, which office he held till 1825, having been defeated for the Presidency the previous year. On account of illness he declined Pres. Adams's request that he remain Secretary, but returned to Georgia, and in 1827 was appointed judge of the northern circuit, holding the position till his death, which occurred in Elberton, Ga., Sept. 15, 1834. E.E.T.

CRAWFORDSVILLE, a thriving city and the capital of Montgomery County, western central Indiana, 43 miles W.N.W. of Indianapolis, on the Cleveland, Cincinnati, Chicago and St. Louis, the Louisville, New Albany and Chicago and the Terre Haute and Indianapolis railroads. Among its chief industries are the manufacture of buggies, of hubs and spokes, coffins, and elevators. It has also foundries and flour-mills. Pop. 1890, 6,089; 1900, 6,649.

CREAMERIES. See BUTTER, XXV, pp. 663–64.

CREASY, SIR EDWARD SHEPHERD, English historian; born at Bexley, Kent, Sept. 12, 1812. He studied at Eton and King's College, Cambridge, and in 1834 was elected a fellow. Called to the bar in 1837, he practiced on the home circuit for more than twenty years, was for several years assistant judge at the Westminster sessions court; and in 1860–73 was chief justice of Ceylon, and was knighted in 1860. He wrote *The Fifteen Decisive Battles of the World* (1851); *Invasions of England* (1852); *History of the Ottoman Turks* (1854–56); *History of England* (2 vols., 1869–70); etc. Died at Hampton Wick, Jan. 27, 1878.

CREATINE ($C^4H^9N^3O^2+H^2O$). This body was discovered by Chevreul in meat-broth. It exists ready-formed in the muscles, and passes into the extract of meat. It may be prepared by treating

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the solution of this extract with basic acetate of lead, filtering, freeing the filtrate from excess of lead by hydrogen sulphide, and evaporating the solution at a gentle heat until it crystallizes. The crystals are separated from the mother liquor, and alcohol added to the latter precipitates a fresh quantity of creatine.

CREDENCE, in the Roman Catholic and Anglican churches, a small table beside the altar or communion-table, on which the bread and wine are laid before being consecrated. Sometimes the place of the credence is supplied by a niche in the sanctuary wall. The term was used also for a sideboard on which the food was placed to be tasted before serving, as a precaution against poison. Hence the origin of the word.

CRÉDIT MOBILIER SCANDAL, the name applied to a scandal in the United States in the year 1872, investigated by a Congressional inquiry, which developed a huge attempt at bribery and corruption. When the Union Pacific railroad was being constructed, it was found, in 1866, impossible to secure the requisite capital to complete the road. Oakes Ames, a wealthy Congressman from Massachusetts, finally was induced to undertake the work. Finding in Philadelphia a "Pennsylvania Fiscal Company," under whose charter the work might be prosecuted and the liabilities of the contracting parties limited, he purchased the charter and changed the name to the Crédit Mobilier of America. Under this name the construction company completed the road, some seven hundred miles, for the Union Pacific Railroad Company. To aid the company, Congressional grants and concessions were secured. When, however, in 1871, one of the stockholders of the Crédit Mobilier brought suit to compel the delivery of certain shares he alleged had been promised him, the trial developed the fact that Mr. Ames had a list containing the initials of many members of Congress, and that he had written a letter, stating that he had placed certain shares "where they would do the most good." The excitement aroused was intense, and led at once to an investigation by the House of Representatives. Mr. Ames vigorously defended himself, denying any breach of integrity, declaring that he had risked his fortune to accomplish what no one else would have done and to do a work of incalculable benefit to the government. In the course of debate it was charged that several leading advocates of the plan had been bribed by donations of large blocks of shares in return for their influence, among the culprits being Schuyler Colfax, the Vice-President of the United States and several Senators and Congressmen. As a result, resolutions of censure were passed in Congress against Ames and James Brooks of New York. Mr. Ames died soon after. Subsequent inquiry quite generally cleared his reputation of all charge of fraud. The scandal, after a time, died away.

CREEDE, one of the phenomenal mining towns of Colorado, the capital of Mineral County, in the southwestern portion of the state. It lies on the southerly slope of a spur of the San Juan Mountains, and its existence as a town dates from 1891, when the influx of miners began. The first mine (a silver mine) was located in 1889 by N. C. Creede. In 1893 the place had a population of 5,000, and during that year nearly the entire town was obliterated by fire, the loss aggregating $1,000,000. It was rapidly rebuilt, and notwithstanding the general depression in the silver-mining industry, is one of the most prosperous of the "silver" camps of Colorado. The place is upon a branch of the Denver and Rio Grande railroad, is lighted by electricity, and has many of the adjuncts of latter-day civilization. Besides mining, it has a considerable lumber-manufacturing industry. Population, 1900, 938.

CREEDMOOR, New York city, in the Borough of Queens, on the Long Island railroad, 12 miles east of Manhattan, is the site since 1871 of a state rifle-range, where international and other matches are held. C.L.S.

CREEPER, a small group of birds of the family *Certhiadæ*, so named because of their habit of rambling about trees in search of food. They are common in Europe and America.

CREEPING OF RAILS, the slight movement of railroad rails in the direction of the heavier traffic and on down grades. Heavily-loaded trains cause the rails to sag beneath the trucks, so that as the train passes along, the rails fall and rise in a wave-like motion. As the truck is always in the trough of one of these wave-like depressions of the rail, its forward movement constantly exerts a pressure against the slight rise, or incline, in front of it, and this tends to cause the rail to move forward. The greater the depth of the wave motion, that is, the more the rail sags, the steeper will be the incline in front of the wheel, and, consequently, the greater will be the forward pressure exerted against the rail. For this reason loosely-constructed road-beds, which "give" beneath the weight of the train, instead of presenting a rigid foundation, are a frequent cause of the creeping of rails. The fact that the rails are supported by ties some distance apart, instead of having a continuous support, also gives them a tendency to move forward, inasmuch as it helps to increase the wave-motion of the rails. Likewise, short rails have a greater tendency to "creep" than long ones. On a single-track road, where the traffic is in both directions, creeping is not noticeable except on steep grades, where gravity tends to aid the movement. Many kinds of "anti-creepers" are used, one device being a clamp that grips the rail by its lower flange and passes down the entire thickness of the tie, thus fastening the rail to the tie in such a way that the latter cannot turn in its place, but must move forward before any movement of the rail can take place. R.W.C.

CREEPS, a miner's term for the depression which takes place on the surface from the removal of beds of coal beneath. Masses of the coal-seam, like huge pillars, are left by the miners for the support of the superincumbent strata.

CREFELD, Prussia. Pop. 1900, 106,887. (VI, 500.)

CREIGHTON, MANDELL, an English historian, and bishop successively of Peterboro and London, was born at Carlisle in 1843, and died at London

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Jan. 14, 1901. He was ordained in 1870. In 1884 he was elected professor of ecclesiastical history in Cambridge University, and next year became canon residentiary of Worcester Cathedral. He edited the *English Historical Review* from 1886, and received the degree of LL.D. from Harvard. He was the author of a useful series of historical manuals, etc., including *History of Rome* (1875); *The Age of Elizabeth* (1876); *The Tudors and the Reformation* (1876); *A History of the Papacy During the Reformation* (1882); and *Cardinal Wolsey* (1888).

CREMATION, the burning of the dead as a substitute for their burial. There has been a steady increase of interest in cremation in the United States since the first regular crematory went into operation in 1885. The United States Cremation Company of New York was among the first in the field. Its cinerator was designed by C. J. Eames and Dr. M. L. Davis. The retort for corpses is built of fire-brick. The body is placed in a chamber immediately over the fuel-chamber, which is heated through holes. The draft is so arranged, however, that no flames reach the body. The volatile matter runs out through highly heated chambers, and is dissipated in the atmosphere. The fuel used is coal. A temperature of 2000° to 2500° F. is maintained, and about two hours are required for the cremation of a corpse.

Dr. Davis has designed the cinerators for several other crematories, and has improved the original design. That at Lancaster, Pennsylvania, has double retorts and furnaces. The materials used are fire-brick, tiles of fire-clay, asbestos, sand and iron. The retorts are so set in the center of each furnace that the flames are made to pass around them three times. The doors are all packed air-tight with asbestos. The volatile matter from the bodies is carried off through flues, in which a temperature of 2500° F. is maintained. Forty-five to ninety minutes are required for the incineration of a body.

In Allegheny County, Pennsylvania, there has been constructed a combined crematory and columbarium, with one hundred niches for urns, to contain the ashes of the dead. The building is very tastefully and expensively designed and decorated. At the Pittsburg crematory the Davis cinerator is used, with natural gas as fuel. Its incinerating capacity is one hour to an hour and a quarter. The Buffalo, New York, crematory makes use of an Italian form of cinerator, designed by Engineer Joseph Venino, being the same used at Milan, Padua and Udine, in Italy, and in Troy, New York. Other United States crematories are located at Detroit, San Francisco, Philadelphia, Waterville (New York), etc., to the number of about twenty. See CREMATION, Vol. VI, p. 500. C. H. COCHRANE.

CRÉMIEUX, ISAAC ADOLPHE, was born of Jewish parents at Nîmes, France, on April 30, 1796, became a member of the bar of Paris, entered the Chamber of Deputies in 1842, and was a member of the provisional government in 1848. He was among those imprisoned under the *coup d'état*, and afterward eschewed politics until the fall of the empire in 1870, when he became a member of the Republican government. He became a senator of France in 1876, and died on Feb. 10, 1880. He was ever a loyal Jew, and founded the Alliance Israelite Universelle. W.F.J.

CRERAR, JOHN, a Chicago business man and philanthropist; born in New York City in 1827; died Oct. 19, 1889, and left $3,000,000 for charitable purposes, of which $2,000,000 was set apart for the founding of a free public library to bear his name. In 1895, after a long contest of the will had been defeated, the trustees of the library decided to devote it exclusively to works on the sciences.

CRESAP, MICHAEL, an American soldier, pioneer and Indian trader; born near Baltimore, Maryland, in 1742. He was one of the early pioneers to the Ohio country, and, in 1774, near Wheeling, West Virginia, led an attacking party, composed of colonists and soldiers, which won a decisive victory over a large body of hostile Indians. Another party of pioneers murdered the family of Logan, a friendly Indian chief, who accused Cresap of the act. In the same year he was made a captain of Virginia militia, and participated in the Dunmore expedition. He then was placed in command of a Maryland rifle company, and later was appointed to take command of the American forces in Massachusetts. He died in New York city, in 1776, while en route to his new post in Boston, and was buried in Trinity churchyard, New York. W.M.C.

CRESCENT, a decoration, sometimes called an order, in Turkey. According to ancient legend, when Philip of Macedon was besieging Byzantium, he began secretly to undermine the walls. But the light of a crescent moon discovered his design. The Byzantines, in gratitude, adopted the crescent as the emblem of state. In 1259, Sultan Othman, the founder of the Ottoman dynasty, adopted the crescent as his symbol, on account of a remarkable vision or dream. It has been the emblem of the sultanate ever since. In 1799, after the battle of Aboukir, the sultan, Selim III, testified his gratitude to Nelson by sending him a crescent richly adorned with diamonds. It was not intended as an order, but Nelson wore it on his coat; and Selim, flattered by the value attached to his gift, resolved that a similar decoration should be conferred on foreigners who had done service to the state. There was an old order of the Crescent instituted by Réné, Duke of Anjou, in 1464.

CRESCENT CITY, a city and county capital, on the southern side of Point St. George, in Del Norte County, northwestern California. Lumber is its greatest export. A lighthouse stands on this point, lat. 41° 44′ 34″ N., long. 124° 11′ 22″ W. Population 1890, 907; 1900, 699.

CRESCENTINO, Italy, a town in the province of Novara on the Po, 25 miles by rail northeast of Turin. It was an ancient Latin town, has interesting antiquities, and manufactures silk and other textiles. Population, 6,500. C.L.S.

CRESCO, a railroad village, the capital of Howard County, northeastern Iowa, on the Chicago, Milwaukee and St. Paul railroad, and on the Turkey

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River, 40 miles N.E. of Charles City. It is a great shipping-point for wheat, and has foundries and other manufactories; also, a good union school and a Catholic parochial school. Population 1890, 2,018; 1900, 2,806.

CRESOLS (C^7H^8O), a product of coal-tar distillation. There are three cresols, two solid and one liquid. They may be formed by treating toluene with sulphuric acid. The liquid cresol was discovered by Fairlie, and extracted from wood-tar by Duclos. It is a colorless liquid, with an odor like that of phenol, and boils at 189–190°. See also TAR, Vol. XXIII, p. 63.

CRESSES, a popular name given to a number of low, usually annual, plants, mostly members of the mustard family (*Cruciferæ*), common throughout the temperate zones, and characterized by the pungent taste of their stems and leaves, which, when young, are valued for salads. They are also used for certain medicinal purposes, chiefly as a diaphoretic. The English water-cress (*Nasturtium officinale*) and the American water-cress (*Cardamine rotundifolia*) are those best known and of chief economic importance. *Lepidium sativum*, the common garden cress, a native of Russia, has been widely introduced in the United States. It is used in the preparation of a remedy efficient in the prevention of scurvy. See also *Cress* and *Nasturtium* under HORTICULTURE, Vol. XII, pp. 293 and 297.

CRESSON, a post village and summer resort of Cambria County, southwestern central Pennsylvania, situated on the top of the Alleghany Mountains, three hundred feet above the sea. It is 11 miles by rail E. of Ebensburg, and its fine scenery, pure air and the reputation of its magnesia springs attract many visitors. Pop. of township (1900), 1,572.

CRESTLINE, a city in Crawford County, northern central Ohio, 12 miles N.E. of Bucyrus, on the Pittsburg, Fort Wayne and Chicago railroad. The Pennsylvania railroad has repair-shops here; and among its industries are lock-works, furnace and stove factory, foundries, etc. Population 1900, 3,282.

CRESTON, a city of southern Iowa, about two hundred miles W. of Burlington, on the Chicago, Burlington and Quincy railroad. It is an important trade center, and is the northern terminus of a railroad extending to St. Joseph, Missouri. It contains a variety of manufactories, including large wagon factories and car-shops. Population 1900, 7,752.

CRESWELL, JOHN A. J., statesman, was born at Port Deposit, Md., on November 18, 1828, and was graduated from Dickinson College in 1848. He rose to leadership at the Maryland bar, was a Unionist in the Civil War, served in the Maryland legislature, was a representative in Congress in 1863 and a U. S. Senator in 1865. In 1869 he was made Postmaster-General, and in 1874 U. S. counsel to the Court of Alabama Claims. He died on December 23, 1891.

W.F.J.

CRETACEOUS PERIOD. See GEOLOGY, Vol. X, p. 317.

CRETE, Nebraska, a city of Saline County on the Big Blue River, and a junction of the Burlington & Missouri and the Missouri Pacific railroads, 20 miles southwest of Lincoln. Among its educational institutions is Doane (Congregational) College. It manufactures flour, dairy products, and beer. Pop., 1900, 2,199. C.L.S.

CRETIN, JOSEPH, clergyman, was born in France in 1800, and in 1838 came to America as a Roman Catholic Missionary. He settled in Iowa, and for twelve years was vicar-general at Dubuque. When the new diocese of St. Paul was created, for the territory of Minnesota, in May, 1849, he was nominated for the bishopric of it, and was duly consecrated in January, 1851. There he labored energetically, especially among the Indians, and founded numerous missions, churches, schools, and other institutions. In the one year 1856 he increased the Catholic population of Minnesota from 25,000 to 50,000. He founded the cathedral of St. Paul, and pushed it forward toward completion. But his strenuous labors broke down his health, and he died on February 22, 1857. W.F.J.

CRÉTINEAU-JOLY, JACQUES, a French theologian and historian; born in Fontenay, September 23, 1803. He studied theology, and prepared for the priesthood, but eventually devoted his attention to church history. His published works include *Le Pope Clement XIV* (1858); *History of the Jesuits* (6 volumes, 1854); *History of Louis Philippe* (1867). He died in Vincennes, January 1, 1875. W.M.C.

CRETINISM. See Vol. VI, pp. 506, 507; and PHYSIOLOGICAL CHEMISTRY, in these Supplements.

CREVAUX, JULES NICHOLAS, a French explorer; born in Lorquin, Lorraine, April 1, 1847. He became assistant surgeon in the French navy in 1868, and surgeon five years later; was awarded the cross of the Legion of Honor in 1876 for his devotion to the fever patients on the Salut Islands. Subsequently he explored the Tumuc-Humac Mountains, and descended the Yaru to the Amazon. He afterward explored the Yapoura, the Pilaya and the Pilcomayo rivers. On April 24, 1882, while prosecuting his explorations in the region of the Teyo, he was murdered by the Tapeti Indians.

CREVECŒUR, the name of a Dutch port in the province of North Brabant, southern Holland, on the left bank of the Meuse, 49 miles S.E. of the Hague. It figured prominently in the wars of the Dutch and Spaniards. Population, 2,129.

CREVILLENTE, a town of southeastern Spain, in the province of Alicante, 21 miles S.W. of Alicante. It has a population of about 16,114, chiefly engaged in agricultural pursuits and weaving.

CREWKERNE, a town in the southeast of Somersetshire, southern England, 15 miles S.E. of Taunton. It lies in a wooded, fertile vale, not far from the river Parret, has a fine church, and a grammar school founded by John de Coombe in 1449, and some manufactures of sailcloth, sacking, dowlas and stockings. Population, 4,946.

CRICHTON-BROWNE, JAMES, SIR, was born at Edinburgh, Scotland, in 1840, the son of an eminent physician, and was educated at Edinburgh, London and Paris. He has had a distinguished career as a physician, especially in the

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treatment of nervous and mental disorders, and has written many treatises and essays on the physiology and pathology of nervous diseases, and diseases of the brain, and has lectured much upon those topics in many institutions. As medical superintendent of the West Riding, Yorkshire, Asylum for the Insane, with 1,500 patients under his professional care, he made that institution a model of good management and a monument of success in the curing of mental disorders, and also made it one of the chief medical schools of the kingdom. In his laboratory there, many important investigations were conducted and discoveries were made. He has also paid much attention to the welfare of school children, especially in protesting against overpressure of studies and the need of better physical nourishment. W.F.J.

CRILLON, Louis des Balbes de Berton de, a French knight, named "Le Brave"; born March 5, 1543, in the Provence; became early a Knight of Malta. In the religious wars of the French Court with the Huguenots he fought with distinction on the side of the former at Dreux, Jarnac, Moncontour, and Lepanto (1571), and in the siege of La Rochelle (1573). Peace declared, he retired to Avignon, where he died, Dec. 2, 1615. G.A.S.

CRIMEAN WAR. See England, Vol. VIII, p. 388; and France, Vol. IX, p. 549.

CRIME OF 1873, The. A phrase first used by a Western Senator, and subsequently popular with the advocates of free and unlimited coinage of silver in the Presidential campaign of 1896, wherewith to describe the alleged surreptitious passage of an act of Congress at this date. Considerable interest centers in this enactment, not only because the Free Silver party regard it as a great crime to "demonetize" silver, but because its more fervid advocates have claimed that the statute went through the halls of Congress "like the silent tread of a cat." The first requisite of a proper understanding of the subject is a consideration of the statute itself. No codification of the mint laws had been made since 1837, and a complete revision of all technical matters of assaying and coinage was commenced in 1870. The Treasury authorities were desirous of obtaining as nearly a perfect system as possible, and with this object in view, sent out the new provisions to scores of experts for suggestions and criticism. Many and varied were the replies. They can be found printed in the House of Representatives Executive Document, No. 307, Second Session, XLIst Congress. In this draft-bill for criticism, a silver dollar of 384 grains standard weight (i.e., 345.6 grains pure silver) was proposed as one just equal to the dollar's value of subsidiary coins issued since 1853. The intention of the bill to cease coining the old silver dollar piece was open and clear. The bill was submitted to Congress by the Secretary of the Treasury, April 25, 1870, and, after having been printed thirteen times, became a law, Feb. 12, 1873. The discussions of its provisions in Congress fill 144 columns of the *Congressional Globe*. The statute as finally passed is as follows, so far as it is of interest and affects the question of the demonetization of silver:

Sec. 14. That the gold coins of the United States shall be a one-dollar piece, which, at the standard weight of 25.8 grains, shall be the unit of value. [Then follow directions as to the other gold coins.]

Sec. 15. That the silver coins of the United States shall be a trade dollar, a half-dollar or fifty-cent piece, a quarter-dollar or twenty-five-cent piece, a dime or ten-cent piece; and the weight of the trade dollar shall be 420 grains troy, the weight of the half-dollar shall be twelve grams and one half of a gram; the quarter-dollar and the dime shall be, respectively, one half and one fifth of the weight of said half-dollar; and said coins shall be a legal tender at their nominal value for any amount not exceeding five dollars in any one payment,

Sec. 17. That no coins, either of gold, silver or minor coinage, shall hereafter be issued from the mint other than those of the denominations, standards and weights herein set forth.

This is the whole of the act of 1873 which deals with the "demonetization" of silver. In the discussions in Congress no opposition was manifested to the omission of the 412½-grain silver dollar, because it was alleged to have been out of circulation since 1840. The omission attracted no attention, for the reason that no such coins were in use.

The procedure as to the act of 1873, when tabulated, reads as follows:

Procedure.	Senate.	House.
Submitted by Secretary of the Treasury	April 25, 1870	
Referred to Senate Finance Committee	April 28, 1870	
Five hundred copies printed	May 2, 1870	
Submitted to House		June 25, 1870
Reported, amended and ordered printed	Dec. 19, 1870	
Debated	Jan. 9, 1871	
Passed by vote of 36 to 14	Jan. 10, 1871	
Senate bill ordered printed		Jan. 13, 1871
Bill reported with substitute and recommitted		Feb. 25, 1871
Original bill reintroduced and printed		Mar. 9, 1871
Reported and debated		Jan. 9, 1872
Recommitted		Jan. 10, 1872
Reported back, amended and printed		Feb. 13, 1872
Debated		April 9, 1872
Amended and passed by vote of 110 to 13		May 27, 1872
Printed in Senate	May 29, 1872	
Reported, amended and printed	Dec. 16, 1872	
Reported, amended and printed	Jan. 7, 1873	
Passed Senate	Jan. 17, 1873	
Printed with amendments; conference committee appointed		Jan. 21, 1872
Became a law, Feb. 12, 1873		

The literature on the subject has been learned, fervid and voluminous. Senator John Sherman's *Recollections;* Prof. J. L. Laughlin's *Facts About Money;* J. K. Upton's *Coin Catechism;* and J. F. Cargill's *Freak in Finance*, may be relied on for the sound-money side of the argument. The free-silver argument can be found in Coin's *Financial School* and several similar works.

CRIMES ACT, Ireland. See Home Rule, in these Supplements.

CRIMINALITY, or the state or quality of being

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criminal, in its bearings on social questions and the eventual improvement or advancement of the race, is now one of the most serious considerations of thinkers and those who are necessarily engaged in the study of the criminal classes from a detective, preventive or scientific standpoint. The study of crime has indeed been advanced to the dignity of a science called criminology. Criminologists are inclined to believe that a criminal is a hereditary resultant; hence such an individual may be styled criminaloid, or with a criminal taint. Dr. S. A. K. Strahan holds that the criminal belongs actually to a decaying race, being in fact only one of the many signs of family decay, and is only found in families whose other members show signs of degeneration. Besides being hereditary, he thinks criminality is interchangeable with other degenerate conditions, such as idiocy, epilepsy, suicide, insanity, scrofula, etc.; and it is not certain, or it is a "chance," whether the insanity or drunkenness, for instance, of the parent will appear as such in the child or be transferred in transmission to one or other of the alternate degenerate conditions. As to the treatment of the criminal, or criminaloid, for the purpose of effectually eradicating the stock from the human element, no system has been, or can be yet, heroically adopted. The time is not ready for the evident measures necessary. Herbert Spencer has declared that not only have artificial punishments failed to produce reformation, but they have in many cases increased criminality. Ruskin has said that reformation depends on the establishment of institutions for the active employment of the individuals while their criminality is still unripe. The present system, Dr. Strahan declares, has proved a disastrous failure. Short periods of punishment can have no effect, either curative or deterrent. Everything points in the direction of prolonged or indefinite confinement in industrial penitentiaries. It is certainly upon such lines that the treatment of the criminal will eventually have to proceed; but the question arises, if the criminaloid is a hereditary resultant, he cannot be regarded as responsible; therefore his treatment should not be conducted upon the idea of inflicting punishment, but on the principle of isolation and the securing the prevention, through him, of the further transmission and continuity of the taint that has developed in his hereditary line. The taint must be drained out of the stream of continuity—of hereditary forces—by simply securing, in such individual, an obliteration of such lineal tendency.

CRIMINALS, Identification of. While various systems have been in use from time immemorial, for the identification of persons charged with crime, it remained for Alphonse Bertillon of Paris to perfect, in 1882, a system that was adopted by the French government, affording a positive means of immediately recognizing and identifying a person who had ever, at any time, been examined according to the rules laid down in the code established by him. The measurements as established are applicable to individuals, tribes or races. The list embraces height; length and width of head; length of left middle and little fingers, forearm and foot, full stretch of arms; and length and breadth of right ear. All marks and scars are fully described and recorded, and exact position noted; all peculiarities of the eyes and hair are given. In defining a scar, its precise location is noted as being either on the right or left of the vertebral column, as well as above or below the plane of the seventh vertebra. For scars on the face the localities and measurements are reckoned from the nostrils, the bridge of the nose, the corners of the mouth, chin, cheek, eyebrows; on the breast, the median line, the nipples, the sternum, are taken as bases; for the arm, the measurements are reckoned from the shoulder, elbow, wrist; for the fingers, the phalanges and articulations. It was found that in the measurements of 130,000 individuals by the police in Paris, no two cases were alike, and it was very seldom that the same kind of scar or mark was on two different persons in the same position. In the practical working of the system, three divisions are made: tall, medium and short. This is designated as the first classification. Each of these classes is further subdivided under head-measurement, followed in turn by other classifications and divisions until the whole number is divided into groups of about ten persons each. As an example of the speed and accuracy with which a criminal can be identified when he refuses to give his name, it is necessary to take, first, his height, thereby locating him in one of the grand divisions, tall, medium, or short, and thereby locating the series of compartments or drawers where his recorded measurement and photograph are to be found. The measurement of the length of the head brings still nearer; the color of the eyes, the length of the outstretched arms, and the length of the foot will bring the searcher to the exact spot where the full description and pictures identify the culprit beyond a doubt. Two photographs are usually taken, one with a profile view, the second a three-quarter face.

The plan adopted by the police of the United States is regarded as an improvement and simplification of the methods as given in the foregoing description. The method in vogue for many years has been to take the height and weight; note the complexion; the color and any other peculiarity of the hair; the teeth, eyes, nose, etc. In the matter of the nose, care is taken to describe it as either regular, irregular, Roman, pug or Grecian. All scars are located and described; birth-marks and India-ink marks, with all deformities, and evidences of accidents are recorded. The measurements can be taken by one policeman, but for rapid work two are usually required,—one for the measuring and one for the recording. The instruments used are calipers, compasses and graduated rules, which, although inexpensive, are so exact that the diameters of the head and the length of the fingers can be given to within one millimeter. The entire system of measurement has recently been exhaustively treated in Alphonse Bertillon's *Signaletic Instructions* (1896), edited by Maj. R. W. McClaughry, the well-known penologist.

CRINOIDEA. See Echinodermata, Vol. VII. p. 550.

CRIPPLE CREEK, perhaps the most remark-

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able of all the recent mining towns of the West, is situated on the southwesterly slope of the foothills of Pike's Peak, in El Paso County, and about 30 miles W.S.W. from Colorado Springs. It has two railroads, the Midland Terminal and the Florence and Cripple Creek. Gold was first discovered here about 1885 or 1886; but although the first "prospects" were located upon ground which has since been demonstrated to be of vast richness, they were not, at that time, prosecuted far enough to demonstrate their worth. The first large strike occurred in 1891, and in 1896 a very large surrounding area of territory has been turned into the production of gold upon a profitable scale. Cripple Creek has been to gold-production what Leadville was to the silver-mining industry. They both marked new departures, or virtually new eras, in the mining of the respective metals, inasmuch as they demonstrated that metals lay hidden in and richly impregnated hitherto unsuspected rock-formations; those at Leadville being the lead carbonates, while at Cripple Creek the gold was found in conjunction with dikes ascending through fissures in the earlier volcanic formation. Cripple Creek has had its vicissitudes. In 1894 the town was the scene of great turmoil and uproar on account of the miners' strike, which paralyzed all industry, caused the destruction of much property and the loss of many lives, and involved the whole state and surrounding country. This trouble being finally settled, the town entered upon a new era of growth. New mines were opened and older ones developed; the influx of population was unprecedented, and, notwithstanding a fire during the early part of 1896, which virtually wiped the town out of existence, it soon had all the adjuncts of modern life and a population in 1900 (12th U. S. census) of 10,147, and an increasing output of gold. In 1895 the production exceeded $8,000,000.

CRISAFULLI, Henri, dramatist; was born of French and Italian parentage at Naples in 1827, and was educated in Paris at the College of Charlemagne. He was a prolific and successful playwriter, working sometimes alone and sometimes in collaboration with Edouard Devicque. Among his works were *Cesar Borgia; Marie Stuart; Girofle-Girofla; Les Loups et les Agneaux; M. et Mme. Fermel; L'Idole; Lord Harrington; Les Deux Faubouriens; Le Démon du Jeu; Le Passé de M. Jouanne; Les Postillons de Fougerolles; Le Bonnet le Coton; Une Pierle*, etc. He also collaborated with Gustave Amard, in writing a series of romances under the title *Les Invisibles de Paris*.

W.F.J.

CHARLES F. CRISP.

CRISP, Charles Frederick, an American jurist and statesman; born of American parentage in Sheffield, Eng., Jan. 24, 1845. He received a common school education at Americus, Georgia, where, at the outbreak of the Civil War, he joined the Confederate army. He was promoted lieutenant, and in 1864 was captured by the Union troops. He was exchanged a few months later. After the war he studied law, and in 1866 was admitted to the bar of Georgia. From 1872 to 1877 he was solicitor-general of Georgia, and from 1877 to 1882 was judge of the state supreme court. He resigned his judgeship to accept the nomination for Congress in 1882. In 1891 he was chosen Speaker of the House of Representatives, and was again selected for the same office in 1893. He was one of the ablest parliamentarians of the day and became a prominent member of Congress, attaining a national reputation as speaker. He died in Atlanta, Georgia, October 23, 1896. W.M.C.

CRISPI, Francesco, an Italian statesman; born at Ribera, Sicily, Oct. 4, 1819. He was an early and ardent promoter of Italy's unification in 1848 in Sicily; in 1859 in Piedmont, and in 1860 again in Sicily under Garibaldi. Since 1865 a member, and in 1876, president of the Chamber of Deputies, he ranged first with the Radicals, but became gradually an adherent and defender of a constitutional monarchy. He was minister of the interior from 1877–87, and from 1893–96, and premier from 1887–91, and as such a stanch supporter of the Dreibund. He died Aug. 11, 1901, at Naples. G.A.S.

FRANCESCO CRISPI.

CRITICISM, Higher, a name given to that criticism of books, and especially of the Bible, which is concerned with their origin, form and value. It is distinguished from the lower criticism, which is concerned with their text.

Traces of the higher criticism of the Bible are found during all the Christian centuries. But systematic work in this field is exclusively modern. It began with Jean Astruc, in his book entitled *Conjectures Concerning the Original Memoirs Used by Moses in Composing the Book of Genesis*, which appeared at Brussels in 1753. This book was intended as a defense of the Pentateuch against Spinoza. Astruc pointed to the fact that the names *Jehovah* and *Elohim* are used in alternate passages in the early chapters of Genesis, and that if the passages containing either of these names be put together, they form a connected narrative. He therefore inferred that Moses made use of two earlier documents, in one of which God was uniformly called Jehovah, and in the other Elohim. The theory of Astruc excited great attention, and Eichhorn, who wrote thirty years later, affirmed that the sections of Genesis in which the names of Jehovah and Elohim, respectively, are used are also characterized by other differences of style. Eichhorn gave to this method of study the name of higher criticism, a designation which it has borne ever since.

The conjectures of Astruc and Eichhorn are

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called "the document theory." Still later, De Wette published his "supplement theory"; and still later, Ewald his "crystallization theory." Without defining these later theories, it may be sufficient to say that the general tendency of the critical labors which they represent was to extend the document theory to a larger number of Biblical books, to find a larger number of original documents, and to analyze the early books of the Bible more minutely. In our own times the movement of the higher criticism has reached what is called the "Grafian phase," represented by Graf, by Kuenen, by Wellhausen, and by many others. The results presented by this, the now reigning school of higher critics, are stated thus by Zenas, in his excellent book on the higher criticism:

"The credible recorded history of Israel dates from the days of Samuel. With this prophet begins, also, the crystallization of the religion of Israel into its present form. The process thus begun continues through centuries. The Hexateuch is a composite work, whose origin and history may be traced in four distinct stages: 1. A writer designated as J, Jahvist, or Jehovist, or Judean prophetic historian, composed a history of the people of Israel about 800 B.C. 2. A writer designated as E, Elohist, or Ephraemite prophetic historian, wrote a similar work some fifty years later, or about 750 B.C. These two were used separately for a time, but were fused together into JE by a redactor, at the end of the seventh century. 3. A writer of a different character wrote a book constituting the main portion of our present Deuteronomy during the reign of Josiah, or a short time before 621 B.C. This writer is designated as D. To this work were added an introduction and appendix, and with those accretions it was united with JE by a second redactor, constituting JED. 4. Contemporaneously with Ezekiel the ritual law began to be reduced to writing. It first appeared in three parallel forms. These were codified by Ezra not much earlier or later than 444 B.C., and between that date and 280 B.C. it was joined with JED by a final redactor. This general view, always allowing modifications in final details, has been accepted by a large number of European and American scholars, and may be said to be the dominant view at the present time. In America these views have been accepted by C. H. Toy, C. A. Briggs, H. P. Smith and B. W. Bacon."

Many advocates of this view on the continent of Europe have been aided to accept them by preconceptions against the supernatural in the Bible and in the religious history of the world; but in England and America this has not usually been the case. No objection can be made to the higher criticism as a method of study in any field of literature; but the higher criticism of the Bible is to be judged not only by the method of those who pursue it, but also by the conclusions they reach. The unsettling of early Biblical history is so extensive, and the analysis of the Hexateuch presented to us by the higher critics so minute and teasing, that these results can be accepted only when accompanied by overwhelming proofs. But the arguments submitted to us seem often unreal, and if such arguments were applied to the mixed plays of Shakespeare, they would not lead us to a conviction of the value of the dramatist's works.

The literature of the subject is almost boundless, but a fair and complete discussion will be found in *The Elements of the Higher Criticism*, by A. C. Zenas, New York.

F. JOHNSON.

CRITTENDEN, GEORGE BIBB, soldier, was born at Russellville, Ky., on March 20, 1812, and was graduated from West Point in 1832. He served in operations against Mexican raiders, was captured and narrowly escaped death, on one occasion offering his own life to save that of a comrade. He fought with distinction through the Mexican War, becoming a major in 1848 for gallant conduct at Contreras and Churubusco. In the Civil War he was a major-general in the Confederate army, and was badly defeated by General Thomas at Mill Springs, for which he was censured and put under arrest. After the war he was state librarian of Kentucky. He died on November 27, 1880. W.F.J.

CRITTENDEN, JOHN JORDAN, an American statesman; born near Versailles, Woodford County, Kentucky, September 10, 1787. He was graduated from William and Mary College in 1807, studied law and was admitted to the bar. In 1809 he was appointed attorney-general of the territory of Illinois. He was elected a member of the Kentucky state legislature in 1816, and in 1817 was elected to the United States Senate. From 1819 to 1835 he continued in the practice of his profession, as one of the first lawyers of Kentucky, residing principally at Frankfort, and occasionally representing his county in the state legislature. In 1835 he was again elected to the United States Senate, and continued to serve in that body until March, 1841, when he was appointed Attorney-General by President Harrison. On the outbreak of the Whigs with John Tyler, in September, 1841, Mr. Crittenden resigned with the other members of the Cabinet except Mr. Webster, and retired to private life, from which, however, he was soon called by the Legislature to again take his seat in the United States Senate, in 1842. In the Senate he warmly supported the war with Mexico, but objected to the annexation of Texas. He was also elected Senator for another term of six years, from March, 1843, but, in 1848, having received the Whig nomination for governor of Kentucky, he retired from the Senate, and was elected by a large majority to that office, which he held till his appointment of United States Attorney-General in the Cabinet of President Fillmore. In 1855 he was again elected to the United States Senate. In 1860 during the pro-slavery agitation in Congress he proposed constitutional amendments to the states. His bill was widely known as the "Crittenden Compromise." After a long discussion the bill was defeated. In 1861 he was defeated for the Senate, but was sent to the House of Representatives. While in Congress he objected strongly to the

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formation of the new state of West Virginia. He was, perhaps, the most popular man in Kentucky during his time and it was owing to his influence that the state remained loyal to the Union in the Civil War. He bitterly opposed the enlistment of negroes in the United States army. He died near Frankfort, Kentucky, July 26, 1863.

W.M.C.

CRITTENDEN, THOMAS LEONIDAS, soldier, son of John Jordan Crittenden and brother of George Bibb Crittenden (q. v.), was born at Russellville, Ky., on May 15, 1819, and was educated for the bar. In 1842 he was elected district attorney, but at the opening of the Mexican War he entered the army as lieutenant-colonel of Kentucky volunteers, and for a time was a member of General Taylor's staff. After the war he was consul at Liverpool for four years, then practiced law again, and engaged in mercantile pursuits. At the opening of the Civil War he entered the Union army and was made a brigadier-general of volunteers, and in July, 1862, major-general of volunteers. He did fine service at Shiloh, at Stone River, and at Chickamauga, and later with the army of the Potomac. In December, 1864, he resigned his commission, but two years later was reappointed to the regular army as colonel and brevet brigadier-general. He died on October 23, 1893.

W.F.J.

CROCKETT, a thriving city, the capital of Houston County, central eastern Texas. It is on the International and Great Northern railroad, 38 miles S.E. of Palestine. It has two seminaries. It lies in the center of a fertile agricultural district. Population 1890, 1,445; 1900, 2,612.

CROCKETT, DAVID, an American pioneer and politician; born in Greene County, Tenn., Aug. 17, 1786. He had little education, not learning the alphabet till he was 18, but he acquired a knowledge of men and things through hard times and rough adventures. He married early, and soon afterward went to live in the wildest portions of the State, where he supported himself and his wife in the usual frontier manner. In the Creek campaign of 1813–14 he commanded a battalion of mounted riflemen under Gen. Jackson. He was a noted hunter, and his skill with the rifle and his companionable nature made him a favorite among his neighbors. He was thus appointed a local magistrate, and later was sent to the State legislature for two terms; was elected to the United States House of Representatives, in which he served from 1827 to 1831, and again from 1833 to 1835. He next went to Texas, then in her revolutionary struggle against Mexico, and in the heroic defense of Fort Alamo, at San Antonio de Bexar, was among those treacherously murdered by order of Santa Anña. He had a great facility for telling amusing stories, and in Washington he obtained general notoriety by his eccentricities of manner and language, and was regarded as a gifted and genial specimen of the "half horse and half alligator." He wrote an *Autobiography* which was published in 1834. Other books have been attributed to him, but probably erroneously. His death occurred March 6, 1836.

DAVID CROCKETT.

E.E.T.

CROCKETT, SAMUEL RUTHERFORD, a Scotch novelist; born at Little Duchrae, in Galloway, in 1859, the son of a crofter. In 1869 his parents removed to Castle Douglas, where the lad had the advantage of a discriminating teacher, who discovered marks of ability in his pupil and encouraged him, so that in 1876 the boy was able to gain a bursary of $100, and proceed to the University of Edinburgh, where he graduated in the arts department four years later. During his college career he did some journalistic work, and later was recommended by Dr. Jowett of Oxford University to a position as traveling tutor. In this capacity he traveled all over Europe, as well as parts of Asia and Africa. This gave him an opportunity rarely experienced by novelists, and he has utilized the scenes and incidents of these travels in his writings. During this period he contributed fugitive pieces of verse to the Scottish journals, which afterward were collected in a volume entitled *Dulce Cor: The Poems of Ford Bereton*. On returning to Scotland, he commenced his theological training at the Free Church New College, Edinburgh, and, on completing his course, went to occupy the Free Church pulpit at Penicuik, in Midlothian. In 1891 he had written his first prose work, *The Stickit Minister*, for the principal character in which he has stated that a cousin was the model. The book appeared in 1893, and ran through six editions in twelve months, and immediately established the author's reputation as a delineator of local character. Following his first success were *The Raiders* (1894); *The Men of the Moss Hags* (1894); *Mad Sir Uchtred* (1894); *The Lilac Sunbonnet* (1894); *Bog, Myrtle, and Peat* (1895); *The Play Actress* (1895); *The Red Axe* (1898); *The Black Douglas* (1898). He has been styled "the Covenanting Novelist," from the subject of his *Men of the Moss Hags*.

CROCODILE-BIRD. See CROCODILE, Vol. VI, p. 525.

CROCUS, a flowering plant. See HORTICULTURE, Vol. XII, p. 262; and SAFFRON, Vol. XXI, p. 153.

CROCUS OF ANTIMONY, a double sulphide of sodium and antimony formed in the manufacture of the metal. Crocus of Mars is the finely divided red oxide of iron.

CROES, JOHN, clergyman, was born at Elizabeth, N. J., on June 1, 1762, and from 1778 to 1781 served in the American army in the Revolution. He then taught school, and entered the Protestant Episcopal ministry in 1790. In 1801 he was settled at New Brunswick, N. J., and was rector of Christ Church and head of a boys' school which afterward was developed into Rutgers College. He was in June, 1815, elected bishop of the diocese of Connecticut, whereupon his fellow-clergymen in New Jersey almost unan-

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imously petitioned him to decline it and to remain among them. He acceded to their request and declined the Connecticut bishopric, whereupon in the following August he was elected, and in November consecrated, first bishop of the diocese of New Jersey. He died on July 30, 1832. W.F.J.

CROFFUT, WILLIAM AUGUSTUS, an American journalist and poet; born in Redding, Connecticut, January 29, 1835. He received a common school education and entered journalism in New Haven. In the Civil War he served as a private, being promoted to corporal. He then resumed his career as a journalist, being engaged upon the New Haven *Palladium*, the Rochester *Democrat*, St. Paul *Times*, the Minneapolis *Tribune*, the Chicago *Post*, the New York *Graphic*, *Tribune*, and *World*, and the Washington *Post*. He twice visited Europe and traveled through Mexico, Yucatan, Cuba, and Nova Scotia and was a voluminous correspondent for the newspapers. He wrote the libretto of a comic opera entitled *Deseret*, which was produced in New York in 1882, and for which Dudley Buck composed the music. The motive for this opera was drawn from life among the Mormons. From 1888 to 1891 he was editorial director of the United States Geological Survey. His books include *A Helping Hand* (1861); *The History of Connecticut in the Rebellion* (1867); *Bourbon Ballads*, a popular series of political rhymes (1880); *A Midsummer Lark* (1882); *The Vanderbilts* (1886); *The Folks Next Door* (1892); *Labor's Riddle Guessed At*, and *The Lord's Day or Man's* (1894). He has also published two volumes of *Poems*. W.M.C.

CROFTERS, tenants of small holdings of land, living chiefly in the Highlands and western islands of Scotland. Those dwelling on the islands, or near the coast, gain their livelihood by farming and fishing, and those living in the interior, chiefly by the cultivation of their holdings. They and the conditions under which they live are descendants of the clansmen and the feudal system that prevailed previous to 1746; and their historic claim is "that the fertile land in the Highland glens and the pastures on the hillsides were the common property of the clan under the chief, and that, even though the chief may have been, in the eye of the law, the absolute owner of the land, still, in point of fact and immemorial custom, the clansmen shared his possessions, and had an undisputed and undisturbed right to their crofts and their pastures or grazings, on payment of a small rent, or on condition that they served under their chief, as they were only too ready to do, in time of war." Consequently, the policy of eviction maintained by the landlords has always been resented and the payment of exorbitant rents sometimes resisted by the crofters; and the poverty and hardship of their lives, similar in many respects to the sufferings of the Irish peasantry, have many times been the topic of general discussion and sometimes of political action.

A Royal Commission, appointed in 1883 to inquire into the condition of the crofters, reported that a "security of tenure founded on the old usage of the country could not now be seriously entertained, as the clan system no longer exists, and the property has, in many cases, changed hands." But the commission added that "it must not be forgotten that the authority of chieftainship has been reasserted, and the obligations of vassalage have been avowed in a new form and for a new cause, almost within the memory of men living. It is difficult to deny that a Macdonald, a Macleod, a Mackenzie, a Mackay, or a Cameron, who gave a son to his landlord (to fight under him) eighty years ago, did morally acquire a tenure to his holding more sacred than the stipulations of a written covenant."

In accordance with the spirit of the report of this commission, and under the inspiration and persuasion of Mr. Gladstone, the Crofters' Holdings Act was passed by Parliament in 1886. This law aimed to perpetuate the Highland village communities by establishing "crofting parishes" within which the act was to be applicable; it secured the crofter in the tenure of his holding; provided for the determining and establishment of fair rents; granted the tenant the right to renounce his holding; and ensured him adequate compensation for any improvements he might make on the property. The act was applicable only to crofting parishes within the counties of Argyll, Inverness, Ross and Cromarty, Sutherland, Caithness, and Orkney and Shetland; for although there are many crofter tenancies in other counties, particularly in Aberdeenshire and Perthshire, they exist under such favorable and different circumstances, that it was deemed wise not to extend to them the privileges of special legislation.

The Crofters' Holdings Act has been vigorously assailed as an unwarrantable encroachment upon the rights of the landlords — especially in that it cancelled much arrearage in rent — and on the ground that it encouraged shiftlessness. The following summing-up of the effects of the law is given by *The Scottish Review*:

> "As direct and intended results, the crofter has received two distinct benefits, (first) reduction of rent, and (second) security of tenure, which enables him to resist the regulations of his landlord formerly enforced by eviction. As indirect results, (first) by the prevention of monopoly the proprietors are discouraged from the expenditure of capital in developing the resources of outlying districts by the establishment of stores, fishing stations, or the like; (second) they are deprived of all control of their property so far as consisting of scattalds (open grounds for pasture or fuel), and the crofters are left to dispute among themselves how the stock on each scattald is to be regulated; (third) the burden of building and maintaining dwelling houses, etc., has been thrown exclusively on the crofters; and (fourth) the settlement of all local disputes has been taken from the proprietor and left to the decision of the Courts of Law."

See SCOTLAND, Vol. XXI, p. 556; also Vol. XXII, SKYE, p. 134; and SUTHERLAND, p. 763. R.C.A.

CROFTON, SIR WALTER FREDERICK, an English prison reformer; born in 1815. In 1833 he entered the Royal Artillery, retiring in 1844 as

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captain. Subsequently he became interested in the improvement of prisons and reformatories. He has done much to advance the merits of refuges and reformatories throughout the civilized world. He was knighted in 1862, received the companionship of the Bath, and was made a privy councillor in Ireland.

CROGHAN, GEORGE, an American soldier; born near Louisville, Ky., Nov. 15, 1791. He graduated at William and Mary College; was aide-de-camp in the battle of Tippecanoe, in 1811; captain in 1812; and major, March 30, 1813. He took part in the defense of Fort Meigs, May 5, 1813; and on Aug. 1 and 2 he successfully defended Fort Stephenson (now Fremont), Ohio, against a vastly superior force. He was made inspector-general with rank of colonel, Dec. 21, 1825, and in that capacity served with General Taylor in Mexico. He died in New Orleans, Jan. 8, 1849.

E.E.T.

CROKE, THOMAS WILLIAM, Roman Catholic archbishop of Cashel, Ireland, was born in Mallow, County Cork, May 19, 1828. He studied in Paris and Rome, taking his degree of D.D. at the Roman University in 1847. After various appointments in Ireland and New Zealand, he became archbishop, June 25, 1875, and was identified prominently with the Irish Land League and other national and patriotic movements. He died in July, 1902.

CROLL, JAMES, physicist; was born in Perthshire, Scotland, in 1821, received a common school education, and was entirely self-taught in science. He was a millwright, an insurance agent, and keeper of the museum of Anderson's College, Glasgow. Finally in 1867 he joined the Geological Survey of Scotland, and remained connected with it until 1881. He was the author and advocate of an interesting theory of climatology, to the effect that, contrary to the opinions of most scientists, the great changes in the climate of the earth, including the glacial period, etc., have been due to the secular variations in the eccentricity of the earth's orbit and the consequent changes arising therefrom, such as the deflection of the ocean currents. Croll supported this theory with much power and ingenuity, and also concerned himself with the general themes of cosmology and theology. His books included *The Philosophy of Theism* (1857); *Climate and Time* (1875); *Discussions on Climate and Cosmology* (1886); *Stellar Evolution* (1889); *The Philosophical Basis of Evolution* (1891), and an *Autobiography* (1896). He was a fellow of the Royal Society, and an LL.D. of St. Andrew's. He died on December 15, 1890.

W.F.J.

CROLY, DAVID GOODMAN, journalist; was born in Ireland on November 3, 1829, came to America in boyhood, and was educated at New York University. His life was devoted to newspaper work, as a reporter for the New York *Herald* and *Evening Post*, editor of the *News* at Rockford, Illinois, city and managing editor of the New York *World* in 1860–72, and managing editor of the New York *Daily Graphic* in 1872–78. He was the author of *The Modern Thinker*, *The Positivist Catechism*, and *Glimpses of the Future*. He was one of the founders of the Lotus Club of New York. He was married in 1857 to Jennie Cunningham, whom see, below. Mr. Croly died in New York on April 29, 1889.

W.F.J.

CROLY, JANE CUNNINGHAM, an American writer; born in Market Harborough, England, Dec. 19, 1829. She came to America with her family at ten years of age, and settled at Poughkeepsie, N. Y. In 1856 she married David G. Croly, a journalist (see preceding paragraph). She held editorial positions on newspapers and magazines — including Demorest's (1860–87) and Godey's Lady's magazines — for over forty years; started the duplicate system of correspondence which ultimately led to the modern syndicate; was the first woman on the staff of any daily newspaper in New York; and was the first regular woman correspondent of several papers. She called the first Woman's Congress in New York in 1856, and the second in 1869; founded Sorosis in 1868, and was its president, 1868–70 and 1876–86. She founded the *Woman's Cycle* in 1889, and was the author of *Talks on Women's Topics; For Better or Worse;* etc. She died in New York, Dec. 23, 1901.

E.E.T.

CROMARTY FIRTH, a deep incision into the northeastern coast of Scotland, in Ross County, extending some twenty miles into the land in a southwesterly direction. It is from three to five miles wide, and forms an excellent harbor.

CROMDALE, a place in southern Elginshire, northeastern Scotland, on the right bank of the Spey, 5 miles N.E. of Grantown. Here, May 1, 1690, eight hundred Jacobite Highlanders were surprised and routed by a body of King William's dragoons.

CROMER, a small town and parish, a favorite watering-place in Norfolk, England, 21 miles N. of Norwich. The town has two stations, one on the Great Eastern railway and one on the Midland, and Great Northern Joint railway. The heavy sea has prevented the formation of a harbor, and vessels are compelled to load and unload on the beach. So strong have the encroachments of the sea been that nearly all of the original town, called Shipdon, as well as the parish church, has been swept away. The principal occupation of the inhabitants is crab and lobster fishing in season, and the collection of jet and amber in the winter. The Norfolk and Norwich Hospital maintains a convalescent home of considerable size. The location of the town is so much above sea-level that the lighthouse is visible for 23 miles. The population is about 2,500.

CROMER, EVELYN, LORD, an English financier and diplomat, cousin to the Earl of Northbrook; born Feb. 26, 1841. As Sir Evelyn Baring he was a European commissioner of the public debt in Egypt, and was one of the comptrollers-general representing England and France in 1879, when Tewfik Pasha became ruler in Egypt. He occupied this position until 1880, when he accepted the office of Finance Minister of India under the

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Marquis of Ripon, in which capacity he framed and carried three budgets. In 1883 he succeeded Sir Edward Malet at Cairo, with the status of minister. He was created a peer in 1892, with the title of Baron Cromer. He is "the maker of modern Egypt."

CROMWELL, RICHARD, a son of Oliver Cromwell, Lord Protector of England; born at Huntingdon, Oct. 4, 1626. He studied law at Lincoln's Inn. When Oliver attained the dignity of Lord Protector, he called his son from the obscurity of a country house to have him elected to Parliament for the counties of Monmouth and Southampton, appointed him First Lord of Trade and Navigation, and made him chancellor of Oxford and a Privy Councillor. In none of these capacities did Richard Cromwell exhibit any aptitude; and his failure as Protector, to which high office he succeeded in September, 1658, on the death of his father, was still more conspicuous. The result was his demission, a little more than seven months after he had assumed the headship of the commonwealth. He retired to Hampton Court, and after a sojourn of twenty years in France he returned to England and died there, July 12, 1712.

CRONJE, GENERAL P. A., a noted Boer commander, born 1835. In 1881 he was in command at the siege of Potchefstroom, against the British. It was to him also that Dr. Jameson, the raider, surrendered with his fellow Uitlanders, Jan. 1, 1896. In the war of 1899–1900 General Cronje commanded the Boers in the early part of the investment of Kimberley. Later on he commanded the burgher forces at the Modder River, at Magersfontein and at Paardeberg, where he surrendered, together with 4,000 men, to Lord Roberts. Was exiled to St. Helena as a prisoner of war in April, 1900, and released in August, 1902. On his return home he found some of his property confiscated and the rest he gave to help his friends. To partly retrieve his losses, he joined the Boer-War spectacle which exhibited in the United States, 1904–5.

CRONWRIGHT-SCHREINER, OLIVE, better known as Olive Schreiner, the South African novelist; born about 1863, in Cape Town, the daughter of a Lutheran clergyman. When she was twenty years of age she went to London with the manuscript of a novel, *The Story of an African Farm*, which had the good fortune of receiving the approval of George Meredith. The story was published under the pseudonym of "Ralph Iron," and was a great success. It ran through many editions. The book dealt with the spiritual liberation of an idealist temperament from the ultra-Calvinism of the Dutch profession. In 1891 she published *Dreams*, a collection of parables; and in 1893, *Dream Life and Real Life*. She was married Feb. 24, 1894, to Mr. Cronwright, a young colonist, upon which occasion she chose to be known as Olive Cronwright-Schreiner, Mr. Cronwright at the same time adopting his wife's name. In 1895 he delivered a lecture at Kimberley, South Africa, on *The Political Situation*, which, with the assistance of his wife, has been elaborated into a book, which the authors describe as dealing with "the retrogressive movement in South Africa, and the manner in which it may be stayed." In 1897 she published *Trooper Peter Halket of Mashonaland*.

OLIVE SCHREINER.

CROOK, GEORGE, soldier; was born near Dayton, O., on Sept. 8, 1828, and was graduated at West Point in 1852. Until the Civil War he served on the western frontier, but in 1861 was assigned to duty in West Virginia, where he soon distinguished himself. He was in the battles of Lewisburg, South Mountain, Antietam, Tullahoma, Chickamauga, Cloyd Mountain, Opequan, Fisher's Hill, and Cedar Creek. Just before the end of the war he was captured by guerrillas, but was exchanged, and was at the surrender of Lee at Appomattox. After the war he was soon sent back to the western frontier, where he conducted several notable campaigns against the Pi Utes, Apaches, Chiricahnas, and other hostile Indians and made for himself the reputation of being one of the greatest Indian fighters in our history. He was made a brigadier-general in 1873. He introduced many reforms into the management of the Indian Department, and did much for the civilization and welfare of the red men. In 1888 he became a major-general of the United States army, and he died on March 21, 1890. W.F.J.

GENERAL CROOK.

CROOK, ISAAC, clergyman, was born in Ohio and was educated at the Ohio Wesleyan University. He entered the ministry of the Methodist Episcopal Church in 1860 and filled several important charges. He was for a time president of the University of the Pacific, in California, chancellor of the Nebraska Wesleyan University, and president of the Ohio University. In 1898 he returned to the work of the ministry. He has written a number of biographical and philosophical works. W.F.J.

CROOK, JAMES KING, physician, was born in Alabama on February 25, 1859, and was graduated in 1880 from the Medical College of New York University, since which time he has been engaged in the practice of his profession in New York City. He has been connected with the various city hospitals, St. Stephen's Home, Mount Sinai Hospital, the Post-Graduate Medical School and Hospital, and various other institutions. He was a delegate to the second Pan-American Medical Congress in 1896, and to the British Medical Association in 1897. W.F.J.

CROOKED ISLAND, one of the Bahamas, valu-

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able chiefly for its salt, of which it produces about 12,000 bushels annually. Its area is about 160 square miles, Lat. 22° 15′ N., long. 74° W.

CROOKED LAKE. See KEUKA LAKE, in these Supplements.

CROOKES, SIR WILLIAM, physicist and chemist; was born in London on June 17, 1832, and studied at the Royal College of Chemistry, where he was first a pupil and then an assistant of Hofmann. Thence he went to Oxford as superintendent of the Radcliffe Observatory, and later became a lecturer and instructor in the Science College at Chester. He founded the *Chemical News* in 1859, and in 1864 became editor of the *Journal of Science*. As early as 1851 he published a paper *On the Seleno-Cyanides*, and ten years later, through the use of spectrum analysis and chemical reactions he discovered the metal thallium, for which achievement he was in 1863 elected a fellow of the Royal Society. In 1865 he invented the process of reducing gold and silver ores through sodium amalgamation. During a series of experiments to ascertain the atomic weight of thallium he was led, in 1872, to investigate the subject of repulsion resulting from radiation, and thus invented the radiometer, which he afterwards improved and modified in the otheoscope. Meantime he also paid much attention to the physical phenomena of so-called spiritualism, and published the result of his investigations in 1874 in *Researches in the Phenomena of Spiritualism*. Next came the investigations and inventions with which perhaps his name is most identified, namely those in relation to the properties of matter in a vacuum. He produced exceptionally perfect vacua, and vacuum tubes which have since been known by his name and which have greatly advanced the art of electrical lighting and the world's knowledge of electrical phenomena. He claimed to have discovered a fourth state of matter, in which molecules were not in contact as in a solid, a liquid or a gas, but isolated. Some of the results of these investigations were published in his *Molecular Physics in High Vacua* (1879). In recognition of these investigations the French Academy of Sciences gave him in 1880 a prize of $600 and a gold medal. His vacuum tubes also served an important end in leading to the invention of the Roentgen ray apparatus, commonly known as the X-rays. (See ELECTRICITY, in this volume, pp. 538–541.) Other researches of his of great practical value were in sanitation, especially the disposal of city sewage, and in beet sugar, calico printing and other departments of industrial chemistry. He conducted a series of experiments in disinfectants for the suppression of the cattle plague, and made a valuable report thereon to the British government in 1866. He has been president of the British Association, of the Chemical Society and of the Institution of Electrical Engineers, Royal medalist, Davy medalist, and three times Bakerian lecturer of the Royal Society, and was knighted in 1897. In addition to the works already named he has written *Select Methods in Chemical Analysis*; *Dyeing and Tissue Printing*; *The Wheat Problem*, etc., and has translated and edited Kerl's *Treatise on Metallurgy*; Wagner's *Chemical Technology*; Auerbach's *Anthracen and Its Derivatives*, and Ville's *Artificial Manures*. W.F.J.

CROOKES'S TUBE. See ELECTRICITY, § 95, in these Supplements.

CROOKS, GEORGE RICHARD, clergyman and educator, was born in Philadelphia, Penn., on February 3, 1822, and before reaching his majority became a minister in the Methodist Episcopal Church. For a time he was instructor in Dickinson College, Carlisle, Penn. In 1860 he was appointed to be the first editor of *The Methodist*, and he conducted that journal for fifteen years. He published a number of text-books, including a *Latin-English Lexicon*, the latter produced in co-operation with Professor Schem. Other works were lives of Bishop Simpson and Dr. John McClintock, and a *Theological Encyclopædia*, prepared in co-operation with Bishop John F. Hurst. In 1880 Dr. Crooks was appointed professor of historical theology in the Drew Theological Seminary, at Madison, N. J., and in that place spent the remainder of his life. He died on February 20, 1897. W.F.J.

CROPSEY, JASPER FRANCIS, artist, was born at Westfield, Staten Island, N. Y., on February 18, 1823, and as early as 1837 won a prize from the American Institute Fair for a model of a house. Thereafter he studied architecture and water-color painting, but was almost entirely self-educated in art. In 1844 he exhibited a painting of *Greenwood Lake* which won for him election as an associate of the National Academy. In 1851 he was elected an academician, and later he became a member of the American Water-Color Society. From 1847 to 1863 he lived chiefly in England, exhibiting regularly at the Royal Academy and elsewhere. In 1876 he exhibited pictures and won a medal at the Centennial Exposition at Philadelphia. He resumed his architectural practice long enough to design the elevated railroad station on Sixth Avenue in New York. He died in 1900. W.F.J.

CROSBY, FANNY, hymn writer, was born at Southeast, New York, on March 24, 1820, and at six months old became blind. She was educated at the Institute for the Blind in New York, and was a teacher there. She has written more than three thousand hymns, including some of the most familiar and beloved in current use. Her married name is Van Alstyne. W.F.J.

CROSBY, HOWARD, an American clergyman and author; born in New York city, February 27, 1826. He was graduated from the University of the City of New York in 1844 and in 1850 became professor of Greek at that institution. In 1863 he was made pastor of the Fourth Avenue Presbyterian Church in New York and for many years was a delegate to the Presbyterian General Assembly and was once its moderator. He was chancellor of the University of New York from

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1870 to 1881 and was a member of the American committee of revisers of the New Testament. He was one of the founders and at one time president of the American Society for the Prevention of Crime. In 1873 he was a delegate to the First Presbyterian General Council, held in Edinburgh, Scotland. He was well known as a writer of religious works and was long a contributor to the magazines and periodicals. His published writings include *Lands of the Moslem* (1850); an edition of the *Œdipus Tyrannus* (1851); *Life of Jesus* (1871); *Commentary on the New Testament* (1885); *Bible View of the Jewish Church* (1888); *The Seven Churches of Asia* (1890). He was given the degree of D.D. by Harvard College in 1859, and that of LL.D. by Columbia University in 1871. He died in New York city, March 29, 1891. W.M.C.

CROSBY, PEIRCE, naval commander, was born at Chester, Penn., on January 16, 1823, and became a midshipman in the U. S. navy in 1838, on the *Ohio*, the flagship of Isaac Hull. He served in the Mediterranean, in home waters, and in the Mexican War, where he took part in the capture of Tuxpan and Tobasco. Thereafter he was in active service at sea most of the time until 1861. At the outbreak of the Civil War he was on duty at Havre de Grace, at Hampton Roads and in the Chesapeake, keeping open lines of communication. Next he went with General Butler's expedition to Hatteras Inlet, took off from the forts the officers and men who surrendered, and captured four blockade runners. Later he was with Farragut at the Mississippi forts, at New Orleans, and at Vicksburg. In the last part of the war he was on blockade duty. During the war between Brazil and Paraguay he escorted the U. S. minister to Paraguay, and compelled the Brazilian admiral to let him pass through the blockade. In 1882 he was made rear-admiral, and commanded on the South Atlantic and Asiatic stations. He was retired in 1893, and died on June 15, 1899. W.F.J.

CROSS, MRS. MARY ANN (or MARIAN EVANS), a celebrated English novelist, better known by her pen-name of "George Eliot," was born at Arbury Farm, Warwickshire, England, Nov. 22, 1820. Her father, Robert Evans, a land-steward on an estate in the vicinity, was a man of strongly marked character, whose portrait, under a partial disguise, is sketched in Adam Bede and Caleb Garth, while some features of her mother's personality may be recognized in Mrs. Poyser, personages who figure in two of George Eliot's most popular novels. Miss Evans attended school for a short time in Nuneaton, and afterward in Coventry, but her education was in the main self-acquired, for from her earliest years she was distinguished by a passionate love of study and had a richly endowed nature, which subsequently enabled her to attain the highest place in imaginative literature. After the death of her mother, she removed in 1841 to Coventry, where she lived alone with her father, pursuing her studies and making the acquaintance of a family of Unitarians, under whose influence her powerful mind received its bent toward rationalism. The first-fruits of this association was her translation from the German of Strauss's *Leben Jesu*. The death of her father in 1849 gave her the opportunity of passing a winter in Switzerland; and on her return to England she established herself in London, where she began to write for the *Westminster Review*, then under the editorship of her friend, Dr. Chapman. To the radical quarterly she made a number of contributions, as well as assisting in the editing of it, and she added to her translations from the German, Feuerbach's *Das Wesen des Christenthums*, or *Essence of Christianity*. Her work for the *Westminster* brought her to the notice of Herbert Spencer, John Stuart Mill and George Henry Lewes, the biographer of Goethe, and a brilliant philosophic essayist. With the latter she formed an irregular union, at variance with the conventional moral sense of society. Lewes had been deserted by his wife, and her offense condoned, so that a divorce was unattainable, and the couple had finally separated.

The alliance with Mr. Lewes, which remained unbroken until his death in 1878, withdrew George Eliot from the conventions of society, and his discernment provided the needed stimulus for undertaking the work of a novelist. At his suggestion, she began those powerful creations which, from the issue of the first installment of the *Scenes of Clerical Life* to *Daniel Deronda*, centered the eyes of the English-speaking world on her work. In 1857 the three sketches which constitute the work first mentioned appeared in *Blackwood's Magazine*. These were followed in 1859 by *Adam Bede*, a powerful novel of real life, revealing a masterly insight into character and a remarkable knowledge of human nature, combined with admirable powers of description. The broader canvas of this work, which remains to-day the most popular of George Eliot's writings, gave fuller scope to its author's powers, a fact which the appearance of the *Mill on the Floss* (1860) emphasizes, for from the publication of the latter novel may be dated the author's assured position as a writer of fiction. In this, and in *Silas Marner* (1861), a less ambitious though very charming story, we begin to see the author's subtle insight into the workings of the human mind, and her fondness for the analytic dissection of her characters. Both deal with the scenes and characters of the rural and manufacturing districts, in which George Eliot's early life had been spent.

GEORGE ELIOT.

With the publication, in 1863, of *Romola*, a historical novel of the period of the Italian Renaissance, George Eliot not only broke new ground, but adopted a more elaborate and pseudo-scientific style, which alienated many admirers, who could not appreciate the erudition which the work manifests, or

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its somewhat artificial and labored utterance. Nor did *Felix Holt, the Radical*, which appeared in 1866, and dealt with political and religious questions among the lower classes of English society, do much to restore her lost *clientèle*. This, happily, was recovered by the publication, in 1871–72, of *Middlemarch*, a study of English provincial life, which exhibits its author's powers in the maturity of their development. Though inferior, as a story, to *Adam Bede*, there is, in *Middlemarch*, more "delicacy of detail and completeness of finish," as well as greater breadth of life. The work, as the prelude to it hints, is an arraignment of modern society "for the crippling conditions it imposes on men and women, especially women of high ideal enthusiasm." It describes, and with a note of pessimism born of an openly confessed skepticism, "a life of mistakes, the offspring of a certain spiritual grandeur, ill matched with the meanness of opportunity." But, in spite of this, *Middlemarch* is a great though somewhat cheerless novel, relieved by the doings and sayings of an exceptionally noble and high-minded heroine, and by her creator's love of a high moral ideal, made human by a keen sense of humor.

With *Daniel Deronda* (1876) a reaction again set in, owing partly to the increased artificiality of the author's style, and partly to lack of public sympathy with her enthusiasm over certain modern phases of Jewish life and character. There is, of course, in the story, no lack of labor and art, and, occasionally, there are gleams of a fine humor; but the work, as a whole, is heavy and lifeless, and is marred by a too erudite and grandiose manner. Her prose work after the publication of *Daniel Deronda* was limited to a series of essays on various topics, which appeared, in 1879, under the title of *The Impressions of Theophrastus Such*. Besides this, she published some verse, which, if we except the hymn, *O, May I Join the Choir Invisible*, was too heavy and ornate for popular acceptance, though it is distinguished by an occasional subtle thought, and by not a few artistic felicities of expression. The poetical work embraces *The Spanish Gypsy* (1868), a romantic drama; *Agatha* (1869); *The Legend of Jubal* (1874); and *How Lisa Loved the King* (posthumous, in 1883). The poetic side of George Eliot's genius is, however, best seen in the imaginative creations and the delicate finish of her novels. In moral tone, the latter are without a blemish, save for the depressive, skeptical note which mars some of the author's best work. In 1880 George Eliot married John Walter Cross, a London stock-broker and intimate friend, who, after the novelist's death, which occurred in London, Dec. 22, 1880, published a voluminous biography, entitled *George Eliot's Life as Related in Her Letters and Journals*. The work gives a delightful human picture of her quiet domestic life.

G. Mercer Adam.

CROSS, Southern, the most conspicuous constellation of the southern hemisphere. It consists of four bright stars in the shape of a cross. The two brilliant stars which mark the summit and foot of the cross have nearly the same right ascension. The constellation, therefore, is almost perpendicular when passing the meridian, and these two stars act as pointers to the antartic pole.

CROSS, Sir Richard Assheton, Viscount, an English statesman; born in Red-Scar, near Preston, May 20, 1832; studied at Rugby and Cambridge. After having practiced law for several years, he entered Parliament in 1857. In 1868 he defeated Gladstone in a contest for southwest Lancashire, which district he represented permanently. He became home secretary under Disraeli in 1874, which post he held till 1880. Under Salisbury he was appointed to the same office in 1885, and was from 1886–92 secretary for India. In the third Cabinet of Salisbury he served as lord privy seal. He published *Acts Relating to the Settlement and Removal of the Poor*, and *The General and Quarter Sessions of the Peace*. G.A.S.

CROSSBOW. See Arms and Armour, Vol. II, p. 488.

CROSSE, Andrew, electrician; was born at Fyne Court, Somersetshire, England, on June 17, 1784, and was educated at Brasenose College, Oxford. He became interested in electricity, especially in the action of electrical currents upon organic and inorganic substances, and conducted some valuable experiments in the artificial formation of minerals by electrical deposition, and the use of electrical currents in the making and improving of wines and cider. In 1837 he announced that by means of an electrical current he had caused the appearance of living organisms of the genus *Acarus* in solutions of inorganic substances. This announcement was incorrectly interpreted as a declaration that he had actually created living beings out of dead matter, and much ridicule was thereby brought upon him. His actual claim, that he had caused the living things to appear, was correct; but it was of no especial significance. He died on July 6, 1855, and a memoir of him was published in 1857. W.F.J.

CROSSED CHECK, a term peculiar to British banking, signifying a check or draft, across the face of which two parallel lines are drawn, stamped or printed. Sometimes the phrase "& Co." is inserted between them, with room before it for the name of a banking company. When a check is thus crossed, the name of the payee's bankers must be written between the lines, and then the check can be cashed at the bank upon which it is drawn only when presented by or through the banking house whose name is written across it. This system is generally practiced in England, for the sake of security, to prevent the cashing of checks by persons who may have acquired them dishonestly, and it is customary for business concerns, in their advertisements, etc., in giving directions for the remitting of money to them, to direct that checks be "crossed to Messrs. So and So," indicating the bankers through which their business is transacted. The system is not used in America. W.F.J.

CROSS-EXAMINATION is the examination of a witness by the person on the opposite side of the

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case from the party who produced the witness, upon the matters concerning which he has testified in his direct examination. In cross-examination the witness may be asked leading questions, and much latitude is permitted to the counsel in asking questions in a manner to suggest the answer expected or desired, especially where the witness appears to be unwilling to disclose anything against the interests of the person calling him. The liberality allowed in cross-examination makes it difficult for a witness to conceal material facts or tell a plausible untruth when examined by a skillful cross-examiner. See EVIDENCE, Vol. VIII, p. 651.

CROSS OF ST. ANDREW. See ANDREW, in these Supplements.

CROTALARIA, a genus of plants of the family *Leguminosæ*, containing numerous species, all natives of warm climates, but cultivated in hot-houses. Many of them have long, straight, slender stems and branches, and some yield valuable fiber, particularly *C. juncea*, the sunn-hemp of India, the fiber of which is now an important article of commerce. *C. sagittalis*, or rattle-box, is a common species of the eastern United States.

CROTON, a large genus of the family *Euphorbiaceæ*, chiefly natives of the tropics, but represented by several species in the United States. Many of the species are valuable on account of their various products, found in the latex and seeds; e.g., *C. Eluteria* of the Bahamas, which yields cascarilla-bark, and *C. tiglium*, of tropical Asia, from whose seeds croton-oil is obtained.

CROTON AQUEDUCT AND DAM. This great work is 38.12 miles long, from Croton Lake to the reservoir in Central Park, New York, 4 miles below the Harlem high bridge; 29.63 miles have been cut through solid rock, or occasionally loose soil; 2.37 miles are pipe-line underground, and 1.12 miles are open trench. The site of the new dam is also on the Croton River, and is built partly of masonry and partly of earthwork. It is 1,200 feet long, 680 feet of which are masonry, and about 160 feet high at the highest portion of the masonry section, the foundation extending about 80 feet below the river bed. The base of the dam reaches a thickness of 185 feet, and the crest 20 feet. The highest portion of the earthwork section is 120 feet above the present ground-level, with an apex 30 feet wide, carrying a roadway 18 feet wide. The excavation for the base of the dam is carried down 125 feet. Water in the Croton River is thus raised 36 feet above the top of the older Croton Dam, and thirty-four billion gallons of water can be stored. The new aqueduct, finished in 1890, is a tunnel of about 14 feet in diameter and over 30 miles in length. It is carried through solid rock at an average depth of 500 feet below the surface. It delivers over three hundred million gallons of water in twenty-four hours. The total cost was over twenty-five million dollars. The water is carried under Harlem River by gravity and siphons. It leads, also, to the reservoir in Central Park, which has a capacity of ten million gallons daily. The cost was over twenty-two million dollars. See AQUEDUCT, Vol. II, p. 194.

CROTON RIVER, New York, about 48 miles long, flows southward from several pure spring-fed lakes in Putnam County, and the south of Dutchess County, and enters the Hudson River at Croton Landing, 36 miles above New York city. Engineering works utilize the river for the metropolitan water supply. C.L.S.

CROUCH, FREDERICK WILLIAM NICHOLLS, an American composer; born in London, England, July 31, 1808. He began his professional career at the Royal Coburg Theatre and later became a violoncellist in the Drury Lane Theatre Orchestra and a member of the Queen's Private Orchestra. In 1840 he removed to the United States and directed musical organizations in New York, Boston, Portland, Washington and Richmond. During the Civil War while living in Charleston he joined the Confederate army and saw active service with the Richmond Grays. His compositions include *Kathleen Mavourneen; O'Donnell's Farewell*, and the *Emigrant's Lament*. In 1896 he composed *Green and Gold* in honor of Robert Emmet's birth. He died in Portland, Maine, August 19, 1896. W.M.C.

CROW-BLACKBIRD. See GRACKLE, Vol. XI, pp. 24, 25.

CROW INDIANS. See INDIANS, AMERICAN, Vol. XII, pp. 871, 874.

CROWE, MRS. CATHERINE (STEVENS), an English authoress; born in Borough Green, Kent, England, in 1800; died in 1876. In 1822 she married Lieutenant-Colonel Crowe of the Royal Army. They made their home in Edinburgh. In 1841 appeared Susan Hopley; in 1843 she published *Men and Women*. These were followed by *Lilie Dawson*, her best novel, (1847); *Night Side of Nature* (1848); *Uncle Tom's Cabin Adapted for Young Persons* (1853); *Irving Lockwood* (1854); *Ghosts and Family Legends* (1858); *Spiritualism and the Age we Live In* (1859); *The Adventures of a Monkey* (1861), etc. Her mind was morbid and despondent, and at one time she had a violent but brief attack of insanity. She wrote supernatural stories, tragedies, juvenile books, and novels.

CROWE, JOSEPH ARCHER, SIR, historian and writer upon art; was born in London, England, on October 30, 1825. He traveled in Italy, met Giovanni Battista Cavalcaselle, returned with him in his exile to London, and wrote in collaboration with him *Early Flemish Painters*; a *History of Painting in Italy*; *Titian*, and *Raphael*. He was a newspaper correspondent in the Crimean War, in the Indian Mutiny, and in the Franco-Austrian War, and for two years, 1857-59, was director of an art school at Bombay. In 1860 he was made British consul at Leipsic, and, in 1882, commercial *attaché* to the British embassy in Paris. Later he rendered various diplomatic services, in Berlin in connection with Samoan affairs, and in Africa. He was made a knight of the Order of the Bath (C. B.) for his services. He died on September 6, 1896. W.F.J.

CROWFOOT, a common name of species of *Ranunculus*, or buttercups, and sometimes extended to the whole family *Ranunculaceæ*. The name refers to the fact that the leaves of many species are

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three to five cleft. The flowers are commonly yellow, and more or less showy.

CROWN DEBTS. It is a prerogative of the crown to take precedence of all other creditors, and, in England, to recover its debts by a summary process called *extent*. The rule in Scotland, however, is limited to movable or personal property, and the crown has no privilege over a subject in a competition for heritage.

CROWN LANDS, the demesne lands of the English crown. They are now contracted within narrow limits, having been almost entirely granted to subjects. The superintendence of such property as still belongs to the crown is now vested in commissioners appointed for the purpose, called the commissioners of woods, forests and land revenues.

CROWN PIECE, an English silver coin of the value of five shillings, introduced by Henry VIII. It has a standard weight of 436.56 grains, and in United States money is worth about $1.25. The name *crown* is also used as the translation of the French *écu*, which varied in value from six to three francs.

CROWN POINT, Indiana, the seat of Lake Co., a farming and manufacturing town, 15 miles S. of Lake Michigan, and 38 miles S.E. of Chicago, at a junction of the Chicago & Erie, and the Pennsylvania railroads. Pop., 1900, 2,336. C.L.S.

CROWN POINT, New York, a town of Essex County, on the southern reach of Lake Champlain, and on the Delaware & Hudson railroad, 106 miles N.E. of Albany. Iron and lime deposits are worked in the vicinity. On a projecting point in the lake marked by a lighthouse, are the ruins of Old Crownpoint Fort celebrated in the French and Revolutionary wars. Pop., 1900, 2,112. C.L.S.

CROWN-WORK, in fortification, is formed to strengthen a weak front, or to occupy ground which might facilitate the enemy's operations. See FORTIFICATION, Vol. IX, p. 388.

CROWTHER, SAMUEL ADJAI, the first negro Anglican bishop of Africa; born in Yoruba in 1812. His original name was Adjai. He was captured by Mohammedan slave-traders in 1819, and after having been exchanged and disposed of several times, was freed by a British man-of-war and landed at Sierra Leone in 1822. He was transferred to Bathurst, on the west coast of Africa, capital of British Gambia, where he was converted to Christianity in 1825, and took the name of an English vicar who adopted him. After acting as a missionary he accompanied the first Niger expedition in 1841, and was then sent to the Church Missionary College, London, in 1842; was ordained by the bishop of London, and returned to Africa. He accompanied the second Niger expedition (1854). He entered enthusiastically into his missionary work in the different West African possessions of Britain. He was consecrated bishop of Niger territory, in Canterbury Cathedral, June 29, 1864, in which year he was given the honorary degree of doctor of divinity by Oxford University. In 1880 he was presented, on account of his contributions to geographical knowledge, with a gold watch by the Royal Geographical Society of London. He contributed to the study of African languages by publishing *The Grammar and Vocabulary of the Yoruba Language* (1852); *Iscama-Ibe Primer* (1857); *Nupe Primer* (1860); *A Grammar and Vocabulary of the Nupe Language* (1864). He also wrote a *Journal of an Expedition up the Niger and Tshadda Rivers in 1854* (1855); also mission reports and translations of portions of the Scriptures into the languages of West Africa. Died in Africa Dec. 31, 1891. The life of this remarkable man can be studied in detail in *Good out of Evil: An Authentic Biography of the Rev. S. Crowther* (London, 1852); and *The Slave-Boy Who Became Bishop of the Niger* (London, 1888).

CROZER THEOLOGICAL SEMINARY, THE, a Baptist educational institution, at Upland, Pennsylvania, founded in 1868 by John Price Crozer, a Philadelphia manufacturer and capitalist. It has an endowment fund of $400,000 and is one of the leading seminaries of the Baptist Church in America. There were 11 professors and 63 students at the institution in 1904. W.M.C.

CROZET ISLANDS, several uninhabited islets of volcanic origin in the Indian Ocean southeast of the Cape of Good Hope and midway between Prince Edward Islands and Kerguelen. The largest are Possession, Penguin, East, and Hog the westernmost. The islands are named after a member of the French expedition commanded by Captain Marion which discovered them in 1772. C.L.S.

CRUCIAN CARP (*Cyprinus carassius*), a name applied to the German carp, native of Europe and Asia. It is an excellent food-fish, and is often reared in artificial ponds in the United States.

CRUCIBLES, vessels made of materials capable of being exposed to high temperatures without alteration, and used for fusing substances together, such as the materials for glass-making or metallic ores, with various fluxes to obtain the several metals they yield. Crucibles are generally made of fire-clay, porcelain, graphite, iron, platinum, and, for some special operations, of silver.

CRUCIBLE STEEL. See IRON, Vol. XIII, pp. 351–353; and IRON AND STEEL, in these Supplements.

CRUCIFERÆ, an important family of dicotyledonous plants found in all countries. The flowers have a calyx of four sepals, which fall off after flowering; a corolla of four petals, which are placed in the form of a cross, whence the name; usually six unequal (*tetradynamous*) stamens and a simple pod with a false partition. The order includes many important vegetables, as the turnip, cabbage, radish, mustard, cress, etc. It also includes many fragrant flowering and ornamental plants, as the sweet alyssum, candytuft, rocket, etc.

CRUELTY TO ANIMALS, THE AMERICAN SOCIETY FOR THE PREVENTION OF, was organized and incorporated April 10, 1866, being the first society organized in America for the protection of animals, its founder and first president being Henry Bergh (q.v., in these Supplements), to whose noble self-sacrifices and untiring energies the cause of animal protection in this country owes its origin. The

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history of the society, therefore, is practically an account of the inception and development of his work of animal protection in America.

In 1862 Mr. Bergh was appointed secretary of legation at St. Petersburg. While in Russia he found himself on several occasions constrained to interfere in cases of atrocious cruelty, and but for his official position he would have been exposed to personal violence. His attention thus was directed to the subject of humanity to the brute creation, and while in London, on his way home in 1865, he made the acquaintance of the Earl of Harrowby, then president of the English Royal Society for the Prevention of Cruelty to Animals, who gave him much valuable information concerning the operations of that society in England. On Mr. Bergh's arrival at home, he found that no similar society existed in this country, and he immediately devoted himself to the establishment of one for the United States. At the outset the proposition met with little encouragement, and without the assistance of the press it probably would have failed. On Feb. 8, 1866, Mr. Bergh delivered a lecture in Clinton Hall, in which he pleaded his cause with such force of argument and such warmth of eloquent conviction that expressions of sympathy and offers of assistance were freely made by persons in attendance. The press lent its powerful aid; the lecture was published, in whole or in part, in all the great cities of the country; public sentiment in favor of Mr. Bergh's movement was aroused, and on April 10, 1866, "The American Society for the Prevention of Cruelty to Animals" was incorporated by the legislature of the state of New York. Among the original charter members of the society were many of the most eminent citizens of the city and state of New York.

On the 19th of April, in the same year, Mr. Bergh secured the passage by the legislature of New York of the first law ever enacted in America for the protection of animals. Within twelve months another "act for the more effectual prevention of cruelty to animals" was passed by the legislature of the same state, and, from time to time, additions have been made to it. The legal definition of the word *animal* now includes every living creature except members of the human race, and the words *torture* and *cruelty* include every act, omission or neglect whereby unjustifiable physical pain, suffering or death is caused or permitted. It is worthy of remark that, in his crusade against the established tolerance of everyday abuses, Mr. Bergh was subjected to unabated opposition, being long the object of contumely and reproach on the part of those whose fancied or actual interests were so unexpectedly invaded. But he had the courage of his convictions and fearlessly adhered to his purpose.

The organization and influence of the American society soon led to the establishment of local societies in all parts of the Union and in other countries, on the American continent and elsewhere. The number of local societies in the United States is now 158, and in other American nations 21 societies have been established since 1866, making a total of 179.

The prevention of cruelty to animals has been the beginning of many other humane organizations. Thus in 1874, the society appeared as prosecutor in a case of cruelty to children, and it then appeared to be advisable to organize a separate society for the prevention of cruelty to children. See CHILDREN, in these Supplements.

The establishment of these and other organizations has found a practical expression in the legislation of nearly every state in the Union. There is now hardly a single state in which cruelty of any kind is not forbidden by the law, under stringent penalties for disobedience.

The practical work is not neglected. The officers of the society are clothed with ample police powers. They wear a distinctive uniform, and patrol the streets by day and by night. They have full power to arrest and prosecute offenders against the laws relating to animals. In addition to the uniformed police, the society has over three hundred special agents in different parts of the state, clothed with the same authority and engaged in enforcing the laws for the prevention of cruelty. In the city of New York the society has ambulances for the removal of injured, sick and disabled animals; appliances for the rescue of drowning animals, and animals which have fallen into excavations, and a patrol-wagon which carries with it the necessary apparatus and medicines for rendering aid to injured animals in the streets.

The official organ of the society is *Our Animal Friends*, a monthly magazine which is devoted to the cause of humanity to all living creatures, and which has an extensive and growing circulation.

The headquarters of the New York society are at 10 East Twenty-second Street, New York.

Similar organizations have sprung up, and are as well conducted, in every American city.

The value of the New York society's work may be gauged by the following table of its operations:

SUMMARY OF OPERATIONS FOR NINE YEARS, 1887–1895.

	1887	1888	1889	1890	1891	1892	1893	1894	1895
Cases prosecuted in the courts	797	991	949	986	1,071	1,080	980	1,010	952
Disabled animals temporarily suspended from labor	3,456	1,749	2,357	4,180	5,725	4,868	3,779	3,596	3,403
Horses, mules and other large animals, disabled past recovery, humanely destroyed	2,546	2,455	2,812	2,284	2,620	3,365	3,384	2,927	2,987
Small animals, homeless or disabled past recovery, humanely destroyed	1,202	1,281	705	1,347	2,212	3,060	4,794	24,275	46,898
Disabled horses and other large animals removed from streets in ambulances	522	495	407	520	578	618	607	513	576
Complaints received and investigated	3,773	3,052	2,793	3,609	6,891	7,301	7,599	13,603	21,690

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CRUIKSHANK, GEORGE, one of the most gifted of English pictorial satirists; born in London, Sept. 27, 1792. A publication *The Scourge* (1811–16) afforded scope for the display of his satiric genius, and from that time forth he continued to pursue with remarkable success this, his true vein. But in the exquisite series of colored etchings contributed to the *Humorist* (1819–21), and in the etchings to the *Points of Humor* (1823–24), his true artistic power began to be visible. This second, and in many ways finest, period of his art, represented by these works, culminated in the etchings to *Peter Schlemihl* (1823), and to Grimm's *German Popular Stories* (1824–26), which, in the simple directness and effectiveness of their execution, and in their fertile and unencumbered fancy, rank as the artist's masterpieces. Clark's *Three Courses and a Dessert* (1830) and the plates to Scott's *Demonology and Witchcraft* (1830) may be regarded as the last examples of his earlier and simpler method as an etcher. His numerous plates in *Bentley's Miscellany* mark a third period of his art, in which he aimed at greater elaboration and completeness, introducing more complex effects of chiaroscuro, and frequently attaining great power of tragic design. The finest of these are the great series of plates to Dickens's *Oliver Twist* and Ainsworth's *Jack Sheppard* and *The Tower of London* in *Ainsworth's Magazine.* Among the best productions of his later years are the large and elaborate etchings to Brough's *Life of Sir John Falstaff,* published in 1858. His last illustration was the frontispiece to Mrs. Blewitt's *The Rose and the Lily* (1877), "Designed and etched by George Cruikshank, aged 83, 1875." As a water-colorist, he left work marked by considerable skill and delicacy. In his later years he devoted himself to oil-painting. His most important picture was *Worship of Bacchus* (1862), which has been engraved partly by his own hand, a vigorous and earnest protest against the evils of drunkenness; and to the cause of temperance he also devoted many of his designs, especially the tragic and powerful series of *The Bottle* (1847), which, reproduced by glyphography, attained an immense circulation. Died Feb. 1, 1878.

GEORGE CRUIKSHANK.

CRUISERS. See NAVY, in these Supplements.

CRUMMELL, ALEXANDER, clergyman; was born in New York city about 1820, the son of a negro slave who was the son of a native chief of Timanee, near Sierra Leone. He was educated at an academy in New Hampshire, from which he and other colored students were driven by a mob, and then at Oneida Institute, New York. Afterward he was a student at Cambridge University, England. He sought entrance to the Protestant Episcopal priesthood for some time in vain, the ecclesiastical authorities being unwilling to receive a negro, but finally was ordained a deacon by Bishop Griswold, of New York, and a presbyter by Bishop Lee, of Delaware, the first negro to be thus ordained. He was a missionary to Liberia, and a professor in the university of that republic. Returning to America, he was for more than a third of a century rector of St. Luke's Protestant Episcopal Church in Washington, D. C., and wrote several books, including compilations of sermons and a study of Liberia. He died in Washington on Sept. 10, 1898. W.F.J.

CRUTCHED FRIARS, a monastic order of the Roman Catholic Church, the members of which each carry a staff, upon the top of which is a cross. This staff was called a "crosier," from the French *croix*, a cross, and this name was in turn corrupted into "crutch," whence the common name of the order. W.F.J.

CRUYS OR KRUYS, CORNELIS, naval commander, was of Norwegian ancestry and was born in Holland about 1656. He was an admiral in the Dutch navy, and thus became acquainted with Peter the Great of Russia when the latter was learning naval architecture in Holland, and was by him made one of the chief commanders of the Russian navy. He did much for the naval interests of Russia, but was most ungratefully treated by the Czar at the instigation of jealous Russian officers, and retired to Finland, where he spent the closing years of his life. The blue cross in Russian naval flags is said to have been adopted in his honor. He died in 1727. W.F.J.

CRYOPHORUS. See EVAPORATION, Vol. VIII, p. 641.

CRYPTOGAMS, seedless plants; all forms below the *Spermaphytes*, or "flowering plants." See BOTANY, Vol. IV, pp. 82, 126, 143.

CRYPTOPROCTA, a large fierce carnivorous animal of Madagascar, forming a genus and species by itself—*Cryptoprocta ferox*. It is related to the cats. R.W.C.

CRYPTOSCOPE is the name given (Feb. 8, 1896) by Professor Salvioni of Perugia, Italy, to an instrument for the purpose of more directly examining the effects of the Roentgen rays on opaque bodies. The instrument consists of a cylinder of cardboard, the inner surface of which is coated with a material such as platino-cyanide of barium, which becomes fluorescent under the action of the rays, the lens being at the end of the cylinder. The object to be examined is placed, with its coverings, between a Crookes tube and the cylinder. The outline or shadow of the concealed object is thrown upon the interior fluorescent surface, and thus becomes apparent to the eye of the observer looking through the lens. The device was simultaneously announced on both sides of the Atlantic, slight modifications occurring in the descriptions. E. P. Thompson of New York City invented a similar appliance, which he called the "kinetoskotoscope," its purpose being intended to render visible, motions occurring within the interior of bodies. But the most efficient of all devices of this kind is Thomas A. Edison's FLUOROSCOPE; q.v., in these Supplements.

CRYSTAL FALLS, a village and the capital of Iron County, Michigan, in the central part of the

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northern peninsula; on the Mequacumeciemecum River, and on the Chicago and Northwestern railroad. Chief industry, iron mining and working. Population 1900, 3,231.

CRYSTAL FALLS, a series of cascades in Cascade Creek, Montana, which, together, measure 129 feet. They are one mile from the mouth of the creek, where it flows into the Yellowstone River.

CRYSTALLINE ROCKS, a name given to all rocks having a crystalline structure. The crystalline texture may be either original or superinduced. Thus, most crystalline rocks, such as certain calcareous masses, owe their origin to chemical precipitation from water, while others, again, such as lavas, have been consolidated from a state of igneous fusion. There is another large class of crystalline rocks, the crystalline granules, some of which present a remarkable foliate character—that is, they are arranged in more or less parallel layers. This peculiar structure appears to have been superinduced—the original rocks having been either fragmental or crystalline, or both—and the result of great heat and pressure.

CRYSTALLOMANCY, a mode of divination by means of transparent bodies, at one time very popular. A precious stone, crystal globe, or other transparent object, was employed; but a beryl was deemed most effective. In using it, the operator first muttered over it certain formulas of prayer, and then gave it into the hands of a youth or virgin, who beheld in it the information required.

CSABA OR BEKES-CSABA, Hungary, a town of modern growth in Bekes County, 38 miles by rail northwest of Arad. In a productive plain region, it has a large agricultural trade and some manufactures. Population, 34,200. C.L.S.

CSANAD, a town of eastern Hungary, capital of the county of Csanad, 44 miles N. of Temesvar, on the Maros. It is the see of a bishop. Population, about 5,000. The county, which has an area of about 700 square miles, has a population of over 130,000.

CSAT OR CSATH, a town of central Hungary, in the county of Borsod, 13 miles from Miskolez. Population, 5,000.

CSONGRAD, a town of central Hungary, in the county of the same name, at the confluence of the Theiss and the Koros, 70 miles S.E. of Budapest. Population, 17,500. The county of Csongrad is mostly marshy plain, unhealthful, but very fertile. Grain, hemp, fruits and tobacco are the chief products. Area of county, 1,313 square miles; population, 260,000.

CTENOID FISHES, an order of fishes, recognized by Agassiz, which were characterized by scales notched in a comb-like fashion. The name now is used to designate this form of scale, but the order is obsolete.

CTENOPHORA. See ACTINOZOA, Vol. I, pp. 120, 121.

CUANZA, COANZA, KUANZA OR KWANZA, Portuguese West Africa, a navigable river of Angola (q. v.) flowing into the Atlantic S. of St. Paul de Loando after a N.W. course of 800 miles from Lake Mussumbo. C.L.S.

CUAUHTEMOTZIN, the thirteenth and last Mexican king; born in 1495, ascended the Mexican throne in 1521, and surrendered, with the City of Mexico, to Cortes, in August of the same year. He was subjected to torture in a vain attempt to induce him to disclose the hiding-place of his treasures, and, after being kept in confinement three years, was executed. An elaborate monument surmounted by his statue was erected to his memory in the City of Mexico in 1887. See CORTES, Vol. VI, p. 391.

CUAUTLA, Mexico, a town of the state of Morelos, 46 miles S.E. of Mexico City, on the Interoceanic railway. CUAUTLA-AMILPAS, a southeastern suburb, was renamed CIUDAD MORELOS in honor of its successful defence by General Morelos (q. v.). Population, 16,000. C.L.S.

*CUBA, one of the West India islands, late a crown colony of Spain. For its general history, description, products, and industries, see CUBA, Vol. VI, p. 599. The island is under a governor-general, assisted by a council of administration representing the United States, which is in military occupation of the island.

As a result of the revolutionary struggle in the island, all industrial and commercial activity has been paralyzed. The island ("Pearl of the Antilles") is one of the best endowed by nature. Ten per cent of the area has been under cultivation, about seven per cent is unreclaimed, and four per cent under forest. The population in 1900 was 1,572,797. The foreign whites number 142,218. They are of mixed race. Slavery was abolished absolutely by law in 1886. Education was made obligatory in 1880.

Finances.—The total receipts of the insular treasury in March, 1900, were $1,678,669.34, of which $1,472,990.14 was from customs, $13,729.23 from the postoffice, $94,880.21 from internal revenue, and $97,619.68 from miscellaneous sources. These figures show an increase of $715,635.77 as compared with those for March 1900, when the total receipts amounted to $963,033.57.

The value of the 90,000 landed estates, in 1892, was 220,000,000 pesos, and the rental 17,000,000 pesos. The live-stock consisted of nearly 600,000 horses and mules, nearly 2,500,000 cattle, 78,000 sheep and 570,000 pigs. The annual yield of sugar averaged nearly 1,000,000 tons, of which the greater part is exported to the United States. More than 240,000 bales of tobacco were exported, and the number of cigars exported exceeded 1,500,000, the number of cigarettes exported being almost 40,000,000 packages. Two thirds of the tobacco and one half of the cigars were exported to the United States. Other exports are rum, mahogany, honey, wax and fruits. The value of the total exports was upward of 89,000,000 pesos, the imports being 56,000,000 pesos, chiefly from Spain, the United States and Great Britain. The chief imports are rice, jerked beef and flour.

The mines are located chiefly in the district of Santiago de Cuba, their extent being 13,727 hectares. In Cuba (1900) there were 950 miles of railway and 3,450 miles of telegraph lines.

The reciprocity treaty entered into between the

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United States and Spanish governments in regard to the latter's late colony of Cuba and the former was cancelled by Spain, Sept. 3, 1894.

This island, called the "Pearl of the Antilles," and also the "Ever-Faithful Island," commanded universal attention on account of its struggle for independence. Discontent was long rife under the oppressive and exacting rule of the Spanish government, which was accused of enforcing the payment of exorbitant taxes to replenish a depleted treasury at home. The struggle of the Cuban insurgents was conducted stubbornly. Before it commenced, there were three parties in the island. One of these was the constitutional party, consisting chiefly of Spanish residents, who favored Spanish monopoly; another party was the autonomists, mostly of native Cuban extraction, who advocated home rule, which party was favored by the Spanish Minister for the Colonies, Señor Maura; the other party was the separatists, who declared for entire independence. This last party, then in the minority, attracted to its side and to the standard of "Free Cuba" the most enlightened Cubans in the island and in America. The practical people of the United States were not slow to express their sympathy with the insurgents. The matter was discussed for three months, from January to April, 1896, in Congress, by both Houses. Sympathy for the Cubans was strong. The result of these debates was, that, April 6, 1896, both Houses adopted the original resolution of the Senate, of February 28th, recommending the recognition of the belligerency of the Cubans, and that the friendly offices of the President should be offered to Spain for the recognition of the independence of Cuba. The resolution had a demonstrative effect in Spain. Popular indignation took the form of riots and of attacks on United States legations. The Spanish government did all in its power to counteract these unruly proceedings, and took no official notice of the resolutions of the American Congress. They waited for a communication from the President. It was stated in Madrid, however, that on the recognition of Cuban belligerency by the United States a memorandum of formal protest would be prepared and sent to all the European powers. President Cleveland, however, declined to take action on the joint resolution, but on April 18, 1896, he sent to the Spanish minister at Washington a message making a friendly offer of mediation on the basis of the granting of reforms and some measure of autonomy. On July 30, 1896, he issued a proclamation warning citizens against violating the neutrality laws.

Public recognition of the Cuban question also occurred at the national political conventions of the Republicans and Democrats, at St. Louis and Chicago, in June and July, 1896. At the former a recommendation was incorporated, expressing sympathy with the Cubans, hopes for their success, and a belief that the United States government "should actively use its influence and good offices to restore peace and give independence to the island." The Democrats extended their sympathy for the insurgents "in their heroic struggle."

The history of the present revolutionary movement in Cuba dates previously to 1893, but in that year the first premonitory symptoms of the present struggle appeared. Rumors of filibustering were rife, and from April to May an incipient revolt was made, and a state of martial law was proclaimed; but the revolt was "snuffed out," the leaders, the Sartorius brothers, surrendering. In the meantime the home government seemed to have come to the conclusion that some concession to the Cubans was necessary, and a scheme of home rule was considered in December, 1894. The "home rule" was to consist of a council, with its seat in Havana, to be composed of twenty-seven members, twelve to be chosen by the government and other government officials, and fifteen by the people. This body was to have control of the budget and to deal with local affairs generally. While this measure was pending in the Spanish Cortes, the revolt received a fresh impetus in the island. In February, 1895, Captain-General Calleja proclaimed martial law in Santiago and Matanzas provinces; and on April 13th the arrival was hailed of José Julián Martí, nominated by the revolutionary junta as secretary-general of the provisional government, and of General Maximo Gomez, who was to take chief command of the revolutionary forces.

The government forces in the island consisted of 9,000 regulars, most of whom were stationed in the western military district, that is, Havana; and the remainder in the eastern district, Santiago. Reinforcements of 4,200 recruits speedily arrived. The civil and military authorities soon reported to the home government that the trouble was at an end, and they kept on so reporting, while the home government was compelled to send constant reinforcements and also to change generals. Marshal Martinez de Campos, in the Senate, March, 1895, reported all danger as past, but recommended that reinforcements be forwarded, as demanded, direct to Santiago, to take the field at once on arrival. It was decided, early in the same month, to send General Campos with strong reinforcements to Cuba; and he speedily embarked with 12,000 additional troops; while two gunboats and a cruiser were also ordered to proceed to the distressful island. The marshal took with him 10,000,000 pesetas in his military chest. The cause of this decision was the defeat of the Spanish troops at Campochulos, which was followed by the resignation of Captain-General Calleja, March 28th. Three days later Antonio and José Maceo, Flor Crombet, Valdes, Dr. Frank Agramonte, and 20 other officers arrived from Costa Rica with an expedition equipped with rifles and cannon, and landed at Duaba, near the eastern extremity of the island. The rebel forces were reported to consist of 7,000 men.

Engagements took place between the Spanish and insurgents, with varying success. April 10th, at Palmarito, Flor Crombet, Cobrero, and Borona, insurgent leaders, were killed. Maceo, who com-

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manded the insurgents, escaped through the woods. The insurgents were not dismayed, but proceeded to declare the independence of the island, and to frame a new constitution, April 11, 1895.

Marshal Campos landed at Guantanamo, April 16th, and reports of Spanish victories followed, but these were denied stoutly by insurgent sympathizers. In the middle of April, General Maximo Gomez, with other insurgent leaders, effected a landing in Cuba, being provided with $50,000 in American gold coin. April 14th, the official Spanish report of the battle of Palmarito announced the death of General José Maceo, which was untrue. In the mean time reinforcements were constantly being forwarded from Spain. The troops sent out were mostly young men of about twenty years of age, and raw and unsuitable for such rough warfare.

In May the insurgents determined to extend their operations westward, from Santiago as a base. May 7th, they had more men, more arms and more supplies of every kind than they had had at any time previously. May 12th, there was reported a battle at Jovito, near Guantanamo, in which Colonel Bosch, the Spanish commander, was killed. The insurgents were under the leadership of Maceo. May 20th, another severe engagement took place near Dos Rios, in which José Marti was killed and Gomez wounded. The town of Cristo had been captured and looted by the Cubans, May 16th.

In June, Campos, was compelled to ask for more men and munitions. The home government immediately authorized the raising of 600,000,000 pesetas in case of need, and, if required, the dispatch of 40,000 men, in addition to the 10,000 already in the island.

During June the revolt spread rapidly; loyalist guerrilla bands went over to the Cubans; Canasima, a town near Matanzas, was fired June 10th, and the city of Cienfuegos, in the administrative district of Santa Clara, and the town of Soledad, in the province of Puerto Principe, were, June 22d, in a state of revolt. The insurgent troops numbered, according to Spanish figures, over 20,000 men. At a meeting of the Spanish Cabinet, held at Madrid, June 27th, Señor Canovas del Castillo, Prime Minister, read a dispatch from General Campos, requesting 14,000 fresh troops. The number of troops in the island at the outbreak of the war, including the reinforcements which had subsequently been sent, amounted to 50,000, or, as the Spanish figures admit, over 40,000. The expense to the Spanish government of the war from March 1 to July 1, 1895, was $9,000,000; and after that date it was not less than $4,000,000 a month.

An instance of the inability of the Spanish generals to cope with the Cubans occurred at the battle of Bayamo, July 13th, in which General Santocildes was killed and General Campos narrowly escaped capture by General Maceo. This was a bloody and fierce battle, in which the Cubans showed themselves worthy of the cause of liberty for which they fought. The memory of the battle will survive in their annals as a heroic and desperate, but successful, combat against the traditionary might from which they were determined to be free. By August, Marshal Campos had again to seek fresh men. He received 30,000 more, making the total number of men sent to Cuba over 84,000.

In the beginning of Aug., 1895, General Bartolomé Masso was proclaimed President by the revolutionary forces of the eastern and central provinces, in succession to José Marti, slain May 20th at Dos Rios. The meeting of delegates at Najasas proclaimed a Cuban republic, consisting of five states, and drafted a provisional constitution. General Antonio Masso was designated commander-in-chief of the Cuban army; Señor Gonzalo de Quesada, Secretary of Foreign Relations, with residence in the United States; and the Marquis de Santa Lucia, Minister of the Interior.

General Lopez was appointed by the Spanish government governor-general of Cuba, in order to relieve General Campos from this administrative burden. At the close of August the insurrection was spreading, and the insurgent chiefs were levying taxes on the planters. On the last day of August the insurgents inflicted a severe defeat on the Spanish troops near Ramon de las Yaguas, José Maceo commanding. Each force was about equal as to numbers.

Early in Sept., 1895, 13,000 additional troops were landed in the island. A petition was presented about this time, through General Campos, to the Spanish government, praying for self-government to be granted to Cuba, and representing that this would cause most of the insurgents to submit at once. In the beginning of October the insurgent army amounted to 30,000 men, and was in two divisions, the western occupying the province of Puerto Principe, under General Gomez, the eastern being under General Maceo. The total available troops under the Spanish general, out of 70,000, were only about the same number, 30,000. In Oct., 1895, the Spanish government was negotiating a loan of 75,000,000 francs in Paris.

The Cubans appointed, early in October, a permanent government, and adopted a constitution. The President was Salvador Cisneros; Secretary of War, Carlos Roloff; general-in-chief, Maximo Gomez, and his lieutenant-general, Antonio Maceo. The constitution authorized the vesting of the executive and deliberative functions in the President and the Cabinet. The Cabinet was to consist of four secretaries, who, with the President and Vice-President, were to constitute the ministerial council. No provision as yet was made for a representative government; the judicial department was to be kept apart from the other divisions of government.

In this month the insurgents used dynamite to bombard railroad trains, etc., and continued its use. Baracoa, an important port on the northern extremity of the island, was blown up by the Cubans, October 10th. On Nov. 18–19, 1895, a bloody battle was fought at Taguasco, province of Santa Clara, in which the Spaniards, under General Campos, were defeated by the Cubans, under Generals Gomez and Maceo. As a result of this, 30,000 new troops were dispatched from Cadiz, under General Pando, a former governor of the island, who became lieutenant to General Campos. Pando was known to the Cubans as a harsh ruler. In Dec.,

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1895, the Cubans, though at first unsuccessful, at length inflicted a series of defeats on the Spanish troops. During that month the insurgents had invaded the province of Havana; but their projected attack on the capital was prevented. However, in the beginning of 1896 they had fixed the center of their operations at Guanajay, within 45 miles of Havana itself, and Marshal Campos declared martial law in the province. At this time more than half the island, including the provinces of Santiago de Cuba, Puerto Principe and half of Santa Clara, was in possession of the Cubans. The Cubans now carried out the order of July 10th for the destruction of the sugar crop, which the Spanish government proposed to give as security to the French for the new loan.

To secure the coast from the chance of the landing of filibusters and supplies, the naval strength was increased materially. By the middle of January it was estimated that one third of the cane crop had been burned, and grinding ceased. The tobacco crop shared the same fate. Railway traffic was stopped by destroying the cars and engines in the province of Havana. On Jan. 17, 1896, General Campos was recalled to Spain, at his own request, and his place was taken by General Valeriano Weyler, whose reputation for ferocity was a by-word in Cuba. He arrived at Havana, Feb. 10, 1896, and on Feb. 17th issued a proclamation establishing martial law of the sternest sort.

General Weyler's presence in Cuba was evidenced by the reports that reached the United States, and his stringent treatment of American citizens and journalists, which went as far as arrest and imprisonment, provoked the protest of the United States consul, General Ramon O. Williams. In March, Gomez was heard of as ravaging the province of Havana, close to the capital. March 8th, 18,000 additional troops arrived from Spain. The regular insurgent army was estimated to be about 60,000 at this time, of which 43,000 were in the field. About two thirds were well mounted, and about half well armed; the others had shotguns, revolvers, or only the machete, and the latter weapon achieved a fame of its own in this war. It is the implement used by the sugar-planters for cutting the cane. It deals a terrible wound, and the Cubans used it most effectively. The great difficulty with the Cubans is their lack of ammunition. They are able to meet the enemy with only six or eight rounds, hence they have to do their effective work at once, and then retire. Telegraph wire cut in small pieces and wound into balls is used in place of bullets. The only artillery is that captured from the Spanish troops. The chief arm of the Cubans is their splendid cavalry, mounted by seasoned horsemen, whose chief weapon is the terrible machete.

On March 22d, Gomez captured the city of Santa Clara, which he refrained from plundering, but took a large amount of military supplies. He held it only long enough to effect this purpose.

Early in the summer, reports came of the ravages of yellow fever, which made havoc among the susceptible Spanish troops. The result was that the latter deserted in numbers, while the officers petitioned to return home. Under such conditions it is impossible for Spain to subdue the revolt. The insurgents have possession of those sections of the country impenetrable and unknown to the Spanish surveyors.

About April 1, 1896, General Gomez camped between two Spanish columns, and sent a message to each of the Spanish generals that he was there to fight him. He then quietly slipped away; and the two columns, advancing, opened fire upon each other, and did not discover their mistake until some on both sides had been killed.

One of the bloodiest encounters of the war occurred April 14th, at La Chuza, in Pinar del Rio province, 15 miles W. of the trocha (the fortified line of 22 miles crossing the island near Havana). As usual the accounts differed as to the numbers engaged, killed and wounded on either side, but the Spanish troops were driven to the coast, where they were relieved by a warship, which opened fire upon the insurgents. In the beginning of May the Cubans were attacked at one of Maceo's forts, in Pinar del Rio, at Cacarajicara, by General Suarez Ynclan, who had to retreat with considerable loss. On May 6th, the town of Punta Brava, near Havana, fell into the hands of the Cubans after a ten minutes' fight. In the early part of June, Maceo, with a force of 2,500 men, broke through the trocha. It was alleged that in this force were four companies of Cuban women, who, furious to revenge the wrongs they had suffered from the Spaniards, could hardly be restrained from rushing relentlessly upon their wounded foes. Operations then generally ceased on account of the season.

Up to April 15, 1896, the loss occasioned by the burning of sugar plantations was estimated at $4,500,000, and of tobacco (in bales) at $1,000,000. The exportation of leaf tobacco was prohibited, except so far as existing contracts were concerned.

The *Competitor*, a swift schooner, with a cargo of munitions for the Cubans, and with some Cubans and other passengers on board, was captured, April 25th, by a Spanish gunboat, off the northern coast of Pinar del Rio. On board were two Americans and an Englishman, and on May 9th, it was announced that among others they had been condemned to death. Such a storm of indignation and remonstrance arose in the United States and Britain over this affair that a new trial for the prisoners was ordered from Madrid. Other filibustering expeditions included the *Laurada*, *The Three Friends*, *City of Richmond*, *Bermuda* and *Horsa*. The *Laurada* landed her cargo, and *The Three Friends* was successful in her first trip in May, but was captured by the United States cutter *Winona* in June, the latter at the same time capturing the *City of Richmond*. The resulting examinations freed the captain and passengers of both. A similar result was reached in regard to the *Bermuda;* but in the case of the *Horsa* it was decided that she had violated the neutrality laws and the captain was sentenced to an imprisonment of 16 months. On April 13 General Fitzhugh Lee was appointed by President Cleveland United States consul at Havana, in succession to Ramon O. Williams.

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In May, 1896, two New York journalists were expelled from the island; and on June 3d an artist of *Harper's Weekly* was imprisoned in Morro Castle, but was released on the American consul producing evidence of the prisoner's American citizenship. Rev. A. J. Diaz was also expelled for alleged abetment of the rebellion, a charge that was not believed by those who were acquainted with the missionary.

On September 15th Colonel Aguelera, with a few followers, while retreating from an insurgent band, attacked a household containing 25 persons, mostly women and children, the latter between one and ten years old. "The children were first pierced with the end of the bayonet, then finished with the machete." Nineteen were butchered and six made their escape. It is said that the colonel and his soldiers boasted of what they had done. Again, near Cuzzo, the same officer came to a house where were three children. The parents were absent, gathering wood for a fire to make breakfast. The colonel ordered the children, between 10 and 14 years of age, to be locked up in the house, after which he ordered his men to set fire to the house. The soldiers at first refused, but under threats of the colonel they were forced to obey. The Spanish papers have been full of "the brave deeds" of this officer, and he was recommended for "suitable recognition." On September 22d news reached the United States of the intended deporting from Havana of 93 political prisoners to the Isle of Pines. On their way to Batabano they were all shot down in a palm grove near Bejucale. Their bodies were afterward horribly mutilated with machetes.

The Cuban forces continued active operations, and harassed the Spanish troops, without, however, achieving decisive results. In July, indeed, small bands reached the outskirts of Havana and created great consternation among its residents. Conflicting claims by both sides made it difficult to decide with whom success lay in the various skirmishes, and charges and countercharges of barbarities in warfare were made by Spaniards and Cubans alike. The nature of the war between the Spanish troops and the insurgents is well set forth by President Cleveland, in his message to Congress of Dec. 7, 1896. In this document he says:

"The insurrection in Cuba still continues with all its perplexities. It is difficult to perceive that any progress has thus far been made toward the pacification of the island. . . . If Spain still holds Havana and the seaports and all the considerable towns, the insurgents still roam at will over at least two-thirds of the inland country." [With the exception of Spanish government] "in the large towns and their immediate suburbs . . . the entire country is either given over to anarchy or is subject to the military occupation of one or the other party. . . . Were the Spanish armies able to meet their antagonists in the open, or in pitched battle, prompt and decisive results might be looked for, and the immense superiority of the Spanish forces in numbers, discipline, and equipment could hardly fail to tell greatly to their advantage. But they are called on to face a foe that shuns general engagements, that can choose and does choose its own ground, that from the nature of the country is visible or invisible at pleasure, and that fights only from ambuscade and when all the advantages of position and numbers are on its side. In a country where all that is indispensable to life, in the way of food, clothing, and shelter, is so easily obtainable, especially by those born and bred on the soil, it is obvious that there is hardly a limit to the time during which hostilities of this sort may be prolonged. Meanwhile, as in all cases of protracted civil strife, the passions of the combatants grow more and more inflamed, and excesses on both sides become more frequent and more deplorable. They are also participated in by bands of marauders, who, now in the name of one party and now in the name of the other, as may best suit the occasion, harry the country at will, and plunder its wretched inhabitants for their own advantage. . . . The Spanish government . . . is acting upon the same theory as the insurgents, namely, that the exigencies of the contest require the wholesale annihilation of property, that it may not prove of use and advantage to the enemy."

In July and September the *Three Friends* succeeded in landing important cargoes of war material for the insurgents, but several members of the expedition were captured by the Spaniards and shot. On July 30th President Cleveland issued a proclamation warning American citizens against breaches of neutrality. Daring and successful attacks by Generals Antonio Maceo and Calixto Garcia so exasperated the Spaniards, both in Cuba and in Spain, that General Weyler was driven to make a show of personal activity, and he took the field; but his so-called campaign resulted in nothing. The Cubans made a raid into Guanabacoa, two miles from Havana, on December 1st, and it seemed as though their boldness might be crowned with success, but the killing of Antonio Maceo (who was ambushed), on Dec. 7th, was a great blow to the insurgent cause. Filibustering still continued, and United States cruisers were occupied in watching and chasing suspected vessels, carrying out the government's principles of fidelity to its declared neutrality with an activity which was more laudable than it was welcome to American sympathizers with the Cuban cause.

Meanwhile, the condition of the island grew rapidly worse, trade being practically annihilated, and the people steeped in misery. In the United States popular feeling against Spanish misrule and the destruction of American interests grew apace, and the government of Spain became anxious concerning the prospects of American intervention. The annual message of President Cleveland in December carefully discussed the situation, and presented for consideration by Congress the difficulties attending the recognition of belligerency or independence, and the questions of armed intervention or the purchase of the island. It also suggested a policy of home rule for Cuba, supported by a guarantee by the United States to the insurgents of the good faith of Spain in carrying out such a scheme. Congress eagerly took up the questions, but practical results were somewhat hindered by side issues of conflict of authority between the President and Congress.

The year 1897 opened with continued Cuban activity and some successes, notably the destruction of

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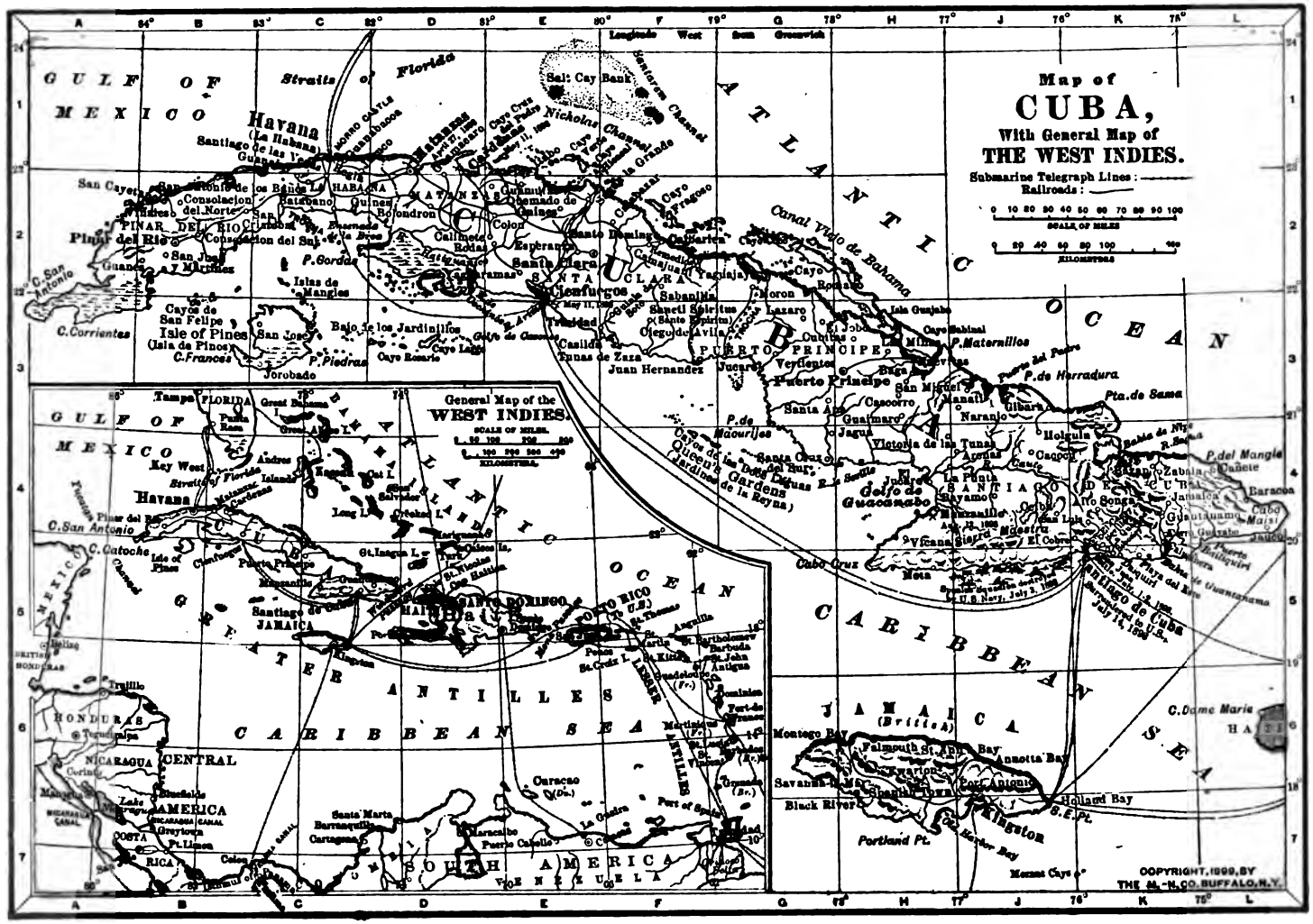

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the Spanish gunboat *Relampago*, by a torpedo in the Rio Cauto. In January General Weyler narrowly escaped capture, through the failure of a well-laid plan to entrap him; but in March the Cuban general, Juan Ruis Rivera, was surprised, wounded, and taken prisoner. The use of dynamite by the insurgents wrought much destruction, and caused great demoralization among the Spanish troops.

On the 4th of February the queen regent promulgated, and on the 20th of April decreed, a scheme of reform for the government of Cuba, granting many features of home rule, but reserving much arbitrary power in the hands of the governor-general and the home government. On the prospect of a demand by the United States government for the release of Julio Sanguily, an American citizen charged with conspiracy and sentenced to imprisonment for life, the Spanish authorities granted his discharge on his waiver of the right of appeal.

Despite repeated successes of the insurgents, and the fact that they were in virtual control of a large part of the island, General Weyler reported to his home government that he had effected a pacification of the island. But his idea of pacification was simply the substitution of starvation for military force,—a policy which he proceeded to carry out by means of his infamous order of "reconcentration." This scheme involved the massing of the country people within certain defined areas, where close guard could be kept upon them. The *pacificos* thus affected were gathered into huge camps; their lands were laid waste, and their property was destroyed, so that no sustenance should be left in the country for the insurgents. Thus shut up, with scant supplies and no resources, these peaceful inhabitants were left to rot by starvation and disease until the horrors became too much for even Spanish ears to bear. In the United States the reports from consuls and others aroused public feeling to a high tension, and the proposition in Congress (suggested by the President) to appropriate a relief fund for the alleviation of this suffering led to urgent calls for intervention in any practicable form.

On the 20th of May the United States Senate passed a resolution recognizing the belligerency of the insurgents; but the measure was never acted on by the House of Representatives. Watchful activity in both Houses for American interests continued, and the country manifested its keen interest in the Cuban situation, and a growing impatience.

The capture of the town of Victoria de las Tunas by General Garcia in the early autumn was marked by heavy slaughter of the defeated Spaniards, especially of the guerrilla troops, and public resentment against General Weyler was so aroused in Spain for his loss of a place reported by him to be impregnable that the Spanish government recalled him, and appointed Marshal Blanco to fill the vacancy. The scheme of Cuban autonomy was also put in force about this time; but the insurgent provisional government pursued its own course, and held an election of a president and cabinet for the inchoat Cuban Republic. The plan of autonomy met with little success; the Cubans, now so near their goal of independence, manifesting no interest in its adoption, and even making a formal protest against its establishment.

Meanwhile want and disease ravaged the island, sparing neither the wretched *reconcentrados* nor the raw and unacclimated Spanish levies. Marshal Blanco took steps to ameliorate the condition of the *pacificos*, and issued a proclamation of amnesty to those charged with rebellion. The aid of the International Red Cross Society was invoked for the relief of the suffering, and the accumulating stories of misery aroused not only American generosity, but also a longing to put an end, once for all, to such horrors.

On the 21st of November an adventurous band of Cubans raided Casa Blanca, opposite Havana, and actually saluted the new governor-general in his palace with a volley of rifle-balls.

The year 1898 found the Cubans still bent on gaining their independence by force of arms, despite Governor Blanco's friendly overtures. A Spanish colonel, Joaquin Ruiz, going on a mission to his personal friend, Gen. Nestor Aranguren, of the Cuban army, to attempt to win him to the cause of home rule, was executed by Aranguren, in pursuance of strict military orders and of an oath to put to death all who ventured to broach the subject of autonomy to the patriots. A month later Aranguren was himself entrapped and slain by a Spanish force sent for the special purpose of avenging the death of Ruiz.

With a view to ascertaining whether the reported horrors of reconcentration were facts or merely sensational stories, Senators Proctor, Gallinger, and Thurston visited the island and personally investigated the camps of the *pacificos*. On their return to the United States they addressed the Senate in powerful language and recounted stories of horror that still further keyed up the American people to a high pitch of nervous and wrathful excitement, which found partial vent in an outpouring of pecuniary and substantial aid for the victims of Weyler's inhuman policy. This aid was distributed by the Red Cross Society and other agencies, despite vexatious obstacles thrown in their way by Spanish officials.

Senator Proctor may be quoted in part as follows: "Outside Havana all . . . is disolation and distress, misery and starvation. Every town and village is surrounded by a trocha, a sort of rifle-pit, with a barbed-wire fence on the outer side of the trench, and at frequent intervals small blockhouses . . . loopholed for musketry, and with a guard of from two to ten soldiers in each. Their huts, usually crowded together, have no floor and no furniture." The people "wear but little clothing; . . . the commonest sanitary provisions are impossible. . . . Torn from their homes, with foul earth, foul air, foul water, and foul food or none, what wonder that one-half have died, and that one-quarter of the living are so diseased that they cannot be saved. A form of dropsy is a common disorder. . . . Little children are still walking about with arms and chest terribly emaciated, eyes swollen, and abdomen bloated to three times the natural size. . . . These cases are hopeless."

In Havana much irritation against Americans was manifested by the turbulent Volunteers, and it became necessary for Gov. Blanco to guard the United States consulate. With the avowed object of reëstab

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lishing friendly and social relations between the two governments, the United States battleship *Maine* was ordered to Havana, and she proceeded thither on the 24th of January. On the 15th of February a terrific explosion blew the ship into fragments, and 266 of her crew were killed. (For particulars of this incident and its far-reaching results, see the articles, HAVANA; "MAINE" (THE); UNITED STATES, in these Supplements.)

On the 9th of April Consul-General Lee quitted Havana, and American residents and others sought refuge in the United States and elsewhere from the coming storm of battle. American relief for the reconcentrados was still distributed among the sufferers, but on the 22d of April the blockade of Cuban ports by American ships was begun, and the island was virtually sealed up. The war which followed (see UNITED STATES, in these Supplements), resulted in the relinquishment by Spain of all claim of sovereignty over the island of Cuba, with a provision for its occupation by the United States pending the pacification of the island and the establishment of a stable government. A commission, consisting of Generals James F. Wade and Matthew C. Butler, and Admiral W. T. Sampson, was appointed by the President, on August 16, to arrange the details of evacution with a similar Spanish commission. At noon on the 1st of January, 1899, the Spanish flag was hauled down at Havana and was replaced by the Stars and Stripes, formal possession being given to the American authorities by the representatives of the former great Power that had held the island of Cuba almost uninterruptedly for over four hundred years.

In anticipation of the cession of the island according to treaty, the President, on the 13th of Dec., 1898, appointed Maj.-Gen. John R. Brooke governor-general of Cuba, a position similar in its scope to that of the former captains-general. The island had been divided into seven military departments each under command of an army officer; responsible to the governor-general of the island. General Brooke was assisted by a cabinet of four members, the incumbents of which were Cubans. In the autumn of 1899 Major-General J. R. Brooke retired from the governor-generalship of the island and was succeeded by Major-General Leonard Wood.

During the American occupation of Cuba, order was restored, important public enterprises were carried on, taxation reduced, the death rate lessened by sanitary precautions and the people admitted, as far as practicable, to a share in the local government. The receipts of the Cuban treasury in 1899 were, in round figures, $16,000,000, and the expenditures $14,000,000. The census taken in April, 1900, gave the island a total population of 1,572,797 and Havana, the capital, 235,981. Municipal elections were held in June, 1900, and, in the September following, the Cuban people elected delegates to a convention to frame and adopt a constitution for their self-government. The convention met at Havana, November 5, 1900, and continued in session about eight months before its labors were completed and mutually satisfactory relations between the coming republic and the United States effected.

The Republic of Cuba was inaugurated May 20, 1902, the United States transfer of authority to the Government of Cuba being made at noon that day by General Wood, the retiring governor-general.

The officers of the new republic were as follows: President, Tomas Estrada Palma; Vice-President, Luis Estevezy Romero.

CABINET: Secretary of State and Justice, Carlos De Zaldo; Secretary of the Interior, Luis Yero Buduen; Secretary of Public Instruction, Leopoldo Cancio; Secretary of Public Works and Acting Secretary of Agriculture, Luciano Diaz; Secretary of the Treasury, Jose M. Garcia Montes.

GOVERNORS OF PROVINCES: Havana, General Emilio Nuñez; Pinardel Rio, Colonel Luis Perez; Santiago de Cuba, General Francisco Echavarria; Santa Clara, General José Miguel Gomez; Puerto Principe, General Lope Recio; Mantanzas, Colonel Domingo Lecuona.

CUCUTA OR SAN JOSÉ DE CUCUTA, a city of northwestern Colombia, in the department of Santander, lat. 7° 50′ N., near the Venezuelan boundary. In the neighborhood are raised great quantities of sugar, panelu, cacao, tobacco and rice. Pop. 10,000.

CUDBEAR. See ARCHIL, Vol. II, p. 381.

CUDLIP, MRS. PENDER HODGE, better known by her maiden name of Annie Thomas; was born at Aldborough, Suffolk, England, and was married in 1867 to the Rev. P. H. Cudlip. Among her best known works are *Theo Leigh; A Passion in Tatters; He Cometh Not, She Said*, and *Allerton Towers*. She has written more than 100 novels and stories. W.F.J.

CUDWEED, a popular name of many species of plants belonging to the natural order *Compositæ*, whose stems and leaves are more or less covered with a whitish, cottony down. They may be kept a long time without undergoing much apparent change, and may therefore be reckoned among everlasting flowers. The common cudweeds of the United States are species of *Gnaphalium*.

CUERNAVACA, Mexico, the capital of the state of Morelos, on the Mexico railroad, 36 miles S.W. of Mexico City. It was the native Cuanhuahuac, and is picturesquely built on the mountain slopes of a valley; in the vicinity are Aztec remains, and the court-house was the winter palace of Cortez. Sugar raising is the chief industry. Pop., 8,800. C.L.S.

CUERO, a city of southeastern Texas, capital of De Witt County, situated on the Guadalupe River, and on the San Antonio and Aransas Pass and Southern Pacific railroads, 80 miles E. of San Antonio. It contains a number of large cotton-gins and a variety of manufactories. Population 1900, 3,422.

CUEVAS DE VERA, a town of southeastern Spain, 42 miles N.E. of Almeria, situated on the Almanzora, about twenty miles from its entrance into the Mediterranean. It has a fine old Moorish castle, and in the neighborhood are rich old silver-mines, still steadily producing. It has manufactories of hardware, earthenware, wine and oil. Population, 20,027.

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CUFFEE, PAUL, an American negro philanthropist; born in Westport, Massachusetts, in 1759. His father was an African-born slave, who purchased his freedom and bought a farm of 10 acres in Massachusetts. His mother was a Nantucket Indian. In 1775 he was a sailor on a whaling vessel, and in 30 years owned landed property, houses, stores, a ship, two brigs, and several smaller craft. He built a schoolhouse, employed a teacher, and opened at his own expense the only public school in his native town. In 1811 he sailed for Sierre Leone in his ship, the *Traveler*, with a colored crew, and instituted the Friendly Society of Sierra Leone. When he visited London he was warmly received by Wilberforce and Clarkson, and commissioned by the African institution to carry goods to Sierra Leone. He died September 7, 1818, while arranging for the colonization of that country.

W.M.C.

CUFIC WRITING. See INSCRIPTIONS, Vol. XIII, p. 123.

CUICHUNCHULLI, the Peruvian *Ionidium parviflorum*, a plant of the violet family, possessing very active emetic and purgative properties, and an alleged remedy for elephantiasis.

W.R.B.

CUIRASSIERS, the name given heavy cavalry who wear the "cuirass" and helmet. They are the modern representatives of the troopers of the 16th and 17th centuries who were similarly accoutred. The German Army has 12 regiments of cuirassiers, the cuirass being of white metal with a brass plate. Russia has 4 regiments of cuirassiers, whose cuirass is of iron, covered with a thin layer of copper and weighs 30 lbs.; that is, twice as much as those of other armies. The French have 12 regiments of cuirassiers, whose cuirass is of steel with brass plate. Napoleon at one time had a body-guard of cuirassiers called "Centgardes," whose cuirass was of aluminum much lighter than steel ones, but like theirs not proof against a rifle-bullet striking them squarely. The only C. in the British army are the Life Guards and Horse Guards. W.R.B.

CULENBORG OR KUILENBURG, a fortified town of the Netherlands, situated on the river Leck, 10 miles N.W. of Thiel. It has manufactories of arms, silk fabrics and twist. Population, 7,655.

CULIACAN, a town of Mexico, 90 miles S.E. of Cuialoa, in a fertile tract on the river Culiacan, and the capital of the state of Sinaloa. It is a depot for goods passing between Guaymas and Mazatlan. Much of its wealth is derived from the rich silver-mines in the neighboring mountains. The principal structure in the city is the mint. Pop., 10,000.

CULILAWAN BARK OR "CLOVE BARK," the medicinal aromatic bark of the *Cinnamomum culilawan*, a tree allied to the cinnamon tree, growing in the Molucca Islands. It is fibrous and has an odor of nutmeg. W.R.B.

CULLEN, a fishing-town of Banffshire, on the Moray Firth, northeastern Scotland, 67 miles N.W. of Aberdeen by railway. It has a cruciform parish church, founded by Robert Bruce, whose second queen died here, and which in 1543 was made collegiate. Cullen has been a royal burgh since about 1200, and unites with Elgin and five other places to return one member to Parliament. Population, 2,100.

CULLEN, PAUL, clergyman; was born in County Kildare, Ireland, on April 27, 1803, and became a Roman Catholic priest in 1829. He was, in 1850, made archbishop of Armagh and primate of all Ireland, and in 1866 he was made a cardinal, being the first Irishman to attain that rank. He was a close friend of Pope Pius IX. He died on October 24, 1878. W.F.J.

CULLMAN, a town and the capital of Cullman County, northern central Alabama, 45 miles N. of Birmingham, on the Louisville and Nashville railroad. It has furniture and wagon factories, but it is principally engaged in fruit-handling, especially grapes. Population 1890, 1,017; 1900, 1,255.

CULLOM, SHELBY MOORE, an American statesman; born in Wayne County, Ky., Nov. 22, 1829. His family removed to Tazewell County, Ill., in 1830. He went to Springfield, Ill., in 1853; studied law; settled in that city, and there began practice, which he continued until 1865, being also city attorney. He was Presidential elector on the Fillmore ticket in 1856; member of the Illinois House of Representatives, 1856, 1860 (Speaker, 1861), 1872 (Speaker, 1873), and 1874; member of the United States House of Representatives, 1865–71; delegate to the Republican national conventions in 1872 and 1884; governor of Illinois, 1877–83; and was elected member of the United States Senate in 1883, in which position he still remains. In July, 1898, he was appointed one of the commissioners to establish government in Hawaii.

SHELBY M. CULLOM.

E.E.T.

CULLUM, GEORGE W., soldier, was born in New York City on February 25, 1809, and was graduated from West Point in 1833. He entered the engineer corps and was engaged in the construction of Fort Adams, and afterward Forts Warren, Trumbull, Winthrop, Sumter, and others. In the Mexican War he had charge of mining, sapping and pontoon works. He was for some years an instructor at West Point, and in 1861 was on the staff of General Scott. For the next two years he was a brigadier-general and a member of Halleck's staff. In 1864 he became superintendent of the West Point Academy, and was brevetted a major-general. He retired from West Point in 1866 and was engaged for eight years in engineering works in and about New York. In 1874 he was retired under the law for age, and devoted himself to literary and scientific work. He compiled a *Biographical Register of the Graduates of the U. S. Military Academy*, and trans-

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lated Dupracq's *Elements of Military Life and History*. He married the widow of General Halleck, inherited at her death her large fortune, continued her charitable works, and gave $290,000 for the Memorial Hall at West Point, $100,000 to the New York Geographical Society, and other large gifts. He died in New York on February 28, 1892. W.F.J.

CULMINATION, the attainment of the highest point of its greatest altitude; the act of reaching the meridian. Thus the sun at midday is at his culmination, and the culmination of a mountain chain is its highest peak. W.R.B.

CULPEPER, Virginia, the seat of Culpeper County, 62 miles southwest of Washington, on the Southern and the Chesapeake & Ohio railroads. Its industries include farming, stock-raising, lumbering, flour-milling, cement, and other manufactures. Population, 1900, 1,618. C.L.S.

CULPEPER, THOMAS, also spelled CULPEPPER and COLEPEPER, colonial governor of Virginia; was born in England, about 1635, the son of John, first Lord Culpeper. He succeeded to his father's title in 1660, became governor of the Isle of Wight in 1661, and in 1675 was appointed governor of Virginia for life. He came to America in 1680 for a time, but persisted in returning to England and spending so much time there, and in accepting or extorting presents corruptly from the Virginia Assembly, that in 1683 his commission as governor was declared forfeited. Thereafter no more governors were appointed for life. Culpeper appears to have been an able man, but covetous and unscrupulous. In the Isle of Wight he was arbitrary and tyrannical to such a degree that the people were moved to petition for his removal from office. In Virginia, despite the impoverished condition of the colony, he enriched himself by the device of purchasing Spanish coins at five shillings each and then, by proclamation, declaring them to be legal tender for six shillings each. The best features of his administration were his procurement of acts pardoning all who had taken part in Bacon's Rebellion and forbidding the frequent assemblage of slaves, the latter being intended to prevent a servile insurrection. He died in England in 1719. W.F.J.

CULROSS, a seaport town in the southern section of Perthshire, central eastern Scotland, on the Forth River, 22 miles W.N.W. of Edinburgh. It is of interest because it has the remains of Culross Abbey, founded by the Bruces of Carnock and Kinlose, about the end of the sixteenth century. Toward the end of the eighteenth century it was occupied by Lord Dundonald.

CULVERIN. See ARTILLERY, Vol. II, p. 573.

CUMBERLAND, a city of Maryland and county seat of Alleghany County, located on the north bank of the Potomac River, at the mouth of Wells Creek, at the western terminus of the Chesapeake and Ohio canal, and at the southeastern terminus of the Pittsburg, Washington and Baltimore railroad. A bridge crosses the Potomac River at this point. The city contains five public schools and one academy. Its principal public buildings are the court-house, city hall and jail. Bituminous coal is mined in the vicinity, and large quantities are shipped from this point. Population, 1890, 12,729; 1900, 17,128. See CUMBERLAND, Vol. VI, p. 618.

CUMBERLAND, a town in Providence County, R.I., situated on Blackstone River. Pop., 1900, 8,925.

CUMBERLAND GAP, a pass 1,675 feet above sea-level in the Cumberland Mountains, at the northeastern corner of Tennessee and the converging point of Kentucky and Virginia. The gap is narrow, cuts through hills about 500 feet high, and since 1891 has been traversed by the Louisville & Nashville, and the Southern railroads. The gap was fortified by the Confederates during the Civil War and witnessed evacuation and possession by both sides, being finally assaulted and captured Sept. 9, 1863, by General Burnside, commanding the Union forces. The railway village of CUMBERLAND GAP is in Claiborne County, Tennessee. Pop., 500. C.L.S.

CUMBERLAND ISLAND, an island of Baffin Land, the most eastern part of that land and separated from the mainland by a narrow strait at its northeastern end.

CUMBERLAND MOUNTAINS, a ridge of the Cumberland Plateau, in the western Appalachians, extending southeastward from Bigstone Gap in Virginia along the Kentucky boundary into Tennessee. Its peaks rise from six to eight hundred feet above the Plateau, which is 2,000 feet above sea-level. The Louisville & Nashville railroad skirts the southern base of the ridge, and facilitates the distribution of the coal, slate, and valuable lumber, obtained from its slopes. C.L.S.

CUMBERLAND PRESBYTERIAN CHURCH, a flourishing offshoot of the Presbyterian Church, the outgrowth of the Cumberland Presbytery in Tennessee, which came into existence in 1810. The movement can be traced to the revival of 1800, in which the Rev. James McGready's very pointed discourses created dissensions among the members of the Transylvania Presbytery, of which the members of Cumberland County were still a part. Two parties thus were formed in the Presbytery, the revivalists and antirevivalists. The former held the distinctive views which were the cause of the separation from the mother church. Meantime the pressing needs for preachers were so apparent that the Transylvania Presbytery, after a severe struggle, agreed to allow probationers to preach, who had not acquired a complete classical education. In 1802 the Synod of Kentucky divided the Transylvania Presbytery, forming a new one; the Cumberland Presbytery, embracing the county of that name. The Cumberland Presbytery, now having the power to choose its own preachers, licensed and ordained them, with the allowance to "except the idea of fatality." This was the rock upon which the church split. This exception was termed "adopting the confession with reservations" by the opponents of the Cumberland Presbytery, and the matter was brought before the Synod of Kentucky in 1804, at which all the members of the Cumberland

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Presbytery were cited to appear, but they did not do so. The following year, a "commission, with synodical powers," met with the Cumberland Presbytery, and proposed to re-examine members already so ordained, but the Presbytery would not submit to this. The Synod in 1806 suspended some of the members of the Cumberland Presbytery for refusing to submit its young men for re-examination, dissolved Cumberland Presbytery, and attached some of its members to Transylvania Presbytery. The ministers and probationers thus cut off from the Synod formed themselves into a council for the purpose of securing the redress of their grievances. Four years passed in fruitless effort in this direction. Feb. 4, 1810, an independent presbytery was formed, to which the name of Cumberland was given, the new presbytery meeting for the first time, March 10th. At this meeting the confession and discipline of the Presbyterian Church was adopted, with the exception of the "idea of fatality," and provisions were made as to the scholarship of licentiates. In 1813 the first Synod was formed, the name of Cumberland being also given to it. It also formulated a doctrinal statement, giving the points of dissent from the Westminster Confession, the statement including the following: "1. That there are no eternal reprobates; 2. That Christ died, not for a part only, but for all mankind; 3. That all infants dying in infancy are saved through Christ and the sanctification of the Spirit; 4. That the Spirit of God operates on the world, or as co-extensively as Christ has made the atonement, in such a manner as to leave all men inexcusable."

The Synod continued until 1828, when it was decided to form a General Assembly, the first General Assembly being held at Princeton, Kentucky, May 19, 1829. The church then consisted of four synods and eighteen presbyteries. The church was now upon a foundation of security. In 1827 a college was organized at Princeton, Kentucky, for the benefit of its clerical students. In 1845 Cumberland University was founded at Lebanon, Tennessee, the activity of which, interrupted during the Civil War, has been extensive, its law school being recognized as the first in the South. Other educational institutions are in existence; the church being besides well organized in all other directions.

CUMBERLAND RIVER, 600 miles long, rises in Tennessee in the Cumberland Mountains, and after a winding W. by N. course through Kentucky and Tennessee, re-enters Kentucky, and joins the Ohio at Smithland, 11 miles above the mouth of the Tennessee River. C.L.S.

CUMBRE, La (Sp. "top" or "height"), one of the principal passes across the Andes, on the main road between Santiago, in Chile, and Mendoza, in the Argentine Republic. Its crest is 12,454 feet high.

CUMBRIAN MOUNTAINS, England, a granitic range extending over parts of the counties of Lancashire, Westmoreland, and Cumberland, and embracing the celebrated "Lake District" immortalized by Wordsworth, Coleridge and Southey, which is annually visited by thousands of tourists. The mountains cover an area about 40 miles long and 36 miles wide, attaining a maximum altitude of 3,216 feet in Scaw Fell, Cumberland. C.L.S.

CUMIANA, a town of western Piedmont, northwestern Italy, in the province of Turin, seven miles N. of Pinerolo, near the right bank of the Cisola. Population, 6,358.

CUMMING, Constance Frederica Gordon-, Scottish author and traveler; born at Altyre House, Morayshire, May 26, 1837, the daughter of Sir William Gordon Gordon-Cumming, second baronet, and Eliza Campbell of Islay, granddaughter of Elizabeth Gunning, one of the beautiful "Gunning sisters," who married John, fifth duke of Argyll. Her brother, Roualeyn George, was the African "lion hunter." In 1867, invited to visit a married sister in India, she developed a passion for travel. She penetrated beyond the Himalayas and explored Chinese Tartary, and during the next twelve years visited various Eastern countries and Pacific islands. Her travels are recorded in her works which include *In the Hebrides; In the Himalayas; Via Cornwall to Egypt; At Home in Fiji; A Lady's Cruise in a French Man-of-War; Fire Mountains of Hawaii; Granite Crags of California; Wanderings in China; The Inventor of the Numeral Type*, a system for the use of illiterate Chinese both blind and seeing being described therein; and has devoted her energies lately to the development of the same. R.C.A.

CUMMING, John, a Scottish divine and author; born in Fintry parish, Aberdeenshire, Nov. 10, 1807. He was educated at King's College, Aberdeen, where he took his degree of M.A. in 1827, and in 1832 was ordained to the Scotch Church, Crown Court, Covent Garden, London, where he preached with great popularity and success till 1879. Edinburgh University gave him the degree of D.D. in 1844. He was active in philanthropic projects, and as a controversialist and lecturer, both against the party that formed the Scotch Free Church and in the "antipopery" cause; but his celebrity was chiefly due to his writings on the interpretation of prophecy. His audacity in this perilous enterprise drew upon him much ridicule. In 1868 he asked the pope if he might attend the Œcumenical Council, but his application was rejected through Archbishop Manning. His works number over a hundred various publications. Among them are *Apocalyptic Sketches* (3 series, 1848–50); *Prophetic Studies* (1850); *Signs of the Times* (1854); *The Millennial Rest* (1862); *Ritualism the Highway to Rome* (1867); *The Sounding of the Last Trumpet* (1867); and *The Seventh Vial* (1870). After some years of ill health, he died, July 5, 1881.

CUMMINGS, Amos Jay, journalist; was born in Broome County, New York, on May 15, 1841, and in boyhood learned the printer's trade in a country newspaper office. He served in the Civil War, in the Army of the Potomac,

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and afterward became a typesetter on the New York *Tribune*, and later a member of its editorial staff. From the *Tribune* he went to the New York *Sun*. He was a prominent advocate and leader of "organized labor," and the champion of labor unions. He was elected a representative in the Fiftieth, Fifty-first, Fifty-second, and Fifty-fourth Congresses. He died on May 2, 1902. W.F.J.

CUMMINS, GEORGE DAVID, clergyman, was born in Delaware on December 11, 1822, and was graduated from Dickinson College in 1841. Three years later he entered the ministry of the Protestant Episcopal Church, and became the rector successively of churches in Norfolk, Va., Richmond, Va., Washington, D. C., Baltimore, and Chicago. In 1866 he was made assistant bishop of the diocese of Kentucky. His opposition to ritualistic practices led to his withdrawal from that church in 1873, and the next year he became a bishop of the Reformed Episcopal Church, of which he was one of the founders. He died on June 26, 1876. W.F.J.

BISHOP CUMMINS.

CUMMINS, MARIA SUSANNAH, author, was born at Salem, Mass., on April 9, 1827, and in her school days began to write for leading magazines. At the age of twenty-seven she wrote *The Lamplighter*, which had an enormous circulation and was one of the most successful works of fiction in American literature. She also wrote *Mabel Vaughan*, *El Fureidis*, and *Haunted Hearts*. She died at Dorchester, Mass., on October 1, 1866. W.F.J.

CUNAXA, an ancient city of Babylonia. See CYRUS THE YOUNGER, Vol. VI, p. 664.

CUNDINAMARCA, a department of central Colombia; area, about 80,000 square miles, of which only a small part is inhabited. It is crossed by the eastern Cordilleras on the east of which is the plain of Cundinamarca, which is very fertile and abounds in cattle. Population about 569,000.

CUNHA MATTOS, RAYMONDO JOSÉ, a Brazilian soldier and author; born in Portugal, November 2, 1776. He entered the army in 1800 as a private in a regiment of artillery, and served in numerous campaigns in Africa, Asia, and elsewhere, until 1816, when he emigrated to Brazil. Here he organized a military school and was engaged by the government as superintendent of fortifications. He was one of the founders of the National Geographical Institute of Brazil. During 1831–32 he was stationed in Portugal on military service. In 1834 he was retired with the rank of field-marshal. He wrote several historical works and an index of military law. His diary of the attack and defenses of the city of Porto was published in 1836, and in the following year appeared in book form his account of his travels and explorations in Brazil. He died in Rio de Janeiro, March 2, 1839. W.M.C.

CUNNINGHAM, SIR ALEXANDER, an English general and archæologist; born in London in 1814; was the son of Allan Cunningham, the poet. He received a military education, and in 1831 was second lieutenant of engineers; in 1834, aide-de-camp to the governor-general of India; in 1839, was on a special mission to Cashmere; and in 1840 became engineer to the king of Oudh. In 1858 he was chief engineer of the Northwest Provinces, and in 1870 became surveyor-general of Indian archæology. He published several important works on archæological topics, including *An Essay on the Aryan Order of Architecture* (1848); *The Bhilsa Topes; or, Buddhist Temples of Central India* (1854); *The Ancient Geography of India, the Buddhist Period*, a most important and valuable work, serving to solve some of the most difficult questions in regard to much that had been in dispute as to the geography of the East (1871); and *Book of Indian Eras* (1883). He died Nov. 28, 1893.

CUNNINGHAM, EDWIN, W., jurist, was born in Ohio on August 31, 1842, and was graduated from Hillsdale College, Mich., in 1866. He was a soldier in the Civil War, and afterward settled in Kansas as a lawyer. He became a justice of the Kansas Supreme Court in 1901, and is the author of various encyclopædia articles on legal topics. W.F.J.

CUNNINGHAM, JOHN F., clergyman, was born in Ireland in 1842, came to America in his youth, and was graduated from St. Benedict's College, Kansas, in 1860. He became a priest of the Roman Catholic Church in 1865, and was the first resident priest of that church at Fort Scott, Kansas. He was transferred to Lawrence, Kansas, where he built St. John's Church, and thence to Topeka, where he built the Church of the Assumption. In 1881 he became vicar-general of the diocese of Leavenworth, from 1882 to 1898 rector of the Leavenworth cathedral, and in 1898 bishop of the diocese of Concordia. W.F.J.

CUNNINGHAMIA, a genus of trees of eastern Asia, of the group *Coniferæ*, nearly allied to the pines and firs, but in foliage resembling the Araucarias. The cone-scales bear three inverted ovules, instead of two, as found in the ordinary pines.

CUP, DIVINATION BY, a mode of foretelling events, practiced by the ancient Egyptians. One of the Eastern methods consisted in throwing small pieces of gold or silver leaf into a cup of water, in which, also, were placed precious stones, with certain characters engraved upon them. The infernal powers were then invoked, and were believed to return answer, either in an intelligible voice, by signs on the surface of the water, or by a representation in the cup of the person concerning whom inquiry was made.

CUPAR-ANGUS, a town of central western Scotland, in the counties of Perth and Forfar, 13 miles W.N.W. of Dundee, situated on the left

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bank of the Isla. It has extensive linen manufactories and timber traffic. Population, 4,729.

CUPULE, in botany, an involucre formed by a number of cohering bracts, and surrounding the fruit or the base of the fruit in certain plants; as, the oak, in which it is the cup of the acorn surrounding a single fruit; the beech, in which it is a spiny four-valved husk, surrounding several distinct fruits; the chestnut, in which it is the prickly husk. The term is applied also to the cup-shaped receptacle found on the thallus of certain liverworts (*Marchantia* and *Lunularia*), in which the reproductive bodies known as *gemmæ* are developed.

CUPULIFERÆ, a family of dicotyledonous plants, consisting of trees and shrubs, natives of temperate climates. The leaves are alternate and furnished with stipules; the staminate flowers, and sometimes the pistillate flowers, are disposed in catkins; the fruit is a one-celled nut in a woody cupule (whence the name of the family); and the seed is usually solitary. This order contains many of the most important trees of Europe and America, including the oak, beech and chestnut.

CURA, Venezuela, the capital of the state of Miranda near the southeastern shore of Lake Valencia, 58 miles southwest of Caracas. It is an agricultural and trading center on the highway to the interior. Population, 12,200. C.L.S.

CURAÇAO ORANGES, small oranges which have fallen from the tree long before maturity. They have properties similar to those of orange-peel, but are more bitter and acrid. A sweet, valued liquor, known as curaçao, is made by dissolving the dried orange-peel in alcohol with sirup and spices added, distilling the solution and adding about one per cent of Jamaica rum. The chief center of manufacture is Amsterdam.

CURARI, OURARI, WOORALI OR WOORARA, a celebrated poison, consisting of the aqueous extract of *Strychnos toxifera*, and various other species of the same genus, used by the South American Indians for arrow poison. When introduced into the blood, it causes nervous paralysis, convulsive movements, and death. Like snake-poison, it is comparatively inert when taken into the stomach.

CURCI, CARLO MARIA, an Italian ecclesiastic; born in Naples, Sept. 4, 1809; entered the Society of Jesus, of which he soon became a distinguished ornament; as a pulpit orator and writer he acquired a high reputation. Three times he was the Lent preacher before the Chapter of San Pietro, in Vaticano, Pope Pius IX being occasionally present to hear him. Father Curci also founded and mainly set forward and contributed to the *Civiltà Cattolica*, which was esteemed so highly by the pope that he provided for its permanent continuance under the management of the Jesuits. In 1871 he was preacher in the great church of the Gesù in Rome. He afterward retired to Florence, devoting himself chiefly to literary work. Died at Careggi, near Florence, June 9, 1891.

CURCULIO, a name formerly used to denote a genus of coleopterous insects, but now generally applied to members of the family *Curculionidæ*, which are commonly known as weevils or snout-beetles. Many thousand species have been described and all are distinguished from other beetles by having the head prolonged into a beak or snout at the end of which is a horizontal pair of jaws. Most of the species are, in the larval state, destructive to plants and fruits, several of them feeding with especial voracity upon the young leaves of peas and beans. The females of some of the genera have the peculiarity of rolling the leaves of plants and trees into little nests where they deposit their eggs, thus furnishing the larvæ with food and shelter. *Conotrachelus nenuphar* lays its eggs in the plum, peach, apricot, and other stone-fruits. R.W.C.

CURICO, Chile, the capital of the province and department of Curico on the Mataquito River, and on the National railway, 120 miles south of Santiago. It occupies the center of a productive plain rising to the Andes on the east and sloping west to the steep and abrupt Pacific Coast. It is the distributing market for the agricultural and stock-raising industries of the region, and has some domestic manufactures. Population, 15,000. C.L.S.

CURIE, PIERRE, a French scientist; born in Paris, 1859. Aided by his wife Marie, born at Warsaw, Poland, 1868, he discovered radium in 1898. M. Curie was made professor of physics and chemistry in 1895. The Academy of Sciences awarded him and his wife the La Caze prize of 10,000 francs in 1901 and in 1904 a chair at the Faculty of Sciences was created for him. A.R.R.

CURITIBA, Brazil, the capital of the state of Paraná, on the Curitiba River, 76 miles by rail west of the seaport town of Paranaguá. It has manufactures of textiles, and exports maté, or Paraguayan tea. Population, 9,000, including many German and French settlers. C.L.S.

CURRENCY QUESTION. See COINAGE, CRIME OF 1873, and FINANCES OF THE UNITED STATES, in these Supplements.

CURRENT-METER. An interesting form of current-meter has been devised and used in studying the deep-sea currents off the Atlantic coasts of the United States. It consists of a weight hung at the lower end of a framework within which is a velocity apparatus with a recording device. The number of rotations of the velocity apparatus within a given time determines the speed of the current. A correct record cannot be obtained unless the apparatus is kept upright. To insure this, a rudder-like extension of the framework is made to carry a traveler, which runs on a rope that may be supported from the farther end of the vessel from which the observation is being taken.

C. H. COCHRANE.

CURRENT RIVER, 250 miles long, rises in the Ozark Mountains in Texas County, Missouri, flows east by south to the Arkansas border, then follows a southwesterly trend to join the Black River at Pocahontas, Randolph County. It is navigable to Jones Ferry, Mo. C.L.S.

CURRENTS, ALTERNATING. See ELECTRICITY, § 86, in these Supplements.

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CURRER BELL, the *nom de plume* of CHARLOTTE BRONTË; q. v., Vol. IV, p. 328. Her two sisters wrote under the names of "Acton Bell" and "Ellis Bell."

CURRY, DANIEL, an American clergyman; born near Peekskill, N. Y., Nov. 26, 1809. He graduated at Wesleyan University in 1837, and the same year was elected principal of the Troy Conference Academy. In 1839 he became professor in the Georgia Female College at Macon, Ga. In 1841 he entered the Georgia Conference of the Methodist Episcopal Church, and was stationed successively at Athens, Savannah, and Columbus. When the differences about slavery broke out, which resulted in the rupture of the Church, he was transferred to the New York Conference. In 1854 he became president of Indiana Asbury University, Greencastle, Ind., but in 1857 he joined the New York East Conference and was stationed in Brooklyn. In 1858–59 he was pastor at Middletown, Conn.; in 1860 at New Rochelle, N. Y.; in 1862 at New York. He was editor of the *Christian Advocate*, 1864–76; of the *National Repository*, 1876–80; and was assistant editor of the *Methodist*, 1880–81. In the latter year he was stationed at 82d Street, New York, and in 1883 at Bethany Chapel, New York. He was several times a delegate to the General Conference. In 1852 he received the honorary degree of D.D. from Wesleyan University, and in 1878 that of LL.D. from Syracuse University. He was the author of several books. He died in New York, Aug. 17, 1887. E.E.T.

CURRY, JABEZ LAMAR MONROE, statesman and educator, was born in Georgia on June 5, 1825, and was educated at the University of Georgia and the Harvard University Law School. He served in the Mexican War, was for several years in the Alabama legislature, and was a representative from that state in the 35th and 36th Congresses. At the outbreak of the Civil War he withdrew from Congress and became a member of the Congress of the Confederate States. In the latter part of the Civil War he was a Confederate army officer. After the war he devoted himself to educational work, as president of Howard College, as a professor in Richmond College, and as general agent of the Peabody Fund. In 1885 he was made American minister to Spain and served for three years. In 1890 he was chosen a trustee of the Slater Educational Fund. He wrote a number of books, on *Struggles and Trials of Virginia Baptists*, *Civil History of the Confederate Government*, *Gladstone*, *Constitutional Government in Spain*, and other topics, and numerous magazine and review articles. He died on February 12, 1903. W.F.J.

CURRY, SAMUEL SILAS, educator, was born at Chatata, Tenn., in 1847, and was educated at Grant University and Boston University. He was professor of oratory in Boston University in 1879–88, and has since been professor of elocution at Newton Theological Seminary, and instructor at Harvard and Yale. He has written several works on elocution and oratory, and was the founder of the School of Expression in Boston. W.F.J.

CURSON, PAUL ALFRED, a French painter, born at Moulinat, near Poictiers, Sept. 7, 1820; studied under Drölling and Cabat, and also in Italy and Greece. The year 1857 brought him his first fame when he exhibited, at the Salon, *Dante and Virgil on the Shores of Purgatory; Blind Greeks;* and *Women of Piscinisco*; the last, a sweet poetic composition. In 1867 he exhibited his famous *Dominicans Decorating their Chapel.* Afterward he exhibited many works dealing with classical subjects, etc. His *Dominicans* and *Ostia* (1868) are hung in the gallery of the Luxembourg. He was a chevalier of the Legion of Honor, and died at Paris, July 22, 1895.

CURSORES, an artificial order in which the struthious birds (ostrich, emu, cassowary, etc.) were formerly associated, with forms having similar habits and superficial resemblances, such as the bustards.

CURTESY is the estate to which a man is entitled at common law in the lands and tenements of his wife. Four things are requisite to entitle a man to this estate: 1. Marriage; 2. Seisin of the wife in the estate; 3. Birth of a child; and 4. Death of the wife. At common law, when all of these circumstances had occurred, the husband was entitled to an absolute estate in his wife's property during his life. When the first three conditions had happened, but before the wife's death, he had an estate called curtesy initiate, which gave him control over her property, but at her death his estate became curtesy consummate. This right has been abolished, or greatly modified, in most states, and the right of dower substituted for it.

CURTIN, ANDREW GREGG, an American statesman; born in Bellefonte, Pa., April 22, 1817. He was educated for the law and practised that profession. In 1854 he conducted the campaign which resulted in the election of Governor Pollock, who, after his inauguration, appointed Curtin Secretary of the Commonwealth. In 1860 Mr. Curtin was elected governor of Pennsylvania, and during the war he carried out such a vigorous policy that the highest reputation was gained for both the State and himself, for sending forward, equipping, and caring for troops. In 1869 he was appointed minister to Russia. He served in the United States House of Representatives from 1881 to 1885. He died in Bellefonte, Pa., Oct. 7, 1894. E.E.T.

CURTIN, JEREMIAH, an American linguist and antiquarian; born in Milwaukee, Wisconsin, in 1840. He was graduated from Harvard in 1863. On leaving college he had acquired a good knowledge of French, Spanish, Portuguese, Italian, Roumanian, Dutch, Danish, Swedish, Icelandic, Gothic, German, and Finnish, besides Greek and Latin. He had also made considerable progress in Hebrew, Persian and Sanskrit. When Admiral Lissofsky's fleet visited America in 1864, Curtin became acquainted with the officers, and accompanied the expedition on its return

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to Russia. From 1868 till 1877 he traveled in Europe and Asia, for the Russian government. He has written *Myths and Folk-Lore of Ireland; Tales of the Fairies and the Ghost World; Myths and Folk-Lore of the Russians; Hero Tales of Ireland*, and has translated the novels of Sienkiewicz from the Polish. W.M.C.

CURTIS, Benjamin Robbins, an American jurist; born in Watertown, Mass., Nov. 4, 1809. He graduated at Harvard in 1829; was admitted to the bar in 1832; and soon secured a prominent position at the Massachusetts bar. In 1851 he was appointed an associate justice of the Supreme Court of the United States, but resigned the position in 1857, returning to the practice of his profession in Boston. Judge Curtis was highly esteemed by his colleagues on the bench, as well as by his fellow-practitioners at the bar. He possessed in a remarkable degree the power of stripping a case of all extraneous matter, and stating in a clear, simple, and comprehensive manner the facts to which the law was to be applied. He took part in the impeachment proceedings in 1868, appearing for the President, and edited the reports of the First Circuit, 1851–56. He died in Newport, R. I., Sept. 15, 1874. E.E.T.

CURTIS, George Ticknor, jurist, was born at Watertown, Mass., on November 28, 1812, and was graduated from Harvard College in 1832. He was admitted to the bar in 1836, and practiced in Boston and New York. Besides filling a leading place at the bar he was the author of a number of important works, including an authorative *History of the Constitution of the United States*, *Digest of English and American Admiralty Decisions*, *The American Conveyancer*, a *Life of James Buchanan*, a *Life of Daniel Webster*, *Rights and Duties of Merchant Seamen*, *Law of Copyright*, *Law of Patents*, *Creation or Evolution?* a philosophical work, and *John Charaxes*, a novel. In his legal practice he had for clients the inventors Goodyear, Morse, McCormick, and others, and he was one of the counsel in the Dred Scott case, maintaining the power and right of Congress to prohibit slavery in the territories. In the Civil War he maintained the right of the Federal government to suppress the Confederacy, though he denied its right to wage war against a State. In 1862 he argued against the constitutionality of the legal tender act. He served a few years in the Massachusetts legislature, but held no other public office, save that of U. S. commissioner in Boston at an early date. He remained in active practice before the Supreme Court of the United States until shortly before his death, being the oldest practitioner at that bar, and ranking among the most eminent. He died on March 28, 1894. W.F.J.

CURTIS, George William, editor and author, was born at Providence, R. I., on February 24, 1824, and in his boyhood was placed in a commercial establishment in New York. At the age of eighteen, however, he went to work and study at the famous Brook Farm Community, where he spent nearly two years and where his whole after career was shaped. Thence he went to Europe and studied at the University of Berlin, and traveled in Egypt and Syria. In 1850 he returned home and published his first book, *Nile Notes of a Howadji*. He joined the staff of the New York *Tribune* in 1850 and wrote much for it. *A Howadji in Syria* appeared in 1852, and in that year he became editor of *Putnam's Monthly* and began contributing to it some of his most charming work. In 1853 he began writing for *Harper's Monthly* and for many years published in it the *Easy Chair* essays. In 1857 he also became connected with *Harper's Weekly*, of which he was for many years the editor. He likewise wrote much for *Harper's Bazar* after its establishment in 1867. As early as 1856 he identified himself with the Republican party and became a prominent orator in its campaigns. He went upon the lecture platform, and ranged among the most popular lecturers of his time. In 1860 he was a delegate to the National Republican convention, and at later dates was conspicuous in other such gatherings. He was an unsuccessful candidate for Congress in 1864, and was a Presidential elector in 1868. He was offered various political places, including the Consul-Generalship in Egypt and the English Mission, but declined them. President Grant made him a commissioner to prepare rules for the civil service, and thereafter he was the leader of the civil service reform movement throughout the nation. In 1864 he was elected a regent of the University of the State of New York, and afterward was chancellor of that organization. In 1884 and 1888 he separated himself from the Republican party and supported the Democratic ticket. He made his home on Staten Island, and continued his editorial work on *Harper's Weekly* until very shortly before his death, which occurred on August 31, 1892. He was a singularly graceful and fluent writer, one of the most eloquent lecturers of his day, and a man of unsurpassed personal charm. W.F.J.

GEORGE W. CURTIS.

CURTIS, Joseph Bridgham, soldier, was born at Providence, R. I., on October 25, 1836, and was graduated from the Lawrence Scientific School of Harvard University in 1856. He then engaged in railroad work until the outbreak of the Civil War, when he entered the army. He was a staff officer for a few months, then in the Sanitary Commission. Returning to active service he was with Burnside at Roanoke Island, at the siege and capture of Fort Macon, and at Antietam, where he acquitted himself with much gallantry. He was promoted to the rank of lieutenant-colonel, and as such was in command of

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the Fourth Rhode Island Regiment at Fredericksburg, on December 13, 1862, when he was shot dead while marching to the assault. W.F.J.

CURTIS, JOSIAH, physician, was born in Connecticut in 1816 and was educated at Yale and at Jefferson Medical College. He spent some years in Europe, studying sanitation. He had charge of the vital statistics of the United States census in 1860, and during the Civil War was an efficient army surgeon. He was appointed naturalist to the United States geological survey in 1872, and in 1873 medical director of the Indian service. He wrote many articles and treatises on professional and scientific topics, and was one of the first to make use of collodion, the honor of inventing which has been ascribed to him almost as much as to Maynard. W.F.J.

CURTIS, MOSES ASHLEY, an American clergyman and botanist; born in Stockbridge, Massachusetts, May 11, 1808. He was graduated from Williams College in 1834, and was ordained a clergyman in the Protestant Episcopal Church. He was a rector in various South Carolina parishes, and throughout his life devoted himself to the study of botany. He made a special study of fungi, and in 1866 published his *Esculent Fungi*, and in 1869 his *Edible Fungi of North Carolina*. His other published writings include *Enumeration of Plants Growing Spontaneously Around Wilmington, North Carolina* (1834); *Contributions to Mycology of North America* (1848); *New Fungi Collected by the Wilkes Exploring Expedition* (1851); *Catalogue of Plants of North Carolina* (1860); *Indigenous and Naturalized Plants of North Carolina* (1866). He died in Hillsboro, North Carolina, January 18, 1872. W.M.C.

CURTIS, NEWTON MARTIN, soldier and legislator, was born at De Peyster, New York, on May 21, 1835, and received an academic education. He was postmaster at De Peyster in 1857–61, and then served in the army through the Civil War, being mustered out in 1865 with the rank of brevet major-general of volunteers. He was collector of customs at Oswegatchie, N. Y., in 1866–67, a special agent of the United States Treasury in 1867–80, a member of the New York legislature in 1884–90, and a representative in Congress in 1891–97. He has given much attention to agriculture, and was president of the New York State Agricultural Society in 1880, secretary of the New York Agricultural Experiment Station in 1879–85, and president of the latter institution in 1885–90. W.F.J.

CURTIS, SAMUEL IVES, an American theologian; born in Union, Connecticut, February 5, 1844. He was graduated from Amherst College in 1867 and from the Union Theological Seminary in 1870. He was pastor of the American chapel in Leipsic in 1874 and in 1878 was appointed professor of biblical literature in Chicago Theological Seminary. His published works include *The Levitical Priests* (1877); translations of *Delitzsch's Messianic Prophecies* (1880); *Old Testament History of Redemption* (1881); *Franz Delitzsch* (1890); *Ezekiel and His Times* (1896). He has also made numerous translations. He died in London, Eng., Sept. 22, 1904. W.M.C.

CURTIS, SAMUEL RYAN, soldier, was born in Clinton County, N. Y., on February 9, 1807, and was graduated from West Point in 1831. He resigned his commission in 1832 and became a civil engineer in Ohio, a lawyer, and a militia officer. He served in the Mexican War, was governor of Matamoras, Monterey, and Saltillo, and afterward settled in Iowa, from which State he was a representative in Congress from 1857 to 1861. In the Civil War he had charge of an instruction camp near St. Louis, and then commanded in the field. defeating General Price at Pea Ridge, on March 8, 1862, and being made a major-general. In September, 1862, he was a commissioner to inaugurate the Pacific railroad enterprise. In 1864 he again defeated Price, and in 1865 was a commissioner to treat with the Sioux Indians. Thereafter he was chiefly interested in Indian affairs and in the Pacific railroad, with which he had been connected in some capacity from the beginning. He died at Council Bluffs, Iowa, on December 26, 1866. W.F.J.

CURTIUS, ERNST, one of the most distinguished German classical scholars of the last century, elder brother of GEORG CURTIUS (q. v.); was born at Lübeck on September 2, 1814, and was educated at Bonn, Göttingen, Berlin, and Athens. He became a teacher at Berlin, professor in the university there in 1844–49; tutor to the Crown Prince of Prussia; professor at Göttingen in 1856, and in 1868 professor at Berlin again. In 1853 he became a member of the Prussian Royal Academy of Sciences, and in 1871 one of its permanent secretaries. He was a painstaking student, and a voluminous writer upon philology and Greek history and archæology, and his researches in Greece and Asia Minor were fruitful of priceless results. His works comprise *Classical Studies* (1840); *Delphica Anecdotes* (1843); *Twelve Attic Inscriptions* (1843); *The Acropolis of Athens* (1844); *Naxos* (1846); *Olympia* (1852); *Ionia* (1855); *Topography of Asia Minor* (1872); *Ephesus* (1874); *The Peloponnesus* (1851–52); a *Manual of Greece* (1857–61), and an *Atlas of Athens* (1878). Two volumes of his collected orations at Göttingen and Berlin were also published in 1875–82. His *magnum opus* was his *Manual of Greece*, a monumental work in three volumes, which has passed through many editions. He died on August 12, 1885. W.F.J.

CURTIUS, GEORG, brother of ERNST CURTIUS (q. v., supra); was born at Lübeck on April 16, 1820; studied at Bonn and Berlin, and in 1849 became professor of classical philology at Prague. He afterward filled the same place at Kiel and at Leipsic. He was one of the foremost Greek scholars and classical philologists of his age, and did much to advance German scholarship. He was the author of numerous important works on philology, grammar, and the classics. He died on August 12, 1885. W.F.J.

CURULE CHAIR, the chair of honor of the

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old Roman kings, and later of consuls, prætors, "curule ædiles," and some of the other higher magistrates of the republic having senatorial rank. It was a folding-stool, originally of ivory, then of metal, with curved legs crossing.

CURVES OF RESISTANCE, EQUATIONS OF. See STRENGTH OF MATERIALS, in these Supplements.

CURWEN, JOHN, teacher of music; was born in Yorkshire, England, on November 14, 1816, the son of a clergyman, and himself became a minister of the Congregational Church, at Plaistow. About 1841 he began to teach music and to advocate the "Tonic Sol-Fa" system, and two years later published a *Grammar of Vocal Music*. Thereafter he devoted himself largely, with much zeal, to the promotion of musical culture among the people, by means of class-teaching, lectures, books, magazine articles, and in all other possible ways. In 1861 he retired from ministerial work in order to give his entire time and strength to his musical propaganda, in which he was highly successful and through which he effected a wide extension of popular interest in music. He died on May 6, 1880. W.F.J.

CURZON, GEORGE NATHANIEL, a British statesman, the eldest son of the Rev. Alfred Curzon, Baron Scarsdale; born in 1859; educated at Eton and at Balliol College, Oxford, where he graduated M.A. in 1887. He was a fellow of All Souls' and president of the Union Society, a debating club, where many English Parliamentarians first cultivated their oratorical powers. He was elected for the Southport division of Lancashire in 1886, and subsequently returned for the same constituency, as a Conservative. He was Under-Secretary of State for India in 1891–92, and Under-Secretary for Foreign Affairs in 1895–98. He has traveled extensively, and published *Russia in Central Asia* (1889); *Persia and the Persian Question* (1892); and *Problems of the Far East* (1894). In a debate in the House of Commons in 1895 he took a prominent part in advocating the view that peers, on succession to their titles, were eligible to sit in the Commons if they had not previously sat in the Upper House. The debate arose in connection with the incident wherein Viscount Wolmer, who had been returned as member for West Edinburgh, attempted to take his seat therefor, though subsequent to his election he had succeeded to the peerage upon the death of his father, the first Earl of Selborne. The House declared that the seat of Viscount Wolmer was vacant. Mr. Curzon subsequently introduced a bill to relieve peers from this disability, but the bill was withdrawn May 24, 1895. Mr. Curzon married, April 22, 1895, a famous beauty, Mary Victoria, the eldest daughter of Levi Z. Leiter, a Chicago millionaire, the wedding taking place with much ceremony at the Washington home of the bride's father. On Aug. 12, 1898, he was made governor-general of India; and on Sept. 23, 1898, created Baron Curzon, of Kedleston, an Irish peerage. Resigned Indian position Aug. 20, 1905.

CUSACK, MARY FRANCES, philanthropist, known as the "Nun of Kenmare," was born in Ireland, and became a Roman Catholic nun. She established the community of the "Sisters of Kenmare" and was its head. During the agrarian agitation in Ireland in 1879–85 she was a prominent figure. In 1884 she established the "Sisters of Peace" in England, and later organized another such body in America. She wrote many educational and religious books. She died on June 7, 1899. W.F.J.

CUSCUS. See PHALANGER, Vol. XVIII, pp. 741, 742.

CUSHING, CALEB, an American statesman, jurist and diplomat; born in Salisbury, Massachusetts, January 17, 1800. He entered Harvard College at the early age of 13 and was graduated with high honors at the age of 17. For two years he remained at Harvard as a tutor of natural philosophy and mathematics, and then took up the study of law, being admitted to the Massachusetts bar at the age of 22. He began practice at Newburyport, and soon acquired widespread fame, standing with Rufus Choate at the head of the Essex County bar. In 1825 he was elected to the state legislature, continuing in office until 1834 with the exception of two years spent in European travel. In 1835 he was elected to Congress as a Jeffersonian Republican. Afterward he became a Whig and joined Tyler and his followers. President Tyler nominated him three times for Secretary of the Treasury but he was rejected by the Senate. In 1843 President Tyler appointed him commissioner to China to negotiate the treaty of July 3, 1844, which was ratified by Congress December 31, 1845. In 1846 after his return to Massachusetts, Mr. Cushing became an enthusiast over the prospect of war with Mexico, and the state legislature refusing to equip a volunteer regiment, he assumed the personal responsibility by advancing the amount of money necessary from his own purse, and was made colonel of the regiment thus organized. In 1845 he joined the forces of General Taylor, participated in the war and in 1847 was made a brigadier-general. In 1850 he returned to his home and was elected mayor of Newburyport. Two years later he was appointed associate justice of the state superior court and in 1853 was appointed Attorney-General of the United States. In April, 1860, he was president of the National Democratic Convention at Charleston, South Carolina. He later joined the extreme Southern faction of his party, and was president of the convention that nominated John C. Breckenridge for President. Just prior to the Civil War President Buchanan sent him to Charleston to induce the state troops to postpone their attack on Fort Sumter, but in this he was unsuccessful. During the war he was employed by President Lincoln upon various confidential and diplomatic missions

CALEB CUSHING.

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and in 1866 he was one of a commission to revise the United States statutes. In 1868 he was sent to Bogotá to settle a diplomatic quarrel. In 1870 he was employed to prepare the protocol of the treaty of Washington, and in the following year was appointed counsel before the Geneva Arbitration Tribunal. Two years later he was nominated Chief Justice of the Supreme Court to succeed Salmon P. Chase, but not being confirmed by the Senate, he was made minister to Spain. As a jurist he was one of the most eminent men of his time, his decisions being distinguished for both sagacity and erudition. As an author he is known by his historical and political writings, which include *Practical Principles of Political Economy* (1826); *History of Newburyport* (1826); *Historical and Political Review of the Late Revolution in France* (1833); *Reminiscences of Spain* (1834); *Growth and Territorial Progress of the United States* (1839); *Life of William Henry Harrison* (1840); *The Treaty of Washington* (1873). He died in Newburyport, Massachusetts, January 2, 1879.

W.M.C.

CUSHING, Frank Hamilton, ethnologist, was born at Northeast, Penn., on July 22, 1857, and in his boyhood became interested in Indian relics. In 1875 he was engaged in making surveys and collections for the Smithsonian Institution, at Washington, and was curator of that institution's exhibit at the Philadelphia World's Fair in 1876. In 1879 he was ethnologist with Major Powell's expedition in New Mexico, and remained among the Zuñi Indians for three years, was admitted to their tribal councils and was elected to their priesthood, thus gaining a peculiarly intimate knowledge of their customs and laws. In 1881 he discovered the ruins of the seven cities of Cibola, and in 1888 discovered other ruined and buried cities in Arizona, which he unearthed and explored. In 1895 he made interesting discoveries in Florida. Thereafter he was connected with the government Bureau of Ethnology at Washington. He was the author of several books, including *My Adventures in Zuñi* and *Myths of Creation*, and of numerous reports and magazine articles. He died at Washington on April 10, 1900.

W.F.J.

CUSHING, Luther Stearns, an American jurist; born in Lunenburg, Mass., June 22, 1803. He became clerk of the Massachusetts House of Representatives in 1832; judge of the Court of Common Pleas in 1844; and in 1848 reporter to the Supreme Judicial Court, in which capacity he edited 12 volumes of reports (55–66 Mass.). He was author and editor of many law text-books and articles, and of the work now known as *Cushing's Manual of Parliamentary Practice*. He died in Boston, Mass., June 22, 1856.

E.E.T.

CUSHING, Thomas, an American statesman; born in Boston, Mass., March 24, 1725. He graduated at Harvard in 1744; represented his native city in the Provincial Assembly, and in 1763 became Speaker, throughout his career in this capacity constantly manifesting his patriotism and his aversion to the course of the British government. He was delegate from Massachusetts to the Continental Congress, 1774–76; commissary-general of Massachusetts, 1775; judge of common pleas and of probate in Suffolk County, Mass.; was lieutenant-governor of Massachusetts, 1779–88, and acting-governor in the latter year. He died in Boston, Feb. 28, 1788.

E.E.T.

CUSHING, William, an American jurist; born in Scituate, Mass., March 1, 1732. He graduated at Harvard in 1751 and was appointed attorney-general of the Colony of Massachusetts. In 1772 he was commissioned judge of the Superior Court of Massachusetts, and in 1777 succeeded his father, John Cushing, as chief justice of that court. In 1782 he was made judge and in 1788 chief justice of the Supreme Judicial Court of Massachusetts. He was commissioned associate justice of the Supreme Court of the United States, Sept. 27, 1789, and held that office till his death, Sept. 13, 1810.

E.E.T.

CUSHING, William Barker, naval commander, was born at Delafield, Wisconsin, on November 24, 1842, and was educated at the Naval Academy at Annapolis. He entered the navy in 1861 as a volunteer, and on the first day of his service captured a schooner, the first prize taken in the war. He distinguished himself by leading a bold attack upon Jacksonville, North Carolina, in 1862, and on October 27, 1864, performed the exploit for which he has since been famous. This was the destruction of the great ironclad ram *Albemarle*, which had been the terror of the Federal navy in the coast waters of North Carolina. Cushing prepared a huge torpedo, which he carried at the end of a spar, at the bow of a small steam-launch, and with a few volunteer comrades made his way to where the ram lay at Plymouth, N. C. Despite a hail of shot rained upon him he steamed straight up to the monster ironclad, in a spirit of daring shouted out to her crew, "Look out! I'm going to blow you up!" and exploded the torpedo. The *Albemarle* was wrecked. Cushing's own boat was sunk and he was nearly killed, but he swam to the shore in the darkness and escaped. For this he received the official thanks of Congress, and in 1872 he was promoted to the rank of commander. He died at Washington on December 17, 1874.

W.F.J.

CHARLOTTE CUSHMAN.

CUSHMAN, Charlotte Saunders, actress, was born in Boston on July 23, 1816, the descendant of Robert Cushman, one of the Plymouth pilgrims. At the age of 13 she became a choir singer, and afterward had a successful concert and operatic career until her voice failed. Then she went upon the dramatic stage, making her first appearance at New Orleans as Lady Macbeth. In

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1843 she played with the great English tragedian, Macready, and two years later played with Edwin Forrest in England. Thereafter she ranked for years as one of the foremost actresses of the world, winning the plaudits of people and critics in Europe and America. Her repertory comprised many parts, chief among them being Lady Macbeth, Rosalind, Beatrice, and Queen Catherine, in Shakespearean plays; Bianca in Milman's *Fazio;* Julia in *The Hunchback;* Lady Teazle in *The School for Scandal;* Nancy Sykes in a dramatization of *Oliver Twist;* and Meg Merrilies in a dramatization of Scott's *Guy Mannering*—the last-named being perhaps her greatest achievement, and one of the most impressive ever seen upon the stage. During the Civil War she acted several times, despite ill health, for the benefit of the sanitary commission. She made a farewell tour of the chief American cities in 1874–75, her last appearance being at the Globe Theatre in Boston on May 15, 1875, and she died in Boston on February 18, 1876, leaving behind her one of the most splendid and inspiring memories in all the annals of the stage. She was a woman of great charm of personal character, of rare native intelligence, of untiring industry, and of indomitable will. W.F.J.

CUSHMAN, Pauline, actress and spy, was born in New Orleans and became a variety actress. She offered her services to the United States government in the Civil War, and was for some time engaged as a military spy. She enabled the government to foil the plans of Southern sympathizers, and several times passed through the lines and secured information of the movements of Confederate troops. Once she was captured and condemned to be hanged, but escaped and rejoined the Union army. She was popularly known by the soldiers as Major Cushing.

W.F.J.

CUSHMAN, Robert, an American Colonial founder; born in England about 1580. He was a member of the Leyden Nonconformist colony, and in 1617, with John Carver (q. v.), went to London to negotiate with the Virginia Company for leave to settle in North America and to petition King James for liberty of conscience there. He subsequently made two similar trips,—the last time with William Brewster (q. v.),—resulting in the issuance of a patent, and in 1620 he went to London for the fourth time, with Carver and Martin, to procure funds and charter the *Mayflower* and *Speedwell.* When the latter vessel put back, leaky, Mr. Cushman remained behind, and brought on the next company on the *Fortune*, which reached Plymouth, Mass., Nov. 9, 1621. He returned to England in the *Fortune*, which was captured by the French and detained two weeks; acted as agent in London for the Colony; and in 1623 procured a new charter for territory on Cape Ann. Early in 1625, while preparing to sail thither, he died. E.E.T.

CUSSET, France, a watering place in the department of Allier, 1,000 feet above sea-level, near the chalybeate springs of Vichy, 32 miles northwest of Roanne. Pop., 5,000. C.L.S.

CUST, Robert Needham, an English Orientalist and philologist; born in 1821 in Bedfordshire, England; educated at Eton, and entered her Majesty's Indian civil service. He remained in this employment until 1860, taking an active part in military service, and ardently devoting himself to the study of Oriental languages and customs. Upon his return to England he became a barrister at law. Mr. Cust is the author of *Modern Languages of East Indies; Modern Languages of Africa; Modern Languages of Oceana; Sketches of Anglo-Indian Life;* and, at the Chicago congresses of 1893, presented an important essay upon *The Progress of African Philology.*

CUSTER, a town and the capital of Custer County, southwestern South Dakota, on French Creek, and on the Burlington and Missouri River railroad, among the Black Hills. There is a large amount of lumber and some gold and silver in the vicinity. Population 1900, 599.

CUSTER, George Armstrong, an American soldier; born in New Rumley, Ohio, December 5, 1839. He was graduated from the United States Military Academy at West Point in 1861 and entered active service at Bull Run during the Civil War. He was then transferred to General Smith's staff, being placed in charge of balloon reconnaissances. For courage and endurance he was soon after appointed on McClellan's staff, and captured the first colors taken by the Army of the Potomac. In 1863 he went on General Pleasonton's staff, and for gallantry was appointed brigadier-general of volunteers, commanding a Michigan brigade. He defeated the Confederate General Stuart at Gettysburg, for which he was brevetted major in the regular army. In 1864 his brigade was assigned to Sheridan's corps and he became one of the most brilliant officers in the Virginia campaigns. He was promoted brevet lieutenant-colonel and brevet colonel. He won victories at Woodstock and Cedar Creek and was brevetted major-general of volunteers. In 1865 his division won the battle of Waynesboro, capturing 1,600 prisoners and 11 guns. He fought at Five Forks and Dinwiddie Court-House, and was brevetted brigadier-general. After the surrender at Appomattox he was brevetted major-general and appointed major-general of volunteers. He was then assigned to duty in Texas, where he was chief of cavalry till mustered out of the volunteer service. In 1866 he took the lieutenancy of the Seventh cavalry at Fort Riley, Kansas, under Hancock, who was succeeded by Sheridan in the summer of 1867. Custer shortly after saw his first Indian service, and closed a campaign against the Cheyennes in 1868. He was stationed in Kentucky in 1871 and in 1873 was sent to Dakota, where he had

GENERAL CUSTER.

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various cavalry commands and several times defeated hostile Indians. On June 25, 1876, with a force of 1,100 men, he attacked a body of Sioux, afterward found to number 9,000, encamped on the Little Big Horn, in Montana, and he and his entire command were killed. In 1888, his wife, Elizabeth Bacon Custer, published a biographical volume *Tenting on the Plains, or Life with General Custer*. W.M.C.

CUSTIS, GEORGE WASHINGTON PARKE, an American author; born in Mount Airy, Maryland, April 30, 1781. His grandfather was Daniel Parke Custis, the first husband of Martha Washington, and he was the adopted son of George Washington. He wrote *Recollections of George Washington* (1860), a posthumous work, and was also the author of several plays and orations. In 1802 he left Mount Vernon and erected Arlington House, near Washington, where his father had left him a large estate. His daughter married Robert E. Lee. He died at Arlington House, Fairfax County, Virginia, October 10, 1857. W.M.C.

CUTHBERT, Georgia, the seat of Randolph County, and the terminus of a branch line of the Central railroad of Georgia, 25 miles southeast of Eufaula. Cotton-ginning, thread, and grist mills represent the chief industries. Population, 1900, 2,641. C.L.S.

CUTHBERT BEDE, pseudonym of BRADLEY, EDWARD; q.v., in these Supplements.

CUTLER, MANASSEH, an American clergyman, scientist, and pioneer; born in Killingly, Conn., May 3, 1742. He graduated at Yale in 1765; engaged in the whaling business, and opened a store in Edgartown, Mass. While thus engaged he studied law, and in 1767 was admitted to the bar; but a predilection for the ministry caused him to remove to Dedham, where he studied theology. In 1770 he was licensed to preach, and in 1771 was ordained as pastor in Ipswich. In 1776 he was commissioned chaplain in the Revolutionary army. At the close of the war he studied medicine and general science, especially botany. In 1781 he was elected a member of the American Academy of Arts and Sciences, and the memoirs of that society contain many papers from his pen. In botanical affairs he was practically self-taught, and has been termed the pioneer of New England botany. He was among the first white explorers of the White Mountains. In 1786 he joined the Ohio Company, and contracted with the government in its behalf for 1,500,000 acres of land northwest of the Ohio River. With 45 associates he founded the city of Marietta, and in 1800–04 he sat in Congress. He died in Hamilton, Mass., July 28, 1823. E.E.T.

CUT-OUT, ELECTRIC, a device, in numerous forms, for switching, or cutting out, or separating some portion of an electric circuit from the remainder. It is often made with fusible wire connections, so that when too strong a current exists in a circuit the wires may burn out, thus cutting out the rest of the current, as in the interior of a building, and preventing harm to those who have to do with the electrical apparatus. Such a cut-out, placed on a building in an incandescent-light circuit, would prevent interior damage if the outside wires came in contact with the exposed wires of an arc circuit.

CUTTER, a small single-masted vessel furnished with a straight-running bowsprit, rigged like a sloop, carrying a fore-and-aft mainsail, gaff top-sail, stay-foresail, and jib. Also a boat belonging to a ship of war. See SAIL, Vol. XXI, p. 161. W.R.B.

CUTTHROAT TROUT (*Salmo clarkii* or *S. mykiss*), a true salmon trout inhabiting the fresh-water streams of northwestern United States. It has a crimson slash on its lower jaw and black spots on its tail. R.W.C.

CUTTINGS, branches or portions of branches of trees or shrubs employed to produce new plants, by burying the lower end in the earth so that new roots may arise from the nodes. See HORTICULTURE, Vol. XII, pp. 243, 244.

CUTWORMS, larval forms of the *Noctuidæ*, or night-flying moths, *Agrostis* being a well known species. These worms eat through the stalks of grain and other plants at or near the surface of the ground. R.W.C.

CUVILLIER-FLEURY, ALFRED AUGUSTE, French journalist; born March 18, 1802, in Paris, was appointed private secretary by Louis Napoleon, ex-king of Holland, and became later on tutor of the Duc d'Aumale. He was elected a member of the Academy in 1866 and died in Paris, Oct. 18, 1887. He published *Portraits Politics et Révolutionaires* (1851), which are fine in form and diction; *Études Historiques et Littéraires* (1854); *Nouvelles Études* (1855); *Voyage et Voyageurs* (1856); *Derniers Études Historiques et Littéraires* (1859); *Historiens, Poètes et Romanciers* (1863); *Études et Portraits* (1865–68). G.A.S.

CUYAHOGA FALLS, Ohio, a summer-resort of Summit County, 4 miles northeast of Akron on the Cleveland, Akron & Columbus, and the Pittsburg & Western railroads. Here the deep channel of the Cuyahoga River falling 240 feet in a short distance yields enormous power for factories. Population, 1900, 3,186. C.L.S.

CUYAHOGA RIVER, Ohio, 60 miles long, rises in Geauga County and enters Lake Erie at Cleveland. C.L.S.

CUYO, capital of Cuyos group, Philippine Islands, on small bay of Cuyo island. It has trade in cocoanut oil, rice and trepang. Pop., 1903, 12,773.

CUZCO, a department of Peru; area 156,270 square miles and population 438,646. The population of Cuzco, the capital was 30,000 in 1900.

CYANEA, a genus of jelly-fishes of the class *Acraspeda* (*Scyphomedusæ*). The animal is a disk-shaped, jelly-like bell, of a reddish brown color, varying from a few inches to several feet in diameter. The slender, thread-like tentacles are arranged in bundles, and are of great length.

CYANIDE PROCESS. See GOLD AND GOLD-MINING, in these Supplements.

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CYANIDES OR SALTS OF PRUSSIC ACID. See CHEMISTRY, Vol. V, pp. 480–482.

CYANITE, KYANITE OR DISTHENE, a mineral composed of alumina and silica. See MINERALOGY, Vol. XVI, p. 426.

CYANOGEN (CN or Cy), although intrinsically of little importance, is one of the most interesting compounds of carbon. Cyanogen forms poisonous compounds with metals, forming *metallic cyanides*, of which the best known is the *cyanide of potassium*, a salt of much importance in photography. With hydrogen it forms the deadly prussic or hydrocyanic acid, while it is united with oxygen in cyanic acid. See CHEMISTRY, Vol. V, p. 480.

CYANOTYPE PROCESSES, in photography, those processes in which the compound radical cyanogen is employed; they were discovered by Sir John Herschel. The process is employed in the making of the so-called "blue-prints." See PHOTOGRAPHY, Vol. XVIII, p. 845.

CYATHEA, a genus of tropical tree-ferns, characterized by its cup-shaped indusium. It forms the type of the family *Cyatheaceæ*, which includes the principal tree-ferns of palm-like habit. This family numbers about two hundred species, all tropical, and which form forests in certain parts of Australia. *C. medullaris* of New Zealand is one of the most common tree-ferns in cultivation.

CYATHOPHYLLUM, a genus of fossil stony corals, with a simple or branched polyparium, internally lamellated, the lamella having a quadripartite arrangement. The older portions are cut off by transverse "tables," or septa, and the base of the stem is often supported by root-like processes. This genus first appeared in the Silurian, was abundant in the Devonian, and disappeared at the close of the Carboniferous epoch. See also *Cyathophyllidæ*, under CORALS, Vol. VI, p. 340.

CYAXARES. See PERSIA, Vol. XVIII, p. 575.

CYCADS, a group of plants. See VEGETABLE KINGDOM, Vol. XXIV, p. 142.

CYCHLA, a genus of fishes of the family *Chromidæ*. They are remarkable for the beauty and brilliancy of their colors, and some of them are highly esteemed for the table. In form and habits they resemble the sunfishes.

CYCLAMEN, a flowering plant. See HORTICULTURE, Vol. XII, pp. 258, 271.

CYCLE, a term used in chronology to denote an interval of time in which certain phenomena recur in the same order. Cycles have chiefly arisen from the fact that neither the year (the period of the earth around the sun), nor the month (the period of the moon around the earth), can be measured by days, or even by hours, so exactly as not to leave fractions. Cycles eliminate these fractions, since they are reckoned from the time a heavenly body is in a particular relation with the earth to a time when it again occupies the same place in the heavens and calendar. See *Solar Cycle*, *Lunar Cycle* and *Cycle of Indiction*, under CALENDAR, Vol. IV, pp. 593, 594; and *Metonic Cycle*, under ASTRONOMY, Vol. II, p. 653.

CYCLOBRANCHIATA, a name formerly applied to a group of mollusks in which the gills were circularly arranged. This was highly artificial, and is now obsolete.

CYCLODUS, a genus of lizards of the family *Scincidæ*, found in Australia and the neighboring islands.

CYCLOID. If a circle roll along a straight line in its own plane, any point on the circumference describes a curve which is called a cycloid. This is the most interesting of what are called the transcendental curves, both from its geometrical properties and its numerous applications in mechanics. In dynamics, for example, we find that a heavy particle descends from rest from any point in the arc of an inverted cycloid to the lowest point in the same time exactly, from whatever point of the curve it starts. See INFINITESIMAL CALCULUS, Vol. XIII, p. 58.

CYCLONES. See METEOROLOGY, Vol. XVI, pp. 159, 160; and in these Supplements.

CYCLOPEAN WALLS. See ARCHITECTURE, Vol. II, pp. 352, 395.

CYCLOPS, a genus of small fresh-water crustaceans, type of a family *Cyclopidæ* in the order *Copepoda*. See CRUSTACEA, Vol. VI, p. 587.

CYCLOSIS, the name employed to designate certain protoplasm confined within a cell-wall. These movements are characteristic of all cytoplasm, and appear as currents setting in various directions, sometimes steadily about the cell-walls, sometimes along strands connecting the wall cytoplasm with that investing the nucleus, flowing in one direction for a time, and then perhaps reversing it. The currents are made visible from the fact that the cytoplasm current carries numbers of opaque granules. This movement is also known as "circulation" and "rotation," and is easily seen in the body-cells of the *Characeæ*, leaves of *Anacharis* and *Vallisneria*, stamen-hairs of *Tradescantia*, etc.

CYDNUS, a river of Asia Minor. See ASIA MINOR, Vol. II, p. 619.

CYLINDER PRESS. See PRESSES, in these Supplements.

CYMA, in architecture. See ARCHITECTURE, Vol. II, pp. 357, 406.

CYMBALS, a pair of concave plates of brass which are struck together to produce a sharp ringing sound of no fixed pitch. They are of very ancient origin and were used by the Greeks in the worship of Cybela. The attempts made to discover the composition of the metal in the ancient instruments have failed, the nearest approach being an alloy of 80 parts copper to 20 of tin. Cymbals are essentially military instruments and play the same part as the bass drum. In orchestras the same performer plays both instruments. One cymbal is tied to the drum and the other held in the left hand. W.R.B.

CYME, a term employed in botany to designate those forms of inflorescence which are definite or centrifugal. See BOTANY, Vol. IV, p. 111.

CYNANCHUM, a genus of *Asclepiadaceæ*, of which some species have been used medicinally.

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The Indian *Cynanchum extensum* yields fiber, and *Cynanchum ovalifolium*, a native of Penang, yields caoutchouc of excellent quality.

CYNOCEPHALUS, an African ape. See APE, Vol. II, p. 133.

CYNODON, a genus of grasses, having digitate or racemose spikes, so named from its sharp-pointed underground shoots. The most important species (*C. Dactylon*) is the widely distributed and well-known Bermuda grass. It is the principal fodder and pasture grass of India, where it is known by the names of *dhob*, *doorba*, etc.

CYNOGALE, an animal of the civet family. See MAMMALIA, Vol. XV, p. 442.

CYNOMORIUM, a genus of the curious parasitic family *Balanophoraceæ*. *C. coccineum*, a plant of a strange fungus-like appearance, is found in the islands of Malta and Gozo, parasitic upon the roots of *Salicornia*. It was long known as *fungus Melitensis*, and enjoyed the highest reputation as a styptic, besides being used as an astringent in dysentery and other maladies. These uses, however, depended on the doctrine of signatures alone, its scarlet color and blood-like juice being interpreted as providential indications of its curative destination for all injuries or diseases accompanied by bleeding.

CYNOSURE (literally, "the dog's tail"), the constellation of the Little Bear. As the pole-star is the principal star of the constellation, the eyes of mariners are frequently directed to it, hence the common application of the term *cynosure* to anything that strongly attracts attention; a center of attention.

CYNTHIANA, Kentucky, the seat of Harrison County, on the east bank of the South Licking River, and on the Kentucky Central division of the Louisville & Nashville railroad, 37 miles N. E. of Frankfort, and 66 miles S. of Cincinnati. Water power is supplied by the river for its whisky distilleries, notably the "Kentucky Bourbon" brand, for extensive flour milling interests, and other industries of an agricultural and stock-raising region. Superior horses are bred and the town is an important race-meeting center. The neighborhood was the scene of Confederate victories July 17, 1862, and June 11, 1864, and of a Union victory June 14, 1864. Pop., 1900, 3,257. C.L.S.

CYPERACEÆ, the family of sedges, nearly akin to grasses, but easily distinguished by their solid, unjointed, generally triangular stems, undivided leaf-sheaths and absence of paleæ. There are between 2,000 and 3,000 species, widely distributed throughout all climates, but more especially in temperate and cold regions, and in marshy soils, of which they often take almost entire possession. Characteristic genera are *Cyperus* and *Scirpus*, while the largest genus, *Carex*, forms a highly specialized group.

CYPERUS, a large genus of sedges, sometimes called "galingales," and very widely distributed. It is characterized by its perfect flowers, flattened spicate or clustered spikelets, involucrate inflorescence and absence of bristles. *C. esculentus*, of the Mediterranean region, is somewhat cultivated for its nut-like sweet tubers, called "chufa." *C. phymatodes* and *C. rotundus*, variety *Hydra* ("nutgrass" or "coco-grass") are troublesome weeds of the southern United States, propagating by nut-like tubers, and very difficult to extirpate.

CYPRINIDÆ, a large family of fresh-water bony fishes, with open swim-bladders. Barbel, bream, carp, chub, dace, gold-fish, gudgeon, minnow, roach, and tench are familiar examples. They are distinguished by their small, toothless mouths, naked head, usually scaled body, and by the absence of the adipose fin. The family includes over a hundred genera, and eight times as many species. See ICHTHYOLOGY, Vol. XII, p. 731.

CYPRINODONTIDÆ ("toothed carp") a family of small bony fishes, with open swim-bladders. They are allied to carps (*Cyprinidæ*), but the mouth bears teeth, the head and body are scaled, and there are never barbules. The family includes twenty genera and over a hundred species, widely distributed in the warm and tropical zones, both fresh-water and marine.

CYPRIPEDIUM. See ORCHIDS, Vol. XVII, p. 840.

CYPRIS, a very common, small fresh-water crustacean, type of a family (*Cyprida*) in the order *Ostracoda*. Like other ostracods, this small "water-flea" has an unsegmented body, seven pairs of appendages, a rudimentary abdomen and a bivalve mollusk shell inclosing all. The shell of cypris is dainty and elastic; the posterior antennæ bear a long tuft of bristles on their second joint; the second pair of maxillæ have a small gill appendage. See also CRUSTACEA, Vol. VI, p. 587.

CYPRUS, a large, historic island in the eastern part of the Mediterranean Sea. For its history down to 1875, geography and general description, see Vol. VI, pp. 659–661.

By virtue of a convention concluded between the representatives of England and the sultan of Turkey, in Constantinople, June 4, 1878, the island became a British colony. Under the same convention it became obligatory upon the inhabitants of the island to pay each year to the Sublime Porte a tribute of £92,800. There was extended to the people in 1882 the privilege of the election of their own representatives in a newly created legislature of limited power. In April of 1895 there began in the island, with apparent spontaneity, a vigorous movement for the abolition of the objectionable tribute to Turkey and for union with Greece.

Cyprus is politically divided into six districts, whose capital, Nicosia (q.v., in these Supplements), has a population of 14,752. The island is 3,584 sq. miles in extent, and had a population in 1901 of 237,022. Imports and exports alike amount to about £290,000 in their annual value. The coins of England and Turkey are current; the weights and measures of the latter nation are used. Cotton, wheat and barley remain the agricultural exports of chief importance, but the dwindling of the

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once famous forests of Cyprus, now almost totally lost, has greatly impaired the fertility as well as the climate of the island. The numerous flocks of goats prevent the development of new vegetation by the destruction of all young shoots. The climate of Cyprus, though generally considered unhealthful, has proved beneficial to the English troops who are stationed there.

Copper, for which Cyprus was once famous, and which took its name from that of the island, has ceased to be an export of importance. An English corporation, which controls the Cyprian output of this mineral, operates only a few mines in the western portion of the island. Salt, once shipped, under the Turks, to a value of $40,000 per annum, is only produced for local consumption.

The highest official on the island is the High Commissioner, who is assisted by an executive council, and by a legislature of 18 members, three of whom are elected (for five years) by Mohammedan and nine by non-Mohammedan voters. An English judicial system is in vogue, and barrister judges preside over the courts. Half a regiment of infantry constitutes the English force of occupation, which is quartered at Polymedia, four miles north of Limassœ. Telegraphic communication with Europe has been established for many years.

Cyprus is a field of great interest and fertility for the archæologist. Here, in the ninth century, there was discovered the *Codex Cyprius*, in which is contained the oldest complete copy extant of the Holy Gospels. Late in the nineteenth century extensive and systematic excavations were begun in Cyprus by the British Museum. These were made in the vicinity of the ancient town of Curium, and there were unearthed many inscriptions and other relics, important in historical confirmation. It became evident, as stated by the historian Strabo, that the town Curium had originally been founded by a colony from Argos. There are contained in the Metropolitan Museum of Art, in New York City, Cyprian relics of great antiquity, which were unearthed by General Louis P. di Cesnola in 1870–75. These include pieces of statuary and like objects.

CYPRUS, CHURCH OF. The Church of Cyprus has characteristics similar to the other orthodox Churches of the East, but has always maintained an independent position; has not been subject to any patriarch. Although attempts were made as early as 431 A.D. and as late as 1600 by the patriarchs of Antioch to claim authority over it their efforts were unavailing. Aside from the period during which Cyprus was in the hands of the Lusignans and the Venetian Republic (1193–1571) the church has always retained its independence. It received the holy ointment from other organizations — up to 1860 from Antioch and after that time from Constantinople, but this was done as an act of courtesy not as an obligation. There are several monasteries dating from the 11th century and onwards; and an archiepiscopal school at Nicosia founded in 1812, and in 1893 it added a high-school department for girls. The absence of any theological seminary has been a drawback to the culture of the clergy, but steps for progress in this direction were recently adopted.

CYRIL OR CONSTANTINE, a missionary and apostle to the Slavs. See METHODIUS, Vol. XVI, p. 202.

CYRIL LUCARIS. See GREEK CHURCH, Vol. XI, p. 141.

CYSTICERCUS. See TAPEWORMS, Vol. XXIII, p. 57.

CYSTIDEA. See ECHINODERMATA, Vol. VII, p. 552.

CYTOLOGY. See EMBRYOLOGY, in these Supplements.

CYTOPLASM, a name applied to the general protoplasm of the cell, in which lie imbedded the other cell-structures, as nucleus, plastids, centrospheres, etc. It is a viscid substance, and as it is the chief seat of the nutritive processes, it must contain at different times all the substances which enter into the structure of the plant.

CZAR OR TSAR, a Slavonic word for prince, not related to Cæsar; a monarch of absolute authority; specifically, the title of the emperors of Russia. Ivan IV, "the Terrible," the first tsar of Russia, was crowned in Moscow in 1547. The empress of Russia is called the *tsaritsa* or *czarina;* the heir apparent, the *tsarevitch;* his wife, the *tsarevna.*

CZECH, SVATOPLUK, Czech poet, was born Feb, 21, 1846, at Ostredek, Bohemia. Having completed his studies at the gymnasium of Prague and in the university of the same city, he divided his time between occupation as an advocate and as the editor of various papers. In 1874 he traveled extensively in Russia, and many of his writings are based upon material gained in this journey. Noteworthy among his contributions to epic poetry are *Dreams; The Adamites; Slavia;* and *Europe.* His collected lyric poems have been published under the title *Narrations, Arabesques and Humoristic Subjects.* His epic poem, *Dagmar*, is thought to be unexcelled in contemporary Czech literature. As one of the editors of *Květy* and the *Lumir*, he has become prominent among Bohemians.

CZERNOWITZ, the capital of the Austrian Duchy of Bukowina (See Vol. VI, p. 666). Of the modern buildings of note there is the Episcopal Palace in Byzantine style, the Greek Orthodox Cathedral, the Jesuit church and a Hebrew temple in the Moorish style. The Francis Joseph University which was opened in 1875 has three departments, law and politics, philosophy, and theology. The doctrines taught in theology are Greek Orthodox and the language in which instruction is given is German. There were 41 professors and lecturers and 390 students in the institution in 1897. The trade is principally in the hands of the Jews and Armenians, the town has a garrison of 2,965 men. Population, 1900, 69,619.

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DAB—DAGOBERT I

DAB, the name of a fish belonging to a group sometimes known as flat-fishes. The body is very much compressed laterally; and both eyes are on one side. R.W.C.

DACELO, a genus of Australian birds known as laughing king-fishers on account of their loud, gurgling note. It belongs to the Picarian order and includes the largest forms of its family, the *Alcedinidæ*. A common species is classified as *D. gigas* or *D. gigantea*. R.W.C.

DACITE, in geology, the name of certain volcanic quartz bearing andesites, carrying in the matrix of rock glasses, felspar, lime-soda, mica, hornblende and pyroxene, containing about 66 per cent of silica; alumnia, 19 per cent; ferric oxide, 2 per cent; ferrous oxide, 1.5 per cent; magnesia, 1.5 per cent; lime, 3 per cent; soda, 4 per cent; potash, 3 per cent. This rock often presents the appearance of porphyry-bearing quartz. Dacite graduates into greenstone, or trachyte rock containing quartz. The name has been given because of the preponderance of the rock in the Roman province of Dacia. W.R.B.

DA COSTA, JACOB M., physician, was born at St. Thomas, Danish West Indies, on February 7, 1833, was graduated from the Jefferson Medical College, Philadelphia, in 1852, and also studied in Paris and Vienna. From 1872 to 1891 he was professor of the practice of medicine and clinical medicine in Jefferson College, and thereafter until his death professor emeritus. He had a distinguished career as a physician and surgeon, and was the author of many standard works and innumerable papers and addresses. By common consent he ranked among the foremost physicians and surgeons of his time. He died in 1900. W.F.J.

DACRES, SIR SIDNEY COLPOYS, naval commander; was born in England in 1805, and entered the navy in 1817. He rendered important services in the Greek War in 1828 and received the cross of the Legion of Honor and the decoration of the Order of the Saviour. In the Crimean War he bombarded Sebastopol and was made a C.B. Afterward he held various commands at sea, was commander-in-chief in the Channel, became first sea lord of the admiralty in 1868, was made vice-admiral and K.C.B. in 1865 and G.C.B. in 1871, and after 1872 was governor of Greenwich Hospital. His death occurred on March 8, 1884. W.F.J.

DACRYDIUM, a genus of coniferous trees of the family *Taxaceæ*, chiefly natives of Tasmania and New Zealand. The Huon Pine (*D. Franklinii*) is valuable for its timber, which is excellent for spars. *D. taxifolium*, the Kakaterra tree of New Zealand, attains a height of two hundred feet, and is also valuable for timber. The fertile cone has usually but one to six bracts, which resemble the ordinary imbricate foliage leaves, in the axils of which there develops a single seed with a fleshy aril.

DACTYLOPTERUS. See FLYING-FISH, Vol. IX, p. 308.

DADAR, a town of Baluchistan, five miles S.E. of the Bolan Pass. It is said to be one of the hottest places in the world, although in latitude 30° N. The British troops here routed a Kelat force in November, 1840. The neighborhood produces grain, pulse, cotton, sugar, madder and fruits. Population, about 3,000.

DADEVILLE, a village and the capital of Tallapoosa County, central eastern Alabama, situated about 50 miles N.E. of Montgomery, on the Central Railroad of Georgia. It has a mineral spring and manufactories of buggies and wagons. Population 1890, 873; 1900, 1,136.

DADO (It., a die), a term applied in architecture to the body of a pedestal, the cubic block between the base and cornice. It is also applied to a protection running around the bottom of the walls of a room, more commonly known as wainscoting.

DAET, a town of the island of Luzon, in the South China Sea, one of the Philippines. It is situated in the southern part of the island, on a river of the same name, and is the capital of the province of North Camarines. Population, 7,702.

DAGNAN-BOUVERET, PASCAL ADOLPHE JEAN, a French painter; born Jan. 7, 1852, in Paris. He studied at the École des Beaux Arts as a pupil of Gérôme, and in 1876 won a second *Grand Prix de Rome*. In the following year his work made its first appearance in the Salon, being represented by two mythological subjects, *Orpheus and the Bacchantes* and *Bacchus, Child*. M. Dagnan-Bouveret attained high rank in the contemporary French school, his mastery of technique and color being of the first order. Primarily a *genre* painter, his subjects are always in admirable taste. *The Parental Blessing*, in a Russian collection, and *The Conscripts*, in the state collections of France, are the most highly regarded of his later achievements. He was made an officer of the Legion of Honor, Dec. 31, 1891.

DAGO, DAGÖE OR DAGDEN, an island in the Baltic Sea, near the entrance to the Gulf of Finland, belonging to the Russian province of Esthonia. It is separated from the island of Oesel by the Dago or Dagden Sound. It measures 34 by 15 miles in extent, has rocky and almost sterile soil, and is inhabited by about 12,000 people. W.F.J.

DAGOBERT I, a Frankish king; received, in 622, Austrasia from his father, Clotaire. He grew up under the tutelage of Major-Domo Pipin

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and of Bishop Arnulf, of Metz. On the death of his father, in 628, he became sole ruler of the Frankish kingdom, having transferred his residence to Paris. He died in 638, the last sturdy scion of the Merovingian family. See FRANCE, Vol. IX, p. 469. DAGOBERT II ruled over Austrasia from 673 to 678, when he was murdered. G.A.S.

DAGUPAN, a Philippine town in Pangasinan, Luzon, an important road center, money-order station and terminus of Manila and Dagupan Ry. Chief shipping point of province. Pop., 1903, 20,357.

DAHLAK OR DAHALAK, an archipelago in the Red Sea, belonging to the Italian province of Eritrea, and lying about 28 miles east of the port of Massowah. The chief island of the group, called Dahlak, was known to the ancient Romans as Orina, and was famous for its pearl fisheries. Two others are named Nora and Harmil. W.F.J.

DAHLEN, a town of Germany in the Prussian Rhine province, about 26 miles E. of Leipsic. It has extensive manufactories of linen and silk. Population, 6,000.

DAHLGREN, FREDERIK AUGUST, a Swedish poet and critic; born in Nordmark, Sept. 20, 1816. He was graduated from the University of Upsala in 1839, and in 1871, having become well known as a historian, as a dramatic author, and as a poet, was elected to the Swedish Academy. He was associated with Chemnitz in the publication of *The Thirty Years' War*, a monumental work, and published several lesser historical works of his own. His *Vermländingarne*, a national opera, was brought out in 1846, and achieved great success. He also furnished for theatrical use translations into Swedish of many of the plays of Shakespeare.

DAHLGREN, JOHN ADOLPH, an American naval officer; born in Philadelphia, Pennsylvania, November 13, 1809. His father, Bernard Ulric Dahlgren, was for twelve years United States consul to Sweden. John Adolph joined the navy at the age of seventeen, passed midshipman in 1832, was advanced to the rank of lieutenant, and in 1855 to that of commander. In 1845 he was detailed to Washington, being assigned to duty in the Ordnance Department. It was due to his efforts that the Ordnance Bureau was extended and developed. He was the inventor of the Dahlgren gun (q. v.), besides contriving an improved and more effective method of mounting gunboats with 12 to 24 pound howitzers, throwing canister-shot and shrapnel-shells. At the outbreak of the Civil War he was commander of the naval station at Washington and in June, 1862, was appointed chief of the Ordnance Department. In July, 1862, he undertook the supreme command of the South Atlantic squadron, and after the death of Admiral Foote in 1863 was appointed to the command of the South Atlantic blockading fleet stationed before Charleston. He was given command of the South Pacific squadron in 1866 and in 1868 was again made chief of the Ordnance Bureau. He published *Thirty-two Pound Practice for Ranges* (1850); *Systems of Boat Armament in the United States Navy* (1852); *Naval Percussion Locks and Primers* (1852); *Ordnance Memoranda* (1853); *Shells and Shell-guns* (1856). He died in Washington, July 12, 1870. His *Memoirs* appeared in 1882. W.M.C.

ADMIRAL DAHLGREN.

DAHLGREN GUN, a form of ordnance named for its inventor, Admiral Dahlgren of the United States navy. It was the result of a careful series of experiments on the construction of large guns. The chief improvement consisted in having relatively less metal in front of the trunnions, and more behind, where there is the greatest strain in firing. The 9-inch and 11-inch Dahlgrens are still the favorites of American seamen, and are unsurpassed by any ship-gun in the world.

DAHLONEGA, a town and the county seat of Lumpkin County, Georgia, in the northern part of the state. It lies on the Chestatee River, a tributary of the Chattahoochee, in a rich agricultural and mineral region, gold having been found in paying quantities in the neighboring mountains. It was once the seat of a United States mint, and is now the site of a state Agricultural College. Its population was 896 in 1890, and 1,255 in 1900. W.F.J.

DAHN, JULIUS SOPHUS FELIX, jurist, historian and poet, son of an eminent actor and actress; was born in Hamburg, Germany, on February 9, 1834, and studied at Munich and Berlin. He became a professor at Munich in 1862, at Würzburg in 1863, and at Königsberg in 1872, filling there the chair of German jurisprudence. He was a voluminous and authoritative writer of great versatility. Four of his books are standard treatises upon German and other law, six are histories dealing with the Germans, Romans, Goths and Langobards, others form a notable series of popular historical romances, including some of the most powerful in modern German literature, and still others are lyrical and dramatic poems of singular beauty. W.F.J.

DAHOMEY. A complete account of Dahomey is contained in Vol. VI, pp. 674–676. Subsequent history alone need be added here. The kingdom of Dahomey, formerly the most powerful on the Slave Coast, Upper Guinea, has been greatly reduced in size and strength, especially by long and disastrous wars waged against Abeokuta and other petty Yoruba states on its eastern frontier. It now comprises an area of about sixty thousand square miles, with an estimated population of a million. Capital, Porto Novo, pop., 50,000. It extends from Yoruba westward to the River Volta, separating it from Ashanti, and borders northward on the Wangera territory. It is entirely an inland state. According to the treaty of delim-

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itation between British and French West African possessions, by convention of Aug. 10, 1889, Dahomey came within the sphere of France. Early in 1890 difficulties arose respecting the disputed stations of Porto Novo and Kotonu on the south coast, but after a brief series of hostilities peace was concluded in September, 1890, Dahomey recognizing the French claims to those places. Hostilities were resumed by the war-loving natives in 1893, and French troops under Colonel Dodds advanced from the coast to the capital, Abomey, which was captured in November, 1893, several disastrous battles having been fought during the campaign. King Behanzin surrendered unconditionally upon the 25th of January, 1894, and was succeeded in the same month by King Guthili.

There are annually exported from Dahomey 10,000 tons of palm-oil and 20,000 of palm kernels, value 12,000,000 francs.

DAIMIO, the "Great Name" of the hereditary and territorial nobles who, up to the revolution of 1871, owed nominal allegiance to the mikado, and sometimes to the shogun. They then became pensionaries. See JAPAN, Vol. XIII, p. 587–593. R.C.A.

DAINGERFIELD, a town and the capital of Morris County, northeastern Texas, situated 17 miles S.E. of Mount Pleasant, on the Rio Grande railroad. It is in a fine forest region, and has manufactures of chairs and other wooden articles. Population 1890, 553.

DAIR-EL-KAMAR, a town of Syria, the capital of the Druses, situated on the edge of a picturesque glen of Mount Lebanon. On the opposite side of the glen are the ruins of the palace Bteddin, formerly the residence of Emir Beshir, a ruler of Lebanon. It has a population of about eight thousand, chiefly engaged in the cultivation of mulberries, olives and vines.

DAIRY PRODUCTS, in the United States. See AGRICULTURE, and BUTTER, in these Supplements.

DAKOTA CITY, a town 16 miles N. of Fort Dodge, on the Blue Earth River, and on the Chicago and North-Western railroad; the capital of Humboldt County, northwestern central Iowa, Humboldt College is situated one mile north of the town. Population 1900, 362.

DAKOTA CITY, capital of Dakota County, northeastern Nebraska. It is located on the west bank of the Missouri, seven miles below Sioux City, Iowa, and on the Chicago, St. Paul, Minneapolis and Omaha railroad. Population 1900, 521.

DAKOTA FORMATION, a geological formation of the Cretaceous period, so named from the Dakota Indians. There are borne in this formation rich deposits of coal and of vegetable remains, indicating that the banks of the water-body depositing the formation were heavily timbered. Frequent shale and sandstone beds common throughout the Great Plains, especially in the western portion, and reappearing in the Colorado uplands, mark the outcrop of this formation. Reservoirs of artesian water occurring in the sandstones of this formation are the most important sources of deep-well supply in the West.

DAKOTA RIVER, also called JAMES RIVER, from the French *Rivière à Jacques*, is a large tributary of the Missouri River, which rises near Devil's Lake in the north-central part of North Dakota, and flows southward through that state and South Dakota to the Missouri River near Yankton, S. D. W.F.J.

DALAGUETE, town on S.E. coast of Cebú, Philippine Islands. Chief occupations, weaving of rough fabrics and the growing of Indian corn, sibucao, cacao, copra and sugar. Pop., 1903, 21,354.

DALAMOW OR DALMOW, a city of India, on the Ganges, in the department of Oude. It is a reputed holy place, containing two antique temples of Siva. Population, 10,000.

DALBERGIA, a genus of trees and climbing shrubs of the natural order *Leguminosæ*, having a stalked and membranous pod, which is flat, tapers to both ends, and contains one to three flat seeds. All the species are natives of warm climates. Some are valuable timber trees and *D. monetaria* of Surinam yields resin similar to dragon's blood. The genus is named in honor of the Swedish botanist, Nicholas Dalberg. W.R.B.

DALE, ROBERT WILLIAM, an English Congregational minister; born in London, Dec. 1, 1829. He was educated at Spring Hill College, Birmingham, and at the University of London. In 1859 he became pastor of the Congregational church at Carr's Lane, Birmingham, having since 1853 served as its associate pastor. For several years editor of *The Congregationalist*, he delivered the Congregational Union lectures in 1873, and took a prominent part in the movements of the churches of his denomination in England. Mr. Dale traveled in the Orient, and in 1877 visited America at the invitation of the theological faculty of Yale College to deliver the Lyman Beecher lectures on preaching. On his return to England he published, in *The Ninteenth Century*, his *Impressions of America*. He was a frequent contributor to the English reviews, and wrote numerous works, among which are *Week-Day Sermons; The Ten Commandments; Nine Lectures on Preaching;* and *Lectures on the Epistle to the Ephesians*. He was a man of exceptional strength and breadth of learning, famous as a writer upon popular subjects, as well as a pulpit orator. He died in London, March 13, 1895.

DALECARLIA, the län or county of Kopparberg, formerly a province of Sweden, lying in the south-central part of the kingdom. The Dalecarlians are celebrated for bravery and patriotism, especially for the part they took in freeing their country from the rule of Christian II of Denmark. As a reward, they are accorded special privileges by the king. The county is rich in mineral resources, especially in iron and copper, and is noted for its rugged and picturesque scenery. Area of Kopparberg, 11,522 square miles; population (1900), 217,708.

DALEVILLE, a village of Lauderdale County, central eastern Mississippi, of importance only as being the seat of Cooper-Huddleston College.

DALHOUSIE, a seaport town of northern New

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Brunswick, situated at the mouth of the Restigouche River, and capital of Restigouche County. It has a fine harbor and docks. The chief industry is preserving salmon and lobster. Its exports are fish and lumber. The Intercolonial railway passes within four miles of the town. Population 1891, 2,532.

DALIAS, a town of southwestern Spain, in the province of Almeria, about 20 miles from the city of that name, and 4 miles from the Mediterranean Sea. It is poorly built and subject to earthquakes. It has lead-mines. The people are chiefly employed in mining, smelting and fishing. Population, 6,254.

DALKISSORE OR ROOPNA-RAYAN, a river of Bengal, rising in lat. 23° 30′ N., and long. 86° 34′ E. It has a southeasterly course of about 170 miles, emptying into the Hoogly River at Diamond Harbor. It is navigable for the greater portion of its course.

DALL, WILLIAM HEALEY, naturalist, was born in Boston on August 21, 1845, and studied under Louis Agassiz. He went with the international telegraph expedition to Alaska in 1865–68, and travelled much in Alaska and Siberia; served on the U. S. coast survey in Alaska in 1871–84, was palæontologist to the U. S. geological survey in 1884–98, and has been attached to the U. S. National Museum since 1880 and professor of invertebrate palæontology in the Wagner Institute, Philadelphia, since 1893. He has written a number of books on Alaska, on molluscs, and on fossils. His mother, Caroline Wells Dall, was a well known writer of the last generation. W.F.I.

DALLAS, a town and county seat of Paulding County, Georgia, in the northwestern part of the state. It was the scene of several battles fought by General Sherman just before taking Atlanta in 1864. Its population was 644 in 1900. W.F.J.

DALLAS, a town and the capital of Polk County, northwestern Oregon, fifteen miles west of Salem, on the Rickreal River, and on the Southern Pacific railroad. It has an academy, woolen and flour mills, tannery, etc. Population, 1900, 1,271.

DALLAS, a city of Texas, the metropolis of the northern portion of the state, capital of Dallas County, on the Trinity River, about one mile below the mouth of the West Fork. Although it was first settled in 1841, it has become one of the most important cities in the state. It is situated in the midst of a productive agricultural region, and has large grain-elevators and commercial warehouses. It is an important railroad center, being at the crossing of the Houston and Texas and the Texas and Pacific railways. It is abundantly supplied with good water, obtained from artesian wells; has gas-works, street-railways and electric-lighting systems. It has a university of the Christian Church, a college for women (Episcopal), a medical college, and excellent public and parochial schools. Its principal manufactures are flour, cottonseed-oil, agricultural implements, cement, artificial stone, wagons and carriages, and cotton and woolen goods. It also carries on an immense trade in cotton, grain, hides, etc The Texas State Fair and Dallas Exposition buildings are located here, and cover eight acres of ground. It has many literary and benevolent institutions. Population 1890, 38,067; 1900, 42,638.

DALLAS, ALEXANDER JAMES, an American statesman; born in Jamaica, W. I., June 1, 1759. He was educated at Edinburgh and at Westminster. He came to the United States in 1783, and in 1785 was admitted to the Pennsylvania bar. In 1791 he was appointed Secretary of the Commonwealth of Pennsylvania, an office he filled for several years. In 1801 he was appointed United States district attorney for the Eastern District of Pennsylvania, and held that position till 1814, in which year he was chosen Secretary of the Treasury. He inaugurated a vigorous financial policy, recommended the establishment of a national bank, and brought order out of the chaos in which he found Treasury matters on assuming office. In 1815 he undertook the additional post of Secretary of War; on April 10, 1816, the national bank act was passed; and in November of that year Mr. Dallas resigned his offices. He published four volumes of Reports of the decisions of the Supreme Court of Pennsylvania, covering a period between 1754 and 1806, and an annotated edition of the State laws. He died in Trenton, N. J., Jan. 16, 1817. E.E.T.

DALLAS, GEORGE MIFFLIN, an American statesman; born in Philadelphia, July 10, 1792, second son of A. J. Dallas (q. v.). He graduated at Princeton, 1810, and was admitted to the bar in 1813. He became private secretary to Albert Gallatin, who was sent on a special mission to St. Petersburg, whence Mr. Dallas was sent to London with despatches to the Russian ambassador there. He spent several months at Ghent during the peace negotiations, and was thence sent home with despatches. He began practice in Philadelphia, and became solicitor to the United States Bank. In 1817 he was appointed deputy attorney-general of Pennsylvania for Philadelphia County. In 1828 he was elected mayor of Philadelphia, but resigned the following year on being appointed United States district attorney, which office he also resigned on being elected United States senator, a position he filled from 1831 to 1833. He was attorney-general of Pennsylvania, 1833–35; minister to Russia, 1837–39; Vice-President of the U. S., 1845–49; minister to Great Britain, 1856–61. He died in Philadelphia, Dec. 31, 1864. E.E.T.

GEORGE M. DALLAS.

DALLES CITY OR "THE DALLES," capital of Wasco County, northern Oregon, located on the south bank of the Columbia River, and on the Oregon railroad, 90 miles E. of Portland. It was

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founded in 1852. It has fine churches and excellent schools, including a Catholic academy. There is a branch mint and large woolen mills. Cattle, sheep and wool form its chief staples of industry. Pop. precinct, 1900, 1,277.

DALLES OF THE COLUMBIA, a place on the Columbia River where the stream is greatly narrowed, to less than one-third its general width, and accordingly plunges with great velocity and tumult between the confining walls of rock. It is in Wasco County, Oregon, about 75 miles east of Portland and 50 miles east of and above the Cascades. The name Dalles is applied to similar places in other rivers; particularly in the St. Louis River, Minnesota. W.F.J.

DALLES OF THE ST. LOUIS, a part of the St. Louis River, in Minnesota, near Duluth, which is greatly narrowed and filled with rapids, entirely impeding navigation. W.F.J.

DALLINGER, WILLIAM HENRY, an English clergyman and naturalist; was born in 1841 at Davenport, England. At the age of 20 he entered the Wesleyan ministry, and for 12 years served in Liverpool. In 1888 he resigned the governorship of Wesley College, Sheffield, and devoted himself to his specialty, the study of minute forms of animal life. In 1866 he published *Minute Forms of Life;* in 1878, *The Origin of Life;* and in 1881, *Creator, and What We May Know of Creation*. The valuable results of Mr. Dallinger's investigations won him recognition throughout the scientific world, in which he held positions of high honor. As a minister he strove to demonstrate the harmony between Christian faith and scientific truth.

DALL'ONGARO, FRANCESCO, Italian journalist and patriot; born 1808 at Mansué; studied theology at Vienna and Padua. In 1836 he founded the journal *La Favilla*, in Triest, and wrote several dramas. Having been expelled in 1847 on account of a revolutionary public speech, he went to Venice, became editor of the *Monitore Romano* and organized the First Italian Legion. Expelled, he spent ten years in exile; was allowed, however, to return in 1859, and became professor of literature at Florence, and later at Naples, where he died Jan. 10, 1873. He wrote *Poesie; Stornelli Politici e non Politici*, etc. G.A.S.

DALRYMPLE, ALEXANDER, a Scotch geographer, younger brother of Sir David D.; was born near Edinburgh, July 29, 1737. During his service with the East India Company (1752–65) he undertook several expeditions to the South Pacific Archipelago; returned, 1765, to England, but again entered the service of the company from 1775–77, and in 1779 was appointed hydrographer of the company, and in 1795 hydrographer of the Admiralty. He died in London, June 19, 1808. His most memorable writings are *Account of Discoveries in the South Pacific Ocean Before 1764*, and *Historical Collection of South Sea Voyages*. G.A.S.

DALTON, a town and the county seat of Whitfield County, Georgia, in the northwestern part of the state. It lies among the mountains, near the Costanaula River, in a rich mineral country, and has considerable mining and manufacturing interests. It was the scene of severe fighting between General Sherman and General Johnston in 1864, during the former's march from Chattanooga to Atlanta, and was nearly destroyed by the ravages of war. With the return of peace its prosperity was restored. It is reached by the Southern railroad. Its population was 3,046 in 1890 and 4,315 in 1900. W.F.J.

DALTON, a town of Berkshire County, Massachusetts, among the Berkshire Hills, a few miles north of east from Pittsfield. It has paper-making and other industries, and is reached by the Boston and Albany railroad. Its population was 3,014 in 1900. W.F.J.

DALTON, JOHN CALL, physician and surgeon; was born at Chelmsford, Mass., on February 2, 1825, and was educated at Harvard and Harvard Medical School (1844 and 1847). He was a professor successively in the Buffalo Medical College, the Medical College of Vermont, the Long Island College Hospital in Brooklyn, N. Y., and the College of Physicians and Surgeons in New York. He was one of the foremost physiologists of his time, and wrote a valuable work on *Human Physiology* in 1859. He died on February 12, 1889. W.F.J.

DALTON-IN-FURNESS, England, an iron mining and manufacturing town of the Furness peninsula, Lancashire, 4 miles north of Barrow-in-Furness, on an inlet of Morecambe Bay in the Irish Sea. An abundance of red hematite iron ore in the vicinity promotes its prosperity. The ruins of the ancient Peel of Foundey castle and the fine remains of Furness Abbey are in the neighborhood. Population, 13,350. C.L.S.

DALTONISM OR COLOR-BLINDNESS. See DALTON, JOHN, Vol. VI, p. 691.

DALY, AUGUSTIN, dramatist, was born at Plymouth, N. C., on July 20, 1838, but spent most of his life in New York City. He began as a journalist, and was dramatic critic of *The Courier* and *Enquirer*, but in 1862 adapted and produced a play and thereafter devoted himself to dramatic work. He wrote and adapted many plays, and managed various theatres in New York. He opened Daly's Theatre in 1879, and made it the home of the best plays produced by the best stock company in America. Many leading actors and actresses were trained by him there. He died on June 7, 1899. W.F.J.

DALY, CÉSAR DENIS, a French architect and publicist; born July 19, 1811, at Verdun, France. Early in his career he began architectural study under Jacques Félix Duban, the greatest French architect of his time. At about the same time he became one of the prominent contributors to the *Democratie Pacifique*, a daily journal whose advocacy of the social philosophy of Fourier, and whose staff of brilliant writers won for it great celebrity. M. Daly established, also, what became the foremost of architectural journals, *La Revue de l'Architecture et des Travaux Publics*. This he edited until his death. He visited America in 1855, traveling

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extensively and making archæological and ethnological studies in the United States and in Central America. His most important work in construction was done from 1840 to 1845, during which time he had in charge the restoration of the cathedral of St. Cecilia, at Albi. The most considerable of M. Daly's professional writings is his monumental *Motifs Historiques d'Architecture et de Sculpture d'Ornement*. He died in Paris, in March, 1894.

DALY, CHARLES PATRICK, an American jurist; born in New York, Oct. 31, 1816. He was a clerk, a foremast hand at sea, and a mechanic; but he studied law and was admitted to the bar in 1837. He was a member of the New York Assembly, 1843; was appointed judge of the court of common pleas in 1844, and held the office 42 years, for 27 of which he was chief justice. He was president of the American Geographical Society from 1864 until his death, which took place in North Haven, L. I., Sept. 19, 1899. E.E.T.

DAM. See WATER-SUPPLY, Vol. XXIV, pp. 427–429.

DAMALA, MADAME. See BERNHARDT, ROSINE, in these Supplements.

DAMANHUR, a town in the province of Behere, in Lower Egypt, 36 miles from Alexandria, known to the ancients as Hermopolis Parva. It has large cotton mills. W.F.J.

DAMAR, a town of Yemen, southern Arabia, situated about 120 miles N.N.W. of Aden. It has a college, and is the residence of a governor. It contains about 5,000 houses.

DAMARALAND, a German protectorate in western South Africa, extending along the coast from the Kunene River to Walfish Bay, inland to long. 21° E. It forms the northern part of the German possessions in southwest Africa. The coast is bare and desolate, but inland are richer tracts. The country is occupied by the South-West African Company, an Anglo-German Syndicate, which obtained the right to search for and work the minerals of the district, outside the bounds of the German Southwest African Colonial Company, which holds the right principally for the coast-lands. The country is apparently rich in copper, and in agricultural resources, though as yet undeveloped. The area, including Great Namaqualand, is 32 square miles with a population of 250,000, of which, in 1894, 12,000 were whites. See also AFRICA, in these Supplements.

DAMASTES, historian; born in Greece in the time of Herodotus, and according to Suidas, a disciple of Hellanicos of Leslos. His works included a *History of Greece*, genealogies of the heroes of the Trojan War, and a treatise upon *The Poets and the Sophists*. G.J.H.

DAMBOOL OR DAMBULA, a village of Ceylon, about 40 miles north of Kandy. Its principal feature, for which it is world-renowned, is a vast Buddhist temple, or series of temples, hewn out of the rock in a hillside. This extraordinary shrine was constructed about 100 B. C., and is especially rich in carvings and statuary, some of the rock-hewn figures being of colossal size. There are also some interesting historical inscriptions upon the walls of great antiquity. The temples are said to have been founded by some kings or chieftains of Ceylon, who found in that place a refuge against their foes. W.F.J.

DAME'S VIOLET (*Hesperis*), a genus of plants of the family *Cruciferæ*, of which there are several species, natives chiefly of the middle and south of Europe. The common dame's violet, or white rocket (*H. matronalis*), is cultivated in gardens in the United States. The night-rocket (*H. tristis*) is a favorite flower in Germany.

DAMIEN, JOSEPH DE VEUSTER, FATHER, a Belgian clergyman and missionary; born in Louvain, January 3, 1840. He was a member of the Society of the Sacred Heart of Jesus and Mary, and at twenty-four years of age, while yet a theological student at the university, he received permission to embark for Honolulu, in place of an elder brother belonging to the same order, who was destined for the mission. In 1873, Father Damien first went to Molokai to help the lepers make their Easter duties. He remained at the Molokai colony until leprosy caused his death August 10, 1889. W.M.C.

DAMM, CHRISTIAN TOBIAS, a Greek scholar and theologian; born near Leipsic in 1699. He was rector of the Berlin gymnasium for twenty years (1744–64). His *Homeric and Pindaric Lexicon*, published in 1765, was his principal work. He also translated into German the Homeric poems. Died in 1778.

DAMMUDAH, a river of India, rising in Ramgarh, Bengal, about lat. 23° 55′ N., and long. 84° 53′ E.; pursues a southeasterly course of about 350 miles, and empties into the Hooghly from the right. The valley of the river is rich in deposits of iron and coal. The stream is navigable for light boats through most of its course.

DAMOPHON, of Messene, a Greek artist, who flourished in the fourth century B. C., famous as a sculptor of large images of gods, made partly of marble and partly of wood. In Elis he was charged with the work of restoring the Olympian Zeus, executed by Phidias, but partly ruined in the length of time. Remains of statues of immense size, made by Damophon, were found in 1889 at Lykosura, Arcadia. G.A.S.

DAMPIER ARCHIPELAGO AND STRAIT, named for the noted buccaneer and navigator William Dampier. The archipelago lies off the northwestern coast of Australia, at lat. 21° S., long. 117° E. They are not important or large; they belong to Western Australia. The strait is at the western end of Papua, or New Guinea, and separates it from Waigoe Island, lat. 0°, long. 131° W. It is 35 miles wide and 70 long.

DAMPS, in mining, the name given to the gaseous products eliminated in wells, coal-mines, etc. There are two kinds: *Choke-damp*, mainly composed of carbonic acid, and so called from its extinguishing flame and life; and *fire-damp*, consisting principally of light carburetted hydrogen, and so called from its tendency to explode when mixed with atmospheric air and brought into

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contact with flame. See also COAL, Vol. VI, p. 67.

DAMROSCH, LEOPOLD, a German-American composer, conductor and violinist; born in Posen, Prussia, October 22, 1832. He was graduated from the medical school of the University of Berlin and for several years was a practicing physician. Meanwhile he had arduously studied music, making his *début* as a concert violinist in 1855. He was a pupil of Ries and Dehn and made such favorable progress as a musician that in 1864 he surrendered his profession of physician and started on a concert tour through Germany. He met with great success and on his return to Posen was appointed musical director at the Stadt Theatre. In 1866 he was appointed to a similar post in Breslau. In 1869 he removed to the United States and in 1871 became leader of the Arion Society in New York city. He was the first to introduce German opera in the United States, its presentation being at the New York Metropolitan Opera House in 1884. He was the founder of the New York Oratorio Society and the Symphony Society, of which organizations he remained leader until his death. In 1881 he conducted in the Seventh Regiment Armory the finest musical festival ever held in New York. He died in New York city, February 15, 1885. W.M.C.

DAMROSCH, WALTER JOHANNES, a German-American musical conductor and composer; born in Breslau, Prussia, January 30, 1862. He removed to New York with his father, Leopold Damrosch, and in 1871 became director of the New York Oratorio Society and New York Symphony Society. He succeeded his father as director of German Opera at the Metropolitan Opera House. He was married in 1890 to Margaret, daughter of James G. Blaine (q.v.). He composed the musical score of the opera *The Scarlet Letter*, after Nathaniel Hawthorne's romance, which was produced in Boston with great success. He was the first conductor to produce *Parsifal* in the United States. He also brought out Grell's *Missa Solemnis* and Liszt's *Christus*. W.M.C.

DAMS, SUBMERGED. See IRRIGATION, in these Supplements.

DAMSON (Lt., *damascanum*), a small succulent oval plum originally brought from Damascus, Syria. There are many sub-varieties of different colors—black, dark purple, yellow, bluish, etc. The most popular damsons are the Frogmore, Shropshire and French varieties, which are largely cultivated in the United States. It is highly prized for making preserves. W.R.B.

DAN, a river which rises in the southern part of Virginia, flows into North Carolina, then back into Virginia, and finally empties into the Roanoke River. The city of Danville, Virginia, is situated upon its banks. W.F.J.

DANA, CHARLES ANDERSON, journalist and *littérateur;* was born at Hinsdale, New Hampshire, on August 8, 1819, a member of the same family that produced Justice Dana and the two Richard Henry Danas. He fitted himself for college, studied two years at Harvard, and then entered the Brook Farm community, where he was intimately associated with some of the foremost intellectual leaders of the day, and where his after career was largely determined. He is said to have been the only one in the community who regarded its affairs with practical business sense. After the failure of Brook Farm he entered newspaper work in Boston, and in 1847 became a member of the staff of the New York *Tribune*. There he remained until 1861, being most of the time Horace Greeley's most trusted aid. From 1861 to 1865 he was assistant Secretary of War at Washington, then edited a paper in Chicago for a short time, and in 1868 became editor of the New York *Sun*, in which capacity he won his chief distinction. A man of strong friendships and equally strong animosities, a trenchant writer, and an encyclopædic scholar, he made the *Sun* one of the foremost journals of America. He was engaged in collaboration with George Ripley in much important encyclopædic work, edited a *Household Book of Poetry*, which still ranks among the best collections of English verse, and wrote a *Life of Ulysses S. Grant*. Down to 1868 a strong Republican, he was thereafter, as editor of the *Sun*, an ardent Democrat until 1884, when he became independent of party ties. In 1896 he again supported the Republican party. He died at his home at Dosoris, Long Island, on Oct. 17, 1897. W.F.J.

CHARLES A. DANA.

DANA, EDWARD SALISBURY, mineralogist; born in New Haven, Conn., Nov. 16, 1849; was graduated at Yale University in 1870, and studied at Heidelberg and Vienna. He began his work as an instructor in 1874, being successively tutor in mathematics, assistant professor, and professor of physics. He also became curator of the mineral cabinet and a trustee of the Peabody Museum, and was elected a member of the National Academy of Sciences in 1884. He is the author of *Text Book of Mineralogy* and other mineralogical works. G.J.H.

DANA, JAMES DWIGHT, scientist; was born at Utica, N. Y., on February 12, 1813, and was graduated from Yale College in 1833, where he was a pupil of the elder Silliman. Later he was an assistant to Silliman, then mineralogist and geologist to the Wilkes exploring expedition which was sent by the U. S. government to the South Pacific in 1838–42. The next thirteen years were spent in preparing the reports of this expedition and in other scientific work. He also edited *The American Journal of Science and Arts* which had been founded by Silliman. In 1855 he succeeded Silliman as professor of geology and natural history at Yale, which place he filled for many years, his work there marking an epoch in American scientific instruction and re-

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search. He was elected president of the American Association for the Advancement of Science in 1854, and was elected to membership in many learned societies throughout the world, including the Royal Academies of Sciences in Berlin and Munich, and the geological and Linnæan societies in London. He easily ranked among the foremost geological philosophers of the world, and imparted imperishable distinction to American science and scholarship.

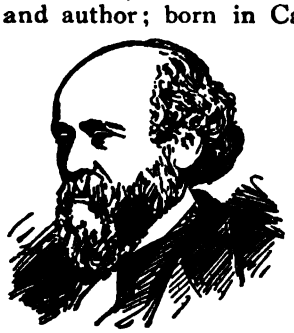
JAMES D. DANA.

He wrote a number of standard works on geology, mineralogy and allied themes, which have been translated and circulated in all countries. Among them are a *Manual of Geology; Text Book of Geology, Corals and Coral Islands; Geological Story Briefly Told*, and *Characteristics of Volcanoes*. He died at New Haven, Conn., on April 14, 1895. W.F.J.

DANA, JOSEPH, an American clergyman; born in Pomfret, Connecticut, November 13, 1742. He was graduated from Yale College in 1760 and was ordained as the minister of the South Society in Ipswich, Massachusetts, November 7, 1765, where he remained for 60 years. Twelve of his occasional sermons were published, one of which was on the death of Washington. On the 60th anniversary of his ordination, at the age of 83, he preached a sermon in which he stated that he had followed about 900 of his parishioners to the grave. He died November 16, 1827. W.M.C.

DANA, JUDAH, jurist and legislator; was born in Massachusetts in 1772, and was graduated from Dartmouth College in 1795. He became a lawyer, was district attorney for Oxford County, Maine, for six years, judge of probate for twenty years, common pleas judge for nine years, one of the authors of the Maine constitution, a member of the State Executive Council in 1834, and U. S. Senator in 1836–37. He died on December 27, 1845. W.F.J.

DANA, RICHARD HENRY, an American lawyer and author; born in Cambridge, Massachusetts, August 1, 1815. He was a son of Richard Henry Dana (q.v., Vol. VI, p. 701). He studied at Harvard, but ill health compelled him to leave college and he shipped as a sailor on the ship *Pilgrim* on a voyage around Cape Horn to the Pacific coast. He detailed his experiences at sea in a volume *Two Years Before the Mast*, which gained wide popularity and remains one of the classics in American literature.



RICHARD H. DANA.

Upon his return he again entered Harvard, graduating in 1837. He then studied law and in 1840 was admitted to the Massachusetts bar. He was active in the formation of the Free Soil party and was a delegate to the Free Soil Convention meeting in Buffalo in 1848. In 1853 he was a member of the Massachusetts Constitutional Convention. In 1858 and 1859 he made a pleasure voyage around the world. In 1860 he was appointed United States attorney for Massachusetts, and in 1867 was elected to the state legislature. He ran for Congress in 1868 but was defeated. In 1876 he was nominated by President Grant United States minister to England, but was rejected by the Senate. He wrote a revision of Wheaton's *International Law*, *The Seaman's Friend*, a manual of laws and customs of the sea; and memoirs of Edward Channing and Washington Allston. Like his father he was a prominent contributor to the *North American Review*. In 1880 he went to Europe to examine into questions of international law. He died in Rome, Italy, January 7, 1882. W.M.C.

DANAO, Philippine Island town on E. coast of Cebú, 4 miles N. of Compostela. Population, 1903, 16,173.

DANBURY, a city of southwestern Connecticut, and one of the capitals of Fairfield County. Danbury is noted chiefly for its manufacture of hats, an industry which has flourished there for more than a century. It has manufactures of sewing-machines, boots and shoes, shirts, etc. There are also iron foundries, extensive waterworks, a town farm for the indigent, a cemetery of remarkable beauty, a high school, several graded schools, and a fine public library. The population of the city in 1890 was 16,552; of the town, including the city, 19,473. In 1900 the population of the city was 16,537; including the town, 19,474. See DANBURY, Vol. VI, p. 702.

DANCE OF DEATH, a certain class of allegorical representations illustrative of the universal power of death, and dating from the fourteenth century. The drama was constructed simply, consisting of short dialogues between Death, portrayed by a skeleton figure, and a number of followers. They were enacted originally in churches, and by religious orders. After a time an illustration was attached to each strophe, and these eventually became the chief point of interest. Being transferred from the quiet convent to more public places, they gave a new impulse to popular art, and series of scenes founded upon the Dance of Death are to be found treated in painting, sculpture and tapestry throughout Europe. The more ancient name was Dance Macabre, a word whose origin has given rise to a great amount of dispute among etymologists.

DANE, NATHAN, an American jurist; born in Ipswich, Mass., in 1752. He graduated at Harvard in 1778; studied law in Salem, Mass., and began to practise in Beverly in 1782. He was a member of the State House of Representatives, 1782–85; delegate to the Continental Congress, 1785–88; member of the State Senate, 1790, 1794,

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1796–98; commissioner to codify the State laws, 1795 and 1812; and member of the Hartford Convention, 1814. He founded the Dane professorship of law at Harvard, stipulating that Judge Story should be its first incumbent. He died in Beverly, Feb. 15, 1835. E.E.T.

DANENHOWER, JOHN WILSON, naval commander and explorer, was born in Chicago on September 30, 1849, and was graduated from the U. S. Naval Academy in 1870. He became an ensign in 1871, a master in 1873, and a lieutenant in 1879. He served on surveying work in the North Pacific in 1873–74, in Hawaii in 1873, and in the Mediterranean in 1877. In 1878 he was sent with the *Jeannette* Arctic exploring expedition, of which he was second in command. Upon the sinking of the vessel he had command of one of the three boats in which the survivors sought to escape, and after a threemonths' march across floating fields of ice succeeded in reaching the Siberian shore in the Lena delta, in September, 1881. He sent forward native messengers to secure aid while he searched for the crews of the other boats. Finally he led his crew 6,000 miles to Orenburg, leaving Melville to continue the quest. He reached America in 1882, published *The Voyage of the Jeannette*, and died on April 20, 1887. W.F.J.

DANIEL, JOHN WARWICK, soldier and Senator, was born at Lynchburg, Virginia, on September 5, 1842, and received an academic education. He entered the "Stonewall Brigade" of the Confederate army in May, 1861, and became General Early's chief of staff, serving until crippled in the Wilderness in May, 1864. Then he studied law at the University of Virginia and engaged in its practice with much success. He served in the Virginia house of delegates in 1869–72, and in the state senate in 1875–81; was a Democratic Presidential elector-at-large in 1876; has been a member of Democratic national conventions since 1880; was candidate for governor in 1881; was a representative in Congress in 1885–86, and in 1887 took his seat as a United States Senator, which he still occupies. He has long been one of the foremost Senators on the Democratic side. He is the author of two notable law treatises, *Daniel on Attachments* and *Daniel on Negotiable Instruments*. He is an impressive orator, and has been much in demand as a public speaker. W.F.J.

JOHN W. DANIEL.

DANIELL'S CELL. See ELECTRICITY, Vol. VIII., p. 87; and ELECTRICITY, §§ 99, 100, in these Supplements.

DANIELSON OR DANIELSONVILLE, a manufacturing town of Windham County, Connecticut, in the northeastern part of the state. It lies on the Quinnebaug River, and is reached by the New England railroad. Its population in 1900 was 2,823. W.F.J.

DANITES, a secret organization among the Mormons, founded in 1838, whose members are believed to have been the authors of the Mountain Meadow massacre in 1857, and to have committed other atrocities. See MORMONS, Vol. XVI, p. 852.

DANKALI OR DANAKIL, a semi-independent state of Abyssinia, extending along the S.W. border of the Red Sea, included in the Italian colony of Eritrea. It is sterile and almost destitute of water. The heat is excessive, often reaching 110°F. The population, about 70,000, is Arabic and Mohammedan; the people are treacherous, indolent, and cruel.

DANNEWIRKE OR DANNEWERK, an ancient Danish wall of defense. See SCHLESWIG, Vol. XXI, p. 432. *The Dannewirke* is a favorite title for Danish newspapers.

D'ANNUNZIO, GABRIELE, Italian poet and novelist; born on the yacht *Irene* in the Adriatic, near Pescara, in 1864; educated at the College of Prato, Tuscany; went to Rome in 1880, but of late years has lived at Chieti. His works are brilliant, but realistic and sensual, and the later ones pessimistic. They include *Primo Vera* (1880); *Terra Vergine; Canto Novo* (1882); *Intermezzo dirime* (1883); *Il Libro delle Vergini* (1884); *San Pantoleone* (1886); *Isotheo; Chimera; Elegie Romana; Poema Paradisiaco; Il Piacere* (1889; in English, "*Pleasure*," 1898); *Marine Odes* (1893); *The Triumph of Death* (1894; English, 1896); *Maidens of the Crag* (1895); and *L'Innocente*.

DANSVILLE, a town of Livingston County, New York, in the western part of the state, on a tributary of the Genesee River. It has considerable industries, and is the site of a large health resort. Its population in 1900 was 3,633. W.F.J.

DANVERS, a town of Essex Co., Mass., 20 miles N. of Boston, on the Boston and Maine railroad; has large factories of shoes, iron, brick, carpets, and lumber, and a state insane asylum. Pop. 1900, 8,542.

DANVILLE, a city, the capital of Vermilion Co., Ill., an important railroad center on the Chicago, Danville and Vincennes, the Paris and Danville, the Wabash, the Indianapolis, Bloomington and Western, and the Evansville, Terre Haute and Chicago railroads; also on the Big Vermilion River; has various factories, also the car and machine shops of the Chicago, Danville and Vincennes railroad; and is engaged largely in the mining and shipment of coal, which crops out in abundant quantities from the bluffs in the immediate vicinity. Pop. 1880, 7,733; in 1890, 11,491; in 1900, 16,354. See DANVILLE, Vol. VI, p. 722.

DANVILLE, a town, the capital of Hendricks Co., Ind., 19 miles W. of Indianapolis, on the Cleveland, Cincinnati, Chicago and St. Louis railroad; has flouring-mills, and factories of wooden articles. Population 1890, 1,569; 1900, 1,802.

DANVILLE, a town and the county seat of Boyle County, Kentucky, near the center of the state. It is in the heart of the best stock-raising region of Kentucky, 75 miles southeast of Louisville and 30 miles south by west of Lexington. It is the seat of several colleges and seminaries, and of a state asylum for the deaf and dumb, and is reached by the Cincinnati Southern railroad. The battle of Perryville on October 8, 1862, was

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fought near the town. Its population was 4,285 in 1900. W.F.J.

DANVILLE, a flourishing city of Pittsylvania County, Virginia, on the Dan River Falls, 65 miles S. of Lynchburg, and is a railroad center. It is estimated that between 30,000,000 and 50,000,000 pounds of tobacco are sold at Danville annually. There are nearly 150 tobacco establishments and three cotton-mills in the city. It is the seat of the Danville Male Academy, the Danville Female Academy, and the Roanoke Female College. Population in 1890, 10,305; in 1900, 16,520.

DANZIG, capital of the province of West Prussia on the Vistula. The old fortifications and bastions which surrounded the inner town were taken down in 1895–96, the trenches filled in and promenades and gardens made on part of the area. A cordon of detached forts were since built for the defence of the harbor. The market hall, post office and railway station are among the new buildings. The industries, in part, are ship building, steel foundries, rolling mills, sugar refineries, flour and oil mills. Pop. 1900, 140,539. See DANTZIC, Vol. VI, p. 720.

DAPHNE, a genus of shrubby plants of the family *Thymeleaceæ*, natives of Europe and Asia, characterized by its very tough bark, entire leaves, salverform or funnelform variously colored flowers in umbel-like lateral or terminal clusters, and brightly colored berries. *D. Mezereum* and *D. Cneorum*, both of Europe, and *D. odora* the "sweet daphne" of China, are in common cultivation. The nearest American representative is the allied genus *Dirca*, known as "leatherwood" or "moose-wood."

DAPHNIA. See CRUSTACEA, VI, 568, 587.

DAPONTE, LORENZO, an Italian composer of librettos; born at Ceneda, Venice, March 10, 1749. He went from Treviso, where he held a professorship at a seminary, to Venice, Gôrz, Dresden, and settled at Vienna. He wrote librettos for Salieri, Martini and Mozart, of which those of *The Marriage of Figaro* and of *Don Juan* obtained the greatest fame. He left Vienna for Triest, London, and New York. In the latter city he, in 1878, became professor of Italian at the Columbia College, and died Aug. 17, 1838. Besides 34 dramatic pieces and opera librettos he also published his *Memoirs* (1823–27). G.A.S.

DARAGUNJ, an Indian town in the Northwest Provinces, opposite Allahabad, and connected with it by a ferry across the Ganges.

DARBUNG, a mountain torrent of Bussaher, Hindustan. It rises in the Himalaya Mountains, 15,000 feet above sea-level, and, after flowing for twenty-seven miles, is lost in the Sutlej, the most easterly of the five rivers of the Punjab. A wooden bridge about thirty-three feet in length crosses this river about seven miles above its junction with the Sutlej, at a descent of 6,000 feet from its source, the banks of the river still farther up being bordered by several villages. Its source, which consists of fields of snow and ice half concealed beneath stones and rubbish, is described as a scene of terrific desolation.

DARBY, JOHN NELSON, an English theologian; and DARBYITES, a sect, his followers. See PLYMOUTH BRETHREN, Vol. XIX, pp. 250, 251.

DARBY CARBONIZING PROCESS. See IRON AND STEEL, in these Supplements.

D'ARCET, JEAN PIERRE JOSEPH, a French chemist; born in Paris, Aug. 31, 1777, the son of Jean D'Arcet, director of the porcelain manufactory at Sèvres; died Aug. 2, 1844. He introduced many innovations in manufacturing gunpowder, steel and bronze wares. He first brought into use bone-dust as a fertilizer, and in 1802, discovered boiling sulphuric acid to be a medium for separating gold from silver. G.A.S.

DARDANELLE, a town and county seat of Yell County, Arkansas, is reached by the St. Louis and Iron Mountain railroad. Its population was 1,602 in 1900. W.F.J.

DARDANELLES, a town of the Turkish province of Bigha Asia Minor, situated at the Ægean extremity of the Dardanelles Strait where it is but one mile between the continents of Europe and Asia. It commands the approach to Constantinople from the Mediterranean. Pop. 1901, 13,000. See DARDANELLES, VI, 724.

DARIEN SCHEME. See PATERSON, WILLIAM, Vol. XVIII, pp. 364, 365.

DARK AGES (476–918 A.D.). A period in European history beginning with the fall of the Roman Empire, in 476 A.D., down to that of the consolidation of the German monarchy under Henry I., "the Fowler," the first of the Saxon line of the kings of Germany and emperors of the Holy Roman Empire, in 919 A.D. In English history, it is the era when Saxon supremacy was firmly established and the feudal system had its beginning. Some historians speak of the era of the "Dark Ages" as synonymous with that of the "Middle Ages," extending the period from 476 A.D. to the close of the 15th century, with the invention of printing, the revival of learning in Europe, and the discovery of America. The era cannot be rigidly put within limits, though we should hardly place the close of the "Dark Ages" beyond the 13th century—the era which saw the rise of modern towns and the germ of political freedom in municipal institutions, the result of a reaction and protest against feudal violence and papal tyranny. For the transition period between the Middle Ages and modern times, see RENAISSANCE, Vol. XX, p. 392.

DARLEY, FELIX OCTAVIUS CARR, artist, was born in Philadelphia, Penn., on June 23, 1822, and in boyhood showed much artistic ability. His first published work was a series of sketches of city street scenes, for a local periodical. In 1848 he removed to New York, where he made illustrations for Irving's *Sketch Book*, *Dietrich Knickerbocker's History of New York*, *Legend of Sleepy Hollow*, *Rip Van Winkle*, and other works. He also illustrated Hawthorne's *Scarlet Letter*, Longfellow's *Evangeline*, *Courtship of Miles Standish*, etc., and some of Cooper's and Dickens's novels. He was the author of *Sketches Abroad with Pen and Pencil*. His best work

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was done in illustrating Judd's novel, *Margaret*, work widely recognized throughout the world as of surpassing excellence. Some of his pictures have been used for the adornment of United States bonds and bank notes. He died at Claymont, Delaware, on March 27, 1888. W.F.J.

DARLING, a river of New South Wales, southwestern Australia, formed by the confluence of a number of rivers in the northern part of the colony, flows southwest for 600 miles and enters the Murray at about lat. 34° S., and long. 142° E.

DARLING, GRACE, life-saving heroine; was born at Bamborough, England, on November 24, 1815, the daughter of William Darling, lighthouse keeper on Longstone Island. On September 7, 1838, the ship *Forfarshire*, with 63 persons aboard, went ashore on Harker's Rock. Forty-three lives were lost before the wreck was seen. Then Darling and his daughter, with marvelous skill and daring, put out in a small boat through a raging storm and rescued the survivors. This exploit made Grace famous, but she died of consumption on October 20, 1842. W.F.J.

DARLINGTON, a town and the capital of Darlington County, northeastern South Carolina, 93 miles E.N.E. of Columbia, on the Atlantic coast line. It has a large trade in cotton, shipping annually twenty thousand bales, and also manufactures cotton goods. Population 1900, 3,028.

DARLINGTON, a city and the county seat of Lafayette County, Wisconsin, in the western part of the "southern tier" of that state. It lies on the Pecatonica River, a tributary of Rock River, in a rich agricultural and cattle country, and has considerable manufacturing industries and an extensive commerce. Other interests are mineral springs, which have given rise to a large health resort, and fresh water pearl fisheries. It is reached by the Chicago, Milwaukee and St. Paul railroad, about 130 miles northwest of Chicago. Its population was 1,808 in 1900. W.F.J.

DARLINGTON, WILLIAM, an American botanist and politician; born in Birmingham, Pa., April 28, 1782. He spent his early life on a farm, studied medicine, and graduated at Pennsylvania University in 1804. In 1806–07 he voyaged to the East Indies as ship's surgeon, and on his return practised at West Chester, Pa., for several years. He raised a company of volunteers in 1812; was major of a regiment in 1814; sat in the United States House of Representatives, 1815–17 and 1819–23; and in 1826 established a botanical society in West Chester, in which city he died, April 23, 1863. E.E.T.

DARLINGTONIA, a genus of Californian plants of the family *Sarraceniaceæ*, being the Pacific coast representative of the Sarracenias, or pitcher-plants of the Atlantic region. The single species known (*D. Californica*) has the habit of the Sarracenias, growing in boggy ground, with a radical rosette of pitcher-like leaves, from the center of which rises the long scape bearing a single large nodding flower. The "pitchers" are the largest and among the most elaborate to be found in the family. The funnel-shaped tube rises with a spiral twist, becomes enlarged at the summit into the inflated over-arching dome which comes down over the rim of the pitcher, and terminates in a gaudily colored fish-tail appendage. Within the pitcher are numerous downwardly pointing hairs, to prevent the escape of the entrapped insects, and an accumulation of a sweetish liquid, in which they are drowned and macerated. Honey-like secretions upon the outside of the pitcher and upon the fish-tail appendage serve as a lure to the rim of the pitcher, within which a glazed zone usually insures a fall into the liquid, and the retrorse hairs prevent an escape. So far as known, the bodies thus obtained are macerated merely for absorption, and not subjected to the action of a digestive fluid, as in certain other carnivorous plants. The pitchers of *Darlingtonia* are two or three feet high, and form one of the most complete insect-traps known. See INSECTIVOROUS PLANTS, Vol. XIII, p. 145.

DARMESTETER, ARSÈNE, a French philologist and classical scholar; born in Paris, Jan. 5, 1846. Having undertaken studies anticipatory to the duties of a Jewish rabbi, he became deeply interested in philology, and determined to make that his life-work. His studies with Paris, the eminent French philologist, began in 1867. A few years later he had won the recognition of contemporary philologists, and had become a prominent authority upon the philology of the Romance languages. Solely to him is credit due for demonstration of the great importance of certain Old French glosses upon Hebrew words in determining the precise character of eleventh-century French. His dictionary of the French language, begun in association with M. Hatzfeld in 1871, is a monumental work of great value to philologists. In 1877 he published *Concerning the Actual Creation of New Words in the French Language*, and, a year later, *View of French Literature in the Sixteenth Century*. At the time of his death, which occurred Nov. 7, 1888, he had but just reached what promised to be the most important period of his work.

DARMESTETER, JAMES, a French Orientalist, brother of the preceding; born March 28, 1849, at Château-Salins, studied in Paris comparative philology, theology, and Old Persian in particular. In 1885 he became professor at the Collège de France. He published *Harvatât et Ameratât* (1875); *Essais Orientaux* (1883); *Le Mahdi* (1885); *Études Iraniennes* (1883); *Les Origines de la Poésie Persane* (1887). After his death, Oct. 19, 1894, at Maisons-Lafitte, appeared a complete translation of the *Zend-Avesta* (1902–03), his chief work, which obtained the grand prize by the Institute de France. G.A.S.

DARNEL, the common name of *Lolium temulentum*, a pasture-grass introduced into the United States from Europe. It grows one or two feet high, with a loose spike of spikelets placed edgewise. It also is called "rye-grass" or "ray-grass," and, frequently being associated with wheat, its grains were supposed once to render the flour injurious.

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DARTER. See SNAKE-BIRD, Vol. XXII, p. 198.

DARTER-FISH, the *Toxotes jaculator*, of the East Indies, supposed to capture insects on overhanging shrubbery by squirting water upon them; also applied to some perches. R.W.C.

DARTMOOR, a granitic upland in Devonshire, England, the source, with two exceptions, of all the principal rivers of the county, remarkable alike for its wild and rugged scenery, its antiquities, its wide, solitary, trackless wastes, and its mineral products. To the brief notices found under DEVONSHIRE, Vol. VII, pp. 120, 121, the addition of more particulars of Dartmoor is desirable, visited as its rugged wilds are by tourists, and favorite subject as its bold scenery has been for the brush of many an artist.

The moor proper is upward of 130,000 acres, or 203 square miles, in extent, the extreme length from north to east being 25 miles, and the extreme breadth from east to west, 20 miles. The outline is irregular, and the surface has been well described as an extensive knob of granite covered by a peaty sponge. Its higher ranges are bleak and barren, but it has some pretty wooded valleys, through which run numerous streams, all well stocked with trout. The characteristic features of Dartmoor, however, and what give to it the chief interest, particularly for the antiquary and archæologist, are its many "tors," or huge blocks of granite, crowning the hills, its "maenhirs," its stone circles and its prehistoric villages, all walled around against wolves. Over the East Dart a rude cyclopean bridge still stands. Antiquaries attribute it to Celtic days, and its structure is such that the scythed chariots of Damnonian warriors might pass the river in safety. Near by is Crockern Tor, where the Stannary Parliament was wont to meet in the open air, until the middle of the last century. Kistvaens, or stone tombs of prehistoric days, are numerous, and Druidical circles are scattered over the moorland. In the most desolate part of the moor is Foxtor-mires, a treacherous morass, in which perished the only convict who has succeeded in escaping from the prison of Prince Town. This last was erected in 1808, at a cost of $635,000, as a place of confinement for prisoners of war. With peace, it was converted into a naphtha factory, but on the cessation of penal transportation it was reclaimed by government and employed as a convict station. Two strong walls inclose a circular area of about thirty acres, on which are built the prisons and offices. They are constructed of large blocks of stone, and radiate from a center. Four of the buildings (each 300 feet long and 50 feet wide) are used as prisons. Upward of 120 acres in the neighborhood are cultivated by the prisoners, and produce barley, oats, flax, carrots and mangold-wurzel.

A little to the west of Prince Town lie the enormous Dartmoor quarries, connected with Plymouth by the Plymouth and Dartmoor railway, and worked by convict labor from the neighboring prison.

The chief drawback to haphazard traveling over Dartmoor is the rough character of its upper parts. No one whose aim is enjoyment should attempt to cross by any but the beaten tracks, except in clear and dry weather.

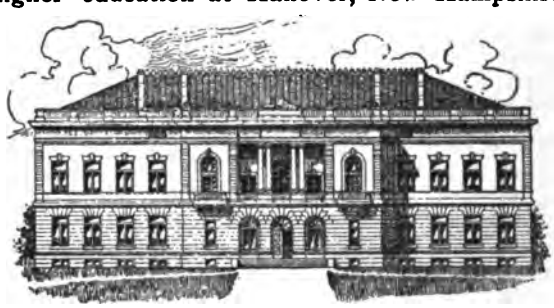
Tavistock, Lidford, with its fabled prototype of lynch law, whereof Browne, the Tavistock poet, wrote:

> I 've ofttimes heard of Lydford law,
> How in the morn they hang and draw,
> And sit in judgment after.

Moreton Hampstead, Bovey Tracey with a church full of quaint epitaphs of Anglican martyrs, Holne, Ashburton and Ivy Bridge are old-fashioned and curious towns around the moor, much frequented by tourists seeking picturesque repose. Dartmoor sheep are a small, hardy race, wild and restless, whose original home is in the forest and heathlands of Devonshire and Cornwall. In size they are small, their average weight on killing being about eleven pounds per quarter. Their mutton is highly esteemed for its flavor, and commands a ready sale. Their wool is soft and long, but of little bulk. They feed upon pasture too poor for the sustenance of other sheep, have white faces and legs, and when the ewes are crossed with Leicesters, heavy lambs are produced. A meteorological station is maintained on Lee Moor at an altitude of 860 feet above sea-level. The mean annual rainfall from 1866 to 1880 was seventy inches. The moor is often used for army maneuvers and artillery practice. Rowe's *Perambulation of Dartmoor* (1895) and Page's *Dartmoor* and *Rivers of Devon* (1895) contain valuable information.

DARTMOUTH, a town of Nova Scotia, connected by ferry with Halifax. It contains a number of manufactories, three tanneries, a provincial lunatic asylum and many handsome residences. Population 1891, 6,252; 1901, 4,806.

DARTMOUTH COLLEGE, an institution of higher education at Hanover, New Hampshire.



BUTTERFIELD MUSEUM, DARTMOUTH COLLEGE.

Its buildings stand upon the banks of the Connecticut River, amid beautiful surroundings. Save Harvard, Yale and Brown, Dartmouth is the oldest of the New England colleges. Moore's Indian Charity School, named for its benefactor, Joshua Moore, was established at Lebanon, Connecticut, Dec. 18, 1754, by Eleazer Wheelock, and out of it grew Dartmouth College. One Samson Occum, an Indian preacher who made a tour of England in 1865, was the means of arousing great interest in this school, and a sum of £10,000 was raised there for its benefit. At this time the first

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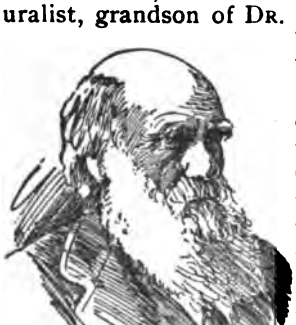
board of trustees was elected, and the Earl of Dartmouth, who had taken keen interest in the enterprise, was chosen its president. The college was named in his honor. It was not, however, called a college until its removal, in 1865, into the township of Hanover, in the province of New Hampshire. The attendance was then about equally divided between Indian and English youths. The charter of the institution was given by Governor John Wentworth, in the name of King George III, Dec. 13, 1769. The college, whose early patrons were mostly in Great Britain, suffered keenly during the War of the Revolution, but it held its own and slowly regained prosperity. In 1816 the state legislature passed an act to change the name to "Dartmouth University," and to put the institution under state control. Out of this legislation grew the notable Dartmouth case, tried before the supreme court of the United States, and argued by Daniel Webster, who won the case for his *alma mater*. The old board of trustees was completely upheld in its maintenance of the sacredness of a private corporation, and its right to non-interference on the part of the state. The "university" was annulled and the former order of things resumed.

Dartmouth has become one of the foremost of institutions of higher education in the Eastern states, and is regarded as typical of the old-fashioned New England college. The religious tone is high, although the institution is non-sectarian. Associated with Dartmouth are the New Hampshire Medical School, the Chandler Scientific School, the Thayer Engineering School and the New Hampshire College of Agriculture and Mechanic Arts. Students in attendance in 1904, 963; instructors, 92; volumes in library, 100,000. The presidency of the college has been held as follows: Eleazer Wheelock, 1769–79; John Wheelock, 1779–1815; Francis Brown, 1815–20; Daniel Dana, 1820–21; Bennett Tyler, 1821–28; Nathan Lord, 1828–63; Asa Dodge Smith, 1863–77; Samuel Colcord Bartlett, 1877–92; William Jewett Tucker, 1893.

DARWIN, CHARLES ROBERT, an English naturalist, grandson of DR. ERASMUS DARWIN (q. v., Vol. VI, p. 730) was born at Shrewsbury, Feb. 12, 1809. He was educated at Edinburgh University, and at Christ's College, Cambridge. It was at the latter institution that his biological studies seriously began. On Dec. 27, 1831, shortly after taking his degree of B.A., he was appointed through the influence of Prof. J. S. Henslow of Cambridge, his instructor in botany, naturalist to the expedition of H.M.S. *Beagle* for a hydrographical survey of South American waters. He returned to England Oct. 2, 1836. It was during this long expedition that he obtained that intimate knowledge of the fauna, flora, and geological conditions of many tropical, subtropical and temperate climates which so admirably equipped him for the great work he was afterward to perform. On his return he formed the friendship of several scientific leaders, through whose influence he was appointed, in 1838, secretary of the Geological Society. In the next year he was elected to the Royal Society, and married his cousin, Miss Wedgewood. In the same year he published *Journal of Researches Into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle.* From 1840 to 1843 Darwin was occupied with the publication of the *Zoölogy of the Voyage of the Beagle.* In 1842 appeared his work on *The Structure and Distribution of Coral Reefs;* in 1844, *Geological Observations on Volcanic Islands;* and in 1846, *Geological Observations on South America.* These placed him at once in the front rank of contemporary scientific thinkers. Three years after his marriage, Darwin settled at Down, in Kent, where the remainder of his life was passed, private means enabling him to devote himself unremittingly to the pursuit of science. In 1858, Darwin set to work seriously to condense his vast mass of notes, and put into shape his great work, *The Origin of Species by Means of Natural Selection*, published in November, 1859. This book (see VARIATION, Vol. XXIV, pp 85, 86), written in a style straightforward, and of charming simplicity, yet whose sensational theories represented the farthest reach of scientific knowledge, at once aroused a storm of controversy as no book of its kind has ever done. Its effect was widespread and profound. Darwin, meanwhile, calmly continued the work, in which he had shown the genius of patience and insight. In his subsequent publications he maintained, throughout a bitter theological and scientific warfare, the undisturbed serenity characteristic of the simple seeker after truth. No personal element finds place in his writings. The great series of works supplemental to *The Origin of Species* includes, besides his scarcely less famous *Descent of Man, The Fertilization of Orchids; Insectivorous Plants; Earthworms; Expression of Emotions in Man and Animals;* and *Cross and Self Fertilization in the Vegetable Kingdom.* It is as the great leader of evolutionary biology that Darwin will mainly be remembered. Though not himself the originator of the hypothesis, he was undoubtedly the first to gain for it acceptance among biological experts. He died April 19, 1882, and was buried with unusual honors in Westminster Abbey.



CHARLES DARWIN.

The article on TIDES, in this ENCYCLOPÆDIA, was written by Mr. Darwin's son, George Howard.

DARWIN, ERASMUS, English naturalist and poet; born Dec. 12, 1731, at Elton; died April 18, 1807. His chief work on natural history is *Zoonomia, or the Laws of Organic Life.* As a poet he is known by *The Temple of Nature.* G.A.S.

DARWIN, FRANCIS, an English botanist; son of Charles Robert Darwin; born at Down, Kent, England, Aug. 16, 1848. He studied at Cam-

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bridge and became professor of botany at the University of Cambridge in 1888. He assisted his father in the editing of his work, *The Power of Movements in Plants* (1880 and 1881). He also wrote treatises on physiological botany, and in conjunction with Acton *Practical Physiology of Plants* (1894). G.A.S.

DARWIN, GEORGE HOWARD, an English scientist, the eldest son of Charles Robert Darwin, was born in 1845. He graduated from Trinity College in 1868, and in 1870 took part in the eclipse expedition to Sicily. He became a fellow of the Royal Society in 1879, and after that time his labors mainly were directed to investigation in physical astronomy. In 1882 he assisted in the revision of Thompson and Tait's *Natural Philosophy*. He became Plumian professor of astronomy and experimental philosophy at Cambridge in 1883. Besides numerous contributions to scientific journals, he has published *On the Influence of Geological Changes on the Earth's Axis of Rotation; On the Remote History of the Earth;* and *On Tides* (1898).

DARWINISM. See EVOLUTION, Vol. VIII, p. 673; and SOCIALISM, Vol. XXII, p. 230.

DASENT, SIR GEORGE WEBBE, an English author; born May 20, 1820, at St. Vincent, in the West Indies, of which island his father was attorney-general; was educated at Westminster School and King's College, London, and at Magdalen College, Oxford; called to the bar at the Middle Temple in 1852. An accomplished linguist, he acted frequently as examiner in English and modern languages for civil service appointments. In 1870–92 he was a civil service commissioner. In 1876 he was knighted for his services. He published a translation of *The Prose, or Younger Edda* (1842); *The Norseman in Iceland* (1858); *Popular Tales from the Norse* (1859); and *Tales from the Fjeld* (1874), both from the Norwegian of Asbjörnsen; translations from the Icelandic of the *Saga of Burnt Njal* (1861) and the *Story of Gisli, the Outlaw* (1866). His introduction to Asbjörnsen's *Popular Tales* is an admirable exposition of the Aryan theory of story transmission. His novels include *Annals of an Eventful Life; Three to One; Vikings of the Baltic;* and *Half a Life.* He died at Ascot, June 11, 1896.

DASYA, a genus of usually filamentous branching Red Algæ. Certain characteristic branches give rise to the *tetraspores*, or reproductive bodies. The species are numerous, brightly colored, and largely of tropical seas, but *D. elegans* is a common species of the Atlantic coast of the United States.

DASYPODIDÆ. See MAMMALIA, Vol. XV, pp, 389 et seq.

DASYURIDÆ. See MAMMALIA, Vol. XV, pp. 382–384.

DATAMES, a Persian general who successfully quelled a confederate revolt, but, subsequently losing favor with Artaxerxes, himself revolted, was betrayed and assassinated, 362 B.C. See PERSIA, Vol. XVIII, p. 590.

DATE-PLUM, a name given to species of *Diospysos*, a genus of plants of the family *Ebenaceæ*. The trees are deciduous, with a globose berry, and grow in a warm or temperate climate. Some species produce ironwood, which is a hard timber, and the blackheart-wood of others is ebony (q.v., Vol. VII, p. 535). The common date-plum, or pishamin, although a native of the coasts of the Caspian Sea, Mauritania, etc., is naturalized and cultivated in southern Europe, and also is called the European lotus and the date of Trebizond. It is a tree growing from 20 to 40 feet high, having shining oblong leaves; the small flowers are reddish white; the fruit, usually the size of a cherry, grows larger in favorable climates, and is then sweet and astringent, and yellow in color. When over-ripe it is eaten, like the medlar, or is used for conserves. One species (*D. Virginiana*), known as the persimmon, or Virginia date-plum, is found throughout the Atlantic and Mississippi valley states, and bears an edible fruit of a reddish color.

DATHOLITE. See MINERALOGY, Vol. XVI, p. 426.

DATIA, a city of central India, capital of a state of the same name. Its population is less than 30,000. W.F.J.

DATISCACEÆ, a small family of plants, allied to *Begoniaceæ*, and consisting of herbs and trees, mostly found in the temperate regions of the northern hemisphere. *Datisca cannabina*, a plant much resembling hemp in its general appearance, a native of Crete, possesses very marked tonic properties. It contains, also, an amylaceous substance, called *datiscin*, resembling *inulin*, and affords a yellow dye.

DATURA, a genus of plants of the family *Solanaceæ*, known as "thorn-apples," or "stramoniums," rank-scented, large-flowered, poisonous weeds, but some in cultivation for ornament. It is characterized by its prismatic calyx, large plaited funnelform corolla, often prickly, globular pods, and large flat seeds. *D. Stramonium*, the common thorn-apple or "Jamestown-weed" (corrupted into "jimson") with green stems and white flowers, and its associate, *D. Tatula*, with purple stem and flowers, are common weeds in waste places in the United States. *D. metel* and *D. meteloides*, and the tropical tree-like shrubs *D. arborea*, and *D. suaveolens*, are cultivated for ornament.

DAUBER, a wasp of the family *Sphegidæ* and genus *Pelopæus*, so named because its nests of mud, which consist of several cells, look like dabs of mud. R.W.C.

DAUBIGNY, CHARLES FRANÇOIS, was born in Paris in 1817, the son of a miniature-painter, and studied under his father, Paul Delaroche, and others. In 1838 he began to exhibit at the Salon, and for many years ranked among the foremost landscape painters of France, his work being notable for its fidelity to nature as well as for its originality of treatment. He had many pupils and imitators, and was practically the founder of a new school of landscape art. He won a first-class medal at the Salon in 1853 with his *Pool of Gylien*. Among his best works are *Springtime; The Banks of the Oise; Windmills at Dord-*

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recht; The Rising Moon, and *Vintage*. Many of his masterpieces are in the Luxembourg and other public galleries, including public and private collections in the United States, where he has always been a great favorite. The French government purchased many of his works. He was also an eminently successful etcher and book illustrator, often producing his plates directly from nature in a style of exquisite freedom and spirit. He died on February 19, 1878.

W.F.J.

DAUDET, ALPHONSE, a French dramatist and novelist; born at Nîmes, May 13, 1840, and educated at the Lyons Lycée. In 1857 he went to Paris, where, in 1864, he became secretary to the Comte de Morny, president of the legislative corps. His literary efforts began with poetry, and his first book, *Les Amoureuses* (1858), immediately gained for him a reputation, and led to his employment on several newspapers. In *Figaro* appeared soon afterward *Les Gueux de Province*, in which he depicted with fidelity the miseries of the ushers in provincial schools. He devoted some not too successful years to theatrical work, writing, by himself or in collaboration, *La Dernière Idole* (1862); *L'Œillet Blanc* (1865); *Le Frère Aîné* (1868); *Le Sacrifice* (1869); *Lise Tavernier;* and *L'Arlésienne* (1872). Some of his best work appeared in journals, especially in *Figaro*, including *Lettres de Mon Moulin* (collected 1869); *Tartarin de Tarascon* (1872); the *Contes du Lundi* (1873); and *Robert Helmont* (1874). It was not till about 1874 that he adopted the style which made him famous. He sketched something of the kind in *Le Petit Chose* (1868), a story founded on his own childhood; and the publication of *Fromont Jeune et Risler Aîné* (1874) established his reputation. These were followed by *Jack*, the story of a workman (1876); *Le Nabab* (1877), a caricature of well-known personages under the empire; *Les Rois en Exil* (1879); *Numa Roumestan* (1882); *L'Évangéliste* (1883); *Sapho* (1884); *L'Immortel* (1888); *Souvenirs d'un Homme de Lettres* (1888); *Port-Tarascon* (1890); *Rose et Ninette* (1892); *La Petite Paroisse* (1895); and *Soutien de Famille* (1896). Died in Paris, Dec. 16, 1897.

ALPHONSE DAUDET.

DAUDET, ERNEST, a French politician, publicist, and novelist, brother of Alphonse Daudet, was born at Nîmes, France, May 31, 1837, and removed to Paris in 1857. For a time, with his brother, in the employment of Comte de Morny, he became successively president of the Legislative Assembly, editorial secretary of the proceedings of the Assembly, and chief clerk of the Senate. While occupying these positions he was a constant contributor to various journals, and in 1873 was appointed director of the *Journal Officiel*. In 1877 he became editor of *L'Estafette*. He is author of numerous novels, of works on the political questions of the day, and some of his later works have dealt with matters of history. *L'Histoire des Conspirations Royalistes du Midi sous la Révolution* (1881) was crowned by the French Academy, and a prize was granted to the author on its account. He also wrote the following noteworthy novels: *Jean le Gueux; La Carmelite;* and *Henriette. Histoire de la Restauration* and *Les Bourbons et la Russie pendant la Révolution Française* are others of his important historical productions. He received the cross of the Legion of Honor in 1868.

DAUGHTERS OF THE AMERICAN REVOLUTION. See COLONIAL SOCIETIES, in these Supplements.

DAUGHTERS OF THE REVOLUTION. See COLONIAL SOCIETIES, in these Supplements.

DAUNOU, PIERRE CLAUDE FRANÇOIS, a French author and statesman; born Aug. 18, 1761, at Boulogne-sur-Mer; died in Paris, June 20, 1840. In the national convention of 1792 he opposed extreme measures against Louis XVI. From 1804–16 he held important public offices, but lost them by the Restauration. Reinstated by the Revolution of 1830, he resigned from the professorship of history at the Collége de France. His chief work is *Cours d'Études Historiques* (20 vols., 1842–49).

G.A.S.

DAVENPORT, a flourishing city of eastern Iowa, and capital of Scott County, on the Chicago, Rock Island and Pacific railroad, and is the southern terminus of the Davenport and St. Paul railroad. It is connected with eastern cities by other railroads terminating on the opposite or eastern bank of the Mississippi River. The western terminus of the Hennepin canal, connecting the Mississippi River with the Great Lakes, is opposite Davenport. It has extensive manufactories of carriages, farming implements, woolen goods, cars, furniture, lumber, flour, etc., the census of 1900 showing 416 manufacturing establishments, having an aggregate capital of $10,774,707, and producing annually nearly $12,000,000 worth of finished products. It has numerous excellent schools, the Catholic Seminary of St. Charles Borromeo, a well-endowed Catholic hospital, and a large public library. It is also the seat of Griswold College (Protestant Episcopal), which was founded in 1859, and is the see of the Episcopal Church of Iowa. On the other side of the river, opposite the city, is Rock Island, a beautiful island several miles in length, owned by the United States government. Rock Island is the site of a United States arsenal and military headquarters, and is connected with Davenport by a notable wrought-iron bridge costing over a million dollars. Population of Davenport in 1890, 26,872; 1900, 35,254. See DAVENPORT, Vol. VI, p. 736.

DAVENPORT, EDGAR LOOMIS, actor; born in Boston, Mass., Nov. 15, 1816. He made his *début* as an actor in Providence, R. I., in 1836, as *Wellborn* in *A New Way to Pay Old Debts*, and for ten years afterward was a valued member of the stock companies of Boston theaters. In 1847 he supported Anna Cora Mowatt during a tour in England, and afterward supported Mac-

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ready for two seasons. He married Fanny Vining, who became a favorite actress. For many years he was a successful star, showing great versatility and much excellence in all his parts. He died Sept. 1, 1877. G.J.H.

DAVENPORT, Fanny Lily Gipsy, actress; was born in London, England, on April 10, 1850, the daughter of Edward L. Davenport, an eminent actor. She made her first stage appearance in a child's part in *Metamora* in Boston. Her first speaking part was at Burton's Theater, New York, in 1857, and her *début* as an adult actress was made at Niblo's, New York, in 1862. After playing a variety of parts she became the leading lady of Augustin Daly's stock company in New York, in 1869, playing chiefly in the standard English comedies, some Shakespearean parts, and some French adaptations. Later she made many tours of America and of England, with great success, and for years was esteemed one of the foremost American actresses. She gave memorable performances of *Nancy Sykes* in *Oliver Twist*, and of *Fédora* in Sardou's drama of that name. She introduced several of Sardou's plays to the American public. Her second husband, Melbourne McDowell, was with her in many plays. She died on September 26, 1898. W.F.J.

FANNY DAVENPORT.

DAVENPORT, John, an American pioneer clergyman; born in Coventry, England, in 1597. He was educated at Oxford, and became an eminent preacher among the London Puritans. His Nonconformist tendencies brought him into conflict with Archbishop Laud, and he resigned his benefice and retired to Holland, where he spent about two years, returning then to London, where a letter from John Cotton induced him to sail for Boston, where he arrived June 26, 1637. On March 30, 1638, he sailed with a company for Quinnipiac (New Haven) to found a new colony. He was minister there for 30 years, and established a system of civil polity which was based on Scriptural rules and the supremacy of the Church. He sheltered the regicides, and when John Wilson, the pastor of the church at Boston, died in 1667, he succeeded him. He died in Boston, Mass., March 15, 1670. E.E.T.

DAVID, a city of the Republic of Panama, about 200 miles west of the city of Panama, and near the northeastern end of David Bay, an indentation of the Pacific coast. It lies at the southern foot of the Cordilleras of Chiriqui, and has some mines of gold and other metals. Its population in 1900 was about 10,000. W.F.J.

DAVID CITY, the capital of Butler County, central eastern Nebraska, 63 miles W. of Omaha, and a railroad center of importance. It is on the Burlington and Missouri River, the Fremont, E'khorn and Missouri Valley and the Union Pacific railroads. It is employed principally in the shipping of grain and stock raised in the neighborhood, but it also has manufactories of importance. Population 1890, 2,028; 1900, 1,845.

DAVID I and DAVID II, kings of Scotland See Scotland, Vol. XXI, pp. 504, 511.

DAVIDS, Thomas William Rhys, a British Orientalist; born at Colchester, May 12, 1843, and educated at the University of Breslau. He has held various appointments in Ceylon. His works include *Buddhism* (1878); a *Translation of the Fausböll Collection of Buddhist Birth-Stories* (1880); *Buddhist Suttas from the Pâli* (1881); and *The Question of King Milanda* (1890). He is professor of Páli and Buddhist literature at University College, London.

DAVIDSON, George, an American geodesist, engineer and astronomer; born in Nottingham, England, May 9, 1825. He removed to the United States with his parents in 1832 and was graduated from the Central High School, Philadelphia, in 1845. He then joined the United States Coast Survey and was chief engineer of a party which surveyed a ship canal route across the Isthmus of Darien. He also made a geographical survey of the coast of Alaska, and traveled in Egypt, China, India and Europe, for scientific study. From 1877 to 1884 he was regent of the University of California, and was president of the California Academy of Sciences. In 1895 he retired from the Coast Survey and became professor of geography in the University of California. He is the author of numerous works on irrigation, harbor and river improvements, transit observations, transit instruments, and the *Coast Pilot of California, Oregon, and Washington*. He has also invented chronometers, a meridian instrument for latitude and time, and various astronomical instruments. W.M.C.

DAVIDSON, John, a Scottish poet; born April 11, 1857, at Barhead, Renfrewshire, Scotland. His youth was largely spent in the chemical department of a sugar-refinery. For several years he was a teacher in small Scottish towns, and in 1890 went to London, where he engaged in journalism and authorship. His best-known volume of verse is *Scaramouch in Naxos*. Others of his works are *A Random Itinerary; A Romantic Farce; An Unhistorical Pastoral; Fleet-Street Eclogues; Plays, Collected Edition; Godfrida* (a drama, 1898); and *The Last Ballad, and Other Poems* (1899).

DAVIDSON, Robert, educator, was born at Elkton, Maryland, in 1750, and was educated at and taught at Newark Academy, Delaware. He became professor of history in the University of Pennsylvania, in 1774, and ten years later settled at Carlisle, Penn., as pastor of a Presbyterian Church. The next year he became professor of history in and vice-president of Dickinson College, and from 1804 to 1809 was president of that institution. He was successful as an educator and administrator, and was much esteemed as a preacher. He wrote a metrical version of the Psalms and some other works, and was noted as a linguist, having at his command no fewer than eight lan-

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guages. He was also an expert astronomer and the inventor of a cosmosphere or compound globe, and was a musician and artist. He died at Carlisle in 1812. W.F.J.

DAVIDSON, SAMUEL, theologian; was born in Ireland in 1807, was educated at the Royal College in Belfast, and entered the ministry of the Presbyterian Church, from which he changed in 1839 to the Congregational Church. In 1835 he was made professor of Biblical criticism in the Belfast College, and in 1842 was called to a chair in the Congregationalist College in Manchester, England. This latter place he was compelled to resign on account of some opinions expressed by him in an edition of Horne's *Introduction to the Study of the Scriptures*. He was a member of the committee on the revision of the Old Testament, and was the author of numerous theological works of marked ability and authority. These include *Sacred Hermeneutics; An Introduction to the New Testament; Treatise on Biblical Criticism; Introduction to the Old Testament; The Canon of the Bible*, and *The Doctrine of Last Things*. He died in 1898. W.F.J.

DAVIDSON, THOMAS, an American naval officer; born in Nottingham, England, August 28, 1828. He was a brother of GEORGE DAVIDSON (q. v.). He removed to the United States with his parents in 1832 and was apprenticed to a ship-builder in Philadelphia. In 1861 he entered the employ of the government in the Philadelphia navy-yard, being made quartermaster and promoted to commander. He constructed the *Tuscarora*, *Miami*, and *Juanita* during the Civil War in remarkable short-time periods. The *Juanita*, which carried seven guns, was built in a little over two months. He saved the *Monongahela* from destruction by successfully floating the vessel, which had been driven ashore forty feet on the beach at Santa Cruz. He died in Philadelphia, Pennsylvania, February 18, 1874. W.M.C.

DAVIDSON, THOMAS, palæontologist; was born in Edinburgh, Scotland, on May 17, 1817, and was educated at the University of that city. He also studied in France and Italy, and spent much of his life abroad, in travel, study and research. His palæontological work led to his election to the secretaryship of the Geological Society of London, and in 1865 to the awarding of the Wollaston gold medal to him. He wrote a number of scientific works, the chief of which was a treatise on *British Fossil Brachiopoda*. He died on October 16, 1885. W.F.J.

DAVIDSON, THOMAS, philosopher and archæologist; was born at Deer, Aberdeenshire, Scotland, on October 25, 1840, and was educated at the University of Aberdeen. After teaching in various English schools he came to the United States in 1867, and became professor of classics in the St. Louis High School. In 1875 he settled in Cambridge, Massachusetts, and afterward traveled much in Italy, Greece and elsewhere, studying art, archæology, literature, and Roman Catholicism. He wrote *A Short Account of the Niobe Group* (1874); *The Place of Art in Education* (1886); *Giordano Bruno; The Relation of His Philosophy to Free Thought* (1886); *A Hand-Book to Dante, from the Italian of Scartazzini* (1887); *Prolegomena to Tennyson's In Memoriam; Aristotle and Ancient and Modern Educational Ideals*, and *The Education of the Greek People and Its Influence on Civilization*. He died on September 14, 1900. W.F.J.

DAVIDSON, WILLIAM, an American soldier; born in Lancaster County, Pennsylvania, in 1746. He entered the army at the outbreak of the Revolution and was appointed brigadier after the battle of Camden. In January, 1781, he was sent by General Greene to prevent Cornwallis from passing the Catawba at Cowan's Ford. He was shot and killed in the battle which ensued on February 1. W.M.C.

DAVIDSON COLLEGE (named in honor of WILLIAM DAVIDSON, q.v., in these Supplements), a Presbyterian institution, founded, in 1837, at Davidson, Mecklenburg County, North Carolina. Having been endowed with $300,000 by Maxwell Chambers of Salisbury, North Carolina, it became one of the most important educational institutions in the state. It has over 800 alumni, an average attendance of 175 and a faculty of 13 members. Women are not admitted. President, Henry L. Smith, M. A.

DAVIES, CHARLES, an American mathematician; born in Washington, Litchfield County, Connecticut, January 22, 1798. He was graduated from the United States Military Academy at West Point in 1824, and was appointed professor of mathematics there in 1828. From 1839 to 1841 he was a professor at Trinity College, and from 1841 to 1845 was paymaster in the United States army. In 1845 he was called to the chair of mathematics at the University of New York, and in 1846 was a professor at the Albany Normal School. From 1857 to 1865 he was professor of higher mathematics at Columbia College. He published *Surveying* (1832); an edition of Legendre's *Geometry; The Metric System; Descriptive Geometry; Logic and Utility of Mathematics; Differential and Integral Calculus*, and other works and text-books on arithmetic and mathematics which were largely adopted by the academies and schools. He died at Fishkill Landing, New York, September 18, 1876. W.M.C.

DAVIES, HENRY EUGENE, soldier; born in New York city, July 2, 1836; educated at Harvard and Williams Colleges and the Columbia Law-School; practised law in New York until 1861, when he became a captain in the 5th New York Volunteer Infantry. He was subsequently major, lieutenant-colonel, and colonel of the 2d New York Cavalry; and in September, 1863, was brevetted brigadier-general. He was assistant United States district attorney in New York in 1870–73; and died in 1894.. G.J.H.

DAVIES, JOHN LLEWELLYN, an English clergy-

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man and author; born at Chichester, Feb. 26, 1826. He was educated at Repton School and at Trinity College, Cambridge, and in 1850 became a fellow of Trinity. Ordained in 1852, he was appointed incumbent of St. Mark's Church, London, and subsequently became rector of Christ Church. He was for some years principal of Queen's College, London, chaplain-in-ordinary to the Queen, and a frequent contributor to periodical literature. He published *Theology and Morality, Belief and Practice* (1873); *The Christian Calling* (1875); *Order and Growth in the Spiritual Constitution of Human Society* (1891); and *Spiritual Apprehension* (1898).

DAVIES, Sir Louis Henry, a Canadian jurist and statesman; born in Charlottetown, Prince Edward Island, May 4, 1845. He was educated at Prince of Wales College, and was called to the bar of the Inner Temple, London, in 1866. He was solicitor-general of his native province in 1869, and again in 1872. He was in the legislative assembly until September, 1876, when he became premier and attorney-general, which portfolios he retained till 1879. He was one of the counsel representing Great Britain before the International Fishery Commission in 1877. He entered the Dominion House of Commons in 1882, and in 1886 was made judge of the Supreme Court. He was knighted in 1897, and was Minister of Marine and Fisheries from 1896 to 1901. In 1898 he was one of the joint high commission for settlement of all differences with the United States respecting Canada. W.M.C.

DAVIES, Samuel, ecclesiastic; born in Newcastle County, Del., Nov. 3, 1724. He was ordained a Presbyterian clergyman in 1747, and sent as a missionary to Virginia, where he met with much opposition from the Episcopal Church. He contested its supremacy and found that the Act of Toleration extended to Virginia. In 1759 he was made president of Princeton College, succeeding Jonathan Edwards. He died Feb. 4, 1761. G.J.H.

DAVIES, Thomas Alfred, an American soldier and author; born at Black Lake, St. Lawrence County, New York, Dec. 3, 1809. He was graduated from the United States Military Academy at West Point in 1829. In 1831 he was an engineer on the Croton aqueduct. At the outbreak of the Civil War he entered the army as colonel of the Sixteenth New York Regiment, and was present at the battle of Bull Run and Corinth. In 1865 he was brevetted major-general of volunteers. His published works include *Cosmogony, or Mysteries of Creation* (1858); *Genesis Disclosed* (1860); *Answer to Hugh Miller and Theoretical Geologists* (1861), and *How to Make Money and How to Keep It* (1866). He died in St. Lawrence County, New York, August 19, 1899. W.M.C.

DAVIESS, Joseph Hamilton, lawyer, whose name as "Joe Daviess" is borne by counties in several western States, was born in Virginia on March 4, 1774, and in infancy was taken by his parents into the Kentucky wilderness. At the age of 21 he was admitted to the bar, being finely educated chiefly through his own private studies. He was in 1802 the first western lawyer to appear before the U. S. Supreme Court. In 1808 he was prosecuting counsel against Aaron Burr for making war against a nation with which the United States was at peace, but failed to sustain the charges through the absence of witnesses. He entered the army and was killed at the battle of Tippecanoe, on Nov. 7, 1811. His name is said to have been originally spelled Daveiss. W.F.J.

DAVIS, Andrew Jackson, an American spiritualist and author; born in Blooming Grove, Orange County, N. Y., Aug. 11, 1826. He had little education, and learned shoemaking, but came under the influence of certain mesmerizers, who exploited his powers; among others the Rev. William Fishbough (then of New Haven), who took down, *verbatim*, from his lips, some 800 pages of "revelations," which purported to embrace a range of ontological, cosmical, theological, spiritual, and social subjects. He then renounced the mesmerical idea, but devoted himself to writing books which purported to be spiritually inspired. Among his writings are *The Principles of Nature*, and *Genesis and Ethics of Conjugal Love*. E.E.T.

DAVIS, Arthur Powell, engineer; born in Decatur, Ill., Feb. 9, 1861; was graduated at the State Normal School of Kansas, and then pursued studies in engineering at Columbian University. In 1884–94 he was topographical engineer on the United States Geological Survey, and conducted explorations and surveys in California, New Mexico, and Arizona. In 1895–97 he had charge of all government stream measurements, and in 1898 conducted the hydrographic investigation of the Panama and Nicaragua canal routes. He then became the head engineer of the Arid Land Reclamation Service. His publications are chiefly technical. G.J.H.

DAVIS, Charles Harold, artist, was born at Cambridge, Mass., on January 7, 1856, and studied at the Boston Museum of Fine Arts, and in the Julien Academy in Paris, in the latter place enjoying the instruction of Boulanger and Lefèbvre. He spent ten years in France, and then returned to America for a prosperous career. Examples of his work are to be found in the Metropolitan Museum of Art in New York, the Pennsylvania Academy of Fine Arts in Philadelphia, the Art Institute in Chicago, and other galleries. He received prizes at the Paris Exposition of 1889, at the Columbian World's Fair of 1893, at the Atlanta Exposition in 1895, and at other exhibitions. W.F.J.

DAVIS, Charles Henry, naval commander and mathematician, was born in Boston on January 16, 1807, entered the United States navy in 1823, served on various surveying expeditions, and prepared the *American Almanac* prior to the Civil War. In 1861 he was chief of staff in the Port Royal expedition, and in 1862 was flag officer of the Mississippi flotilla, in which capacity he forced the evacuation of Fort Pillow. After the war he received the thanks of Congress, was made rear-

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admiral, and had charge of the naval observatory, and commander of the Norfolk navy-yard. He excelled as a mathematician, and wrote various books and papers on scientific topics. He died on February 20, 1877. W.F.J.

DAVIS, CHARLES HENRY, naval commander, son of Charles Henry Davis (q. v.), was born at Cambridge, Mass., on August 28, 1845, and was graduated from the Naval Academy in 1864. He served in the Civil War, and afterward was engaged in various expeditions for determining latitude and longitude. In 1878–79 he was superintendent of the naval observatory. In the Spanish War of 1898 he was in command of the auxiliary cruiser *Dixie*. He was promoted to be captain in August, 1898. He has written several works on scientific topics, and also a *Life of Rear-Admiral Davis*. W.F.J.

DAVIS, CUSHMAN KELLOGG, an American statesman; born in Henderson, New York, June 16, 1838. He was graduated from the University of Michigan in 1857, studied law and was admitted to the bar. He served in the Civil War and began the practice of law in St. Paul, Minnesota, in 1865. He was sent to the Minnesota legislature in 1867; became United States District Attorney in 1868; was elected governor in 1874; and was elected United States Senator in 1887, 1893, and 1899. In 1898 he was a member of the peace commission which negotiated the treaty between Spain and the United States. He died in St. Paul, Minn., Nov. 27, 1900. W.M.C.

DAVIS, DAVID, an American jurist and statesman; born in Cecil County, Md., March 9, 1815.

JUDGE DAVID DAVIS.

He received a classical education, graduating at Kenyon College, Ohio, in 1832. He studied law at Lenox, Mass., and at the law school at New Haven; was admitted to the bar and commenced practice in Illinois in 1835; and located at Bloomington, Ill., in 1836. He was a member of the State House of Representatives in 1844; delegate to the State Constitutional convention in 1847; was a circuit judge from 1848 to 1862; and a delegate to the national Republican convention a Chicago in 1860. In October, 1862, he was appointed by President Lincoln an associate ju. tice of the Supreme Court of the United States, and served till March, 1877, when he resigned to take his seat as United States senator from Illinois, succeeding John A. Logan, to which office he had been elected the previous January. He was elected president of the Senate, *pro tem.*, Oct. 13, 1881; served until March 3, 1883; and died at Bloomington, June 26, 1886. E.E.T.

DAVIS, EDWIN HAMILTON, archæologist, was born in Ross County, Ohio, on January 22, 1811, and was educated for the medical profession. His chief attention was given to archæological research, his inspiration arising from the Indian mounds of Ohio and other western states. His exploration of these mounds and collection of relics marked an epoch in our knowledge of the American aborigines, and his book on *Ancient Monuments of the Mississippi Valley*, the first work published by the Smithsonian Institution, remains a noble monument of American scholarship. There is a large collection of his Indian relics in the American Museum of Natural History, in New York. He died on May 15, 1888. W.F.J.

DAVIS, GARRET, an American statesman; born in Mount Sterling, Kentucky, September 10, 1801. He studied law and in 1823 was admitted to the Kentucky bar. In 1833 he was elected to the state legislature and was a member of the Kentucky Constitutional Convention of 1839. He was then elected to Congress and served continuously until 1847. He was a pro-slavery champion and tried to prevent the secession of Kentucky during the Civil War. He was elected United States Senator to succeed John C. Breckenridge and filled that office until his death at Washington, District of Columbia, September 22, 1872. W.M.C.

DAVIS, GEORGE ROYAL, an American soldier, legislator and financier; born in Palmer, Massachusetts, January 3, 1840. He commenced the study of law, but in 1862 entered the Union army. After the war he engaged in manufacturing in Chicago. He was elected to Congress in 1878, serving until 1885. He was treasurer of Cook County, Illinois, from 1886 to 1890. He was director-general of the World's Columbian Exposition in 1893. He died in Chicago, November 25, 1899. W.M.C.

DAVIS, HENRY GASSAWAY, capitalist; born in Howard County, Maryland, Nov. 16. 1823; educated at public schools; went to work young, became superintendent of a plantation, then brakeman, conductor, and later agent at Piedmont, W. Va., of the B. & O. R. R.; became president of railroads and of the Davis Nat. Bank of Piedmont; was state senator, 1867–69; U. S. Senator from W. Va., 1871–83, and nominated for Vice-President on the Democratic national ticket, July 10, 1904.

DAVIS, HENRY WINTER, an American statesman and orator; born in Annapolis, Maryland, August 16, 1817. He was graduated from Kenyon College in 1837, studied law at the University of Virginia and was admitted to the Virginia bar in 1841. He gained local reputation as a political orator and in 1854 was elected to Congress, serving for three terms. In 1860 he declined the Republican nomination for Vice-President and also declined a cabinet portfolio under President Lincoln. In 1863 he was again elected to Congress where he was chairman of the Committee on Foreign Affairs. He was among the foremost men in Congress, advocating emancipation and loyalty to the Union. He wrote *The War of Ormuzd and Ahriman in the 19th Century* (1853), and *Speeches and Addresses in Congress* (1867).

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He died in Baltimore, Maryland, December 30, 1865. W.M.C.

DAVIS, JEFFERSON, an American statesman, and President of the Confederate States during the Civil War; born at Abberville, Christian County, Kentucky, June 3, 1808. At an early age he removed with his parents to Wilkinson County, Mississippi. He was given an academic education and entered Transylvania University in 1822, which he left two years later to enter the United States Military Academy at West Point, from which he was graduated in 1828.

JEFFERSON DAVIS.

He served in the Black Hawk War in 1831, being promoted to first lieutenant of dragoons for gallantry in action, and was employed in various expeditions against the Comanches, Pawnees and other hostile Indian tribes. He left the army in 1835, married the daughter of Zachary Taylor, and settled down in Mississippi as a cotton planter. In 1844, after some years of retirement, he began taking an interest in politics and was a Democratic presidential elector. In 1845 he was elected a representative to Congress; but resigned in 1846, having been elected colonel of the First Mississippi Volunteer Regiment of Rifles. He joined the army of General Taylor in the Mexican War and distinguished himself at Monterey and Buena Vista, being severely wounded in the latter battle. In 1847 he was appointed brigadier-general of volunteers, but declined the commission on the grounds that, by the Constitution, the militia appointments were reserved to the states and that such appointments by the President were in violation of state rights. He was then appointed by Governor Brown of Mississippi to fill a vacancy in the United States Senate. In 1850 he was elected Senator for a full term by the state legislature. While in the Senate he was an ardent advocate of state rights and was chairman of the Committee on Military Affairs. In 1851 he resigned his seat in the Senate, having received the Democratic nomination for governor of Mississippi. He was defeated in a close contest. In 1853 he was appointed Secretary of War by President Pierce and held this post until the inauguration of President Buchanan in 1857. In addition to many army reforms, he inaugurated "the system of explorations in the western part of the continent for geographical purposes and for determining the best route for a railroad to the Pacific Ocean." He was again elected a member of the United States Senate from 1858 to 1861. He was at this time one of the most prominent members of the Democratic party, and was frequently mentioned as a candidate for the presidency. He was a leading member of the secret caucus of Southern senators which met in Washington January 5, 1861, and framed the scheme of revolution which was shortly afterwards carried into action. On January 21, he took his leave of the Senate in a speech in which he gave his opinion that, by the secession of his state, his connection with that body was terminated, and reaffirmed the doctrine of the right of secession. The states of South Carolina and Mississippi led the way in seceding from the Union. On February 9, 1861, Jefferson Davis was unanimously elected by the Confederate Congress which met at Montgomery, "President of the Confederate States of America." On February 16, he accepted the office in an address, in which he expressed his desire for the maintenance of peaceful relations with the states which remained in the Union. He declared that if war should be forced upon them, they would make the enemies of the South "smell Southern powder and feel Southern steel." Meanwhile President Davis had assumed control of the militia of his state, and began the enormous task, after war was declared, of organizing the military resources of seceding states. He practically created the Confederate army and navy and the organization necessary to carry on a war. On April 17, 1861, he issued a proclamation authorizing privateering. In his message to the Confederate Congress, April 24, President Davis voiced the sentiments of his people when he said: "We protest solemnly in the face of mankind that we desire peace at any sacrifice save that of honor. In independence we seek no conquest, no aggrandizement, no concessions of any kind from the states with which we have lately been confederated. All we ask is to be let alone; that those who never held power over us shall not now attempt our subjugation by arms." The Confederate Constitution allowed the President to veto any part of a bill and approve the remainder, giving his reason for such action, and fixed the term of office of the President at six years and made him ineligible for a second term. On May 21, President Davis approved an act in answer to one enacted by the Federal government, providing that all persons owing debts to parties in the North should pay the same into the Confederate Treasury. In the war the Confederates mustered into service something like 600,000 men. President Davis called to his assistance the best fighting blood in the South, with such generals as Robert Edward Lee, Albert Sidney Johnston, Joseph E. Johnston, P. G. T. Beauregard, Stonewall Jackson, Bedford Forrest, J. E. B. Stuart, Stephen D. Lee, Richard Taylor, Fitzhugh Lee, Wade Hampton, Kirby Smith, W. J. Hardee, John B. Gordon, Jubal A. Early, and others. On August 14, President Davis issued a proclamation warning all persons of fourteen years and upwards owing allegiance to the United States, to leave the Confederacy within forty days or be treated as alien enemies. In November, 1861, Mr. Davis was duly elected by the Confederate States President for the full term of six years, and in the following February the first Congress assembled at Richmond, where Mr. Davis was

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inaugurated on the 22nd. The President reluctantly yielded to the passing of a conscription law, and on the approach of McClellan's army he declared martial law for ten miles round Richmond. President Lincoln having issued his proclamation of emancipation January 1, 1863, Mr. Davis replied by an indignant counter-manifesto, in which he described the emancipation proclamation as the "most execrable measure recorded in the history of guilty man." The war advanced with varying fortunes. During the early part of 1864, the future promised well for the Confederacy, but subsequent Northern successes sent a gloom over the South and a peace party grew rapidly. At the commencement of 1865 a feeling of despondency began to spread over the South. Mr. Davis still contemplated resistance, however, notwithstanding the contrary advice of his generals. In April he left Richmond for Danville, Greensboro, and Charlotte, to confer with his generals. Meanwhile Lee had surrendered to Grant, and on May 10, Mr. Davis was captured at Irwinsville, Georgia, by a party of Union soldiers. He was taken to Fort Monroe and indicted by the Grand Jury of the District of Columbia for treason. He was, however, never brought to trial, but after two years' imprisonment was taken into court at Richmond and was released at the instance of the government on bail. Horace Greeley was one of his sureties. He was included in the General Amnesty Act of Congress of December 25, 1868. After his release he was looked upon as a hero throughout the South and was welcomed everywhere. At one of many public receptions given him, he made a speech in which he reaffirmed his adhesion to the doctrine of state sovereignty. For several years after the war he was president of a Southern insurance company and resided in Memphis, Tennessee. The last years of his life were spent upon his estate at Beauvoir, Mississippi, where he wrote a valuable historical work *The Rise and Fall of the Confederate Government* published in 1881. He died in New Orleans, Louisiana, December 6, 1889. In 1893 his remains were removed to Richmond, Virginia, and reinterred with imposing ceremonies. W.M.C.

DAVIS, Jefferson Columbus, soldier; was born in Indiana on March 2, 1828, and at the age of eighteen left school to enlist in the army for the Mexican War, in which he served with distinguished gallantry. At the outbreak of the Civil War he was a member of Major Anderson's garrison of Fort Sumter. He afterward served under General Blunt in Missouri and under Sherman in Georgia. After the war he was on duty in Alaska and in the Modoc War in California. He was the first American army officer to command in Alaska, and Fort Davis there was named for him. He died in Chicago on November 30, 1879. W.F.J.

DAVIS, Jessie Bartlett, an American operatic singer; born near Morris, Illinois, in 1860. She received her musical education under Frederick Root of Chicago, in which city she sang in the choir of the Church of the Messiah. She appeared in *Pinafore*, presented by the Chicago Church Choir Opera Company in 1879, and in 1882 filled the rôle of *Siebel* in *Faust*. She then studied a year in Paris with Madame La Grange. She was married to Will J. Davis in 1880, and in 1886 joined the American Opera Company. For many years she took leading contralto parts with the Bostonians. Died May 14, 1905. W.M.C

DAVIS, John, an American statesman; born in Northborough, Mass., Jan. 13, 1787. He graduated at Yale in 1812; studied law, and commenced practice in Worcester, Mass., in 1815. He was a Representative in Congress from Massachusetts, 1825–34, when he resigned his seat, having been elected governor of Massachusetts. In March, 1835, having been elected to the United States Senate, he resigned the governorship and sat in the Senate from 1835 to 1840, when he was again elected governor and so remained till January, 1843. He was elected to the Senate in 1845, and sat till 1853. He died at Worcester, Mass., April 19, 1854. E.E.T.

DAVIS, John Chandler Bancroft, diplomat; born in Worcester, Mass., Dec. 29, 1822. His father, John Davis, was four times elected governor of Massachusetts; his mother, Eliza Bancroft Davis, was a sister of George Bancroft, the historian. Educated in the schools of Worcester and at Harvard he studied law, and was admitted to the bar in 1844, but gave up his practice in 1849 to become secretary of the United States legation in London. He returned to the practice of law in 1852, but retired in 1862 owing to ill health. In 1869 he was elected a member of the New York legislature from Newburg, where he then resided, and before his time expired was called by President Grant to serve as Assistant Secretary of State. During his incumbency of this office, he took part in several important diplomatic matters, and prepared the *Case of the United States* for submission to the "Alabama Claims" arbitration tribunal at Geneva. In 1873 he was appointed United States minister to Germany, a position which he resigned in 1877. For the succeeding four years he was judge of the United States Court of Claims, resigning this post to serve again as Assistant Secretary of State under President Arthur. He filled this post for six months when, in 1882, he was reappointed to the Court of Claims. The following year he became the reporter of the United States Supreme Court. G.J.H.

DAVIS, Sir John Francis, an English Orientalist and army officer; born in London in 1795. He was long a resident in China as chief superintendent of Canton, and afterward as governor and commander-in-chief of the colony of Hongkong. He was created a baronet in 1845. His *China During the War and Since the Peace* appeared in 1852, and was followed in 1857 by *China: A General Description of That Empire*, one of the most trustworthy authorities on China and the Chinese. He died in London, Nov. 13, 1890.

DAVIS, Nathan Smith, physician; was born

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at Greene, New York, on January 9, 1817, and was educated at the Fairfield Medical College. He settled in practice at Binghamton, N. Y., and was also a teacher and lecturer there. It was largely through his efforts that a national medical convention was called in 1846 and the American Medical Association was formed. Of that association, of which he was practically the founder, he was president in 1864–65. In 1847–49 he practiced in New York City and was a lecturer in the College of Physicians and Surgeons. In 1849 he removed to Chicago, where he has since remained. He was a professor in the Rush Medical College there in 1849–59, and in 1859 was one of the founders of the Chicago Medical College, now a part of the Northwestern University, in which he was professor from 1859 to 1889, and dean of the faculty from 1889 to 1898. W.F.J.

DAVIS, NATHAN SMITH, JR., physician, was born in Chicago on September 5, 1858, son of Nathan Smith Davis (q. v.). He was educated at the Northwestern University, the Chicago Medical College, the University of Heidelberg, Germany, and in Vienna, Austria. He is dean of the Chicago Medical College, is the author of several important treatises, and has been a member of several international medical congresses. W.F.J.

DAVIS, NOAH, jurist, was born at Haverhill, New Hampshire, on September 10, 1818, was educated at the Lima, N. Y., Seminary, and was admitted to the bar in 1841. He was a justice of the supreme court of the state of New York from 1857 to 1868, and in 1869–70 was a Republican representative in Congress. President Grant appointed him United States district attorney in New York City, in which place he served in 1870–72. In the latter year he was returned to the supreme court, and in 1874 became its chief justice. He presided over the trial of Edward S. Stokes for the killing of James Fisk, Jr., and the famous trial of "Boss" William M. Tweed for official corruption. He returned to private practice in 1887, in New York City, and for the remainder of his life was a conspicuous figure at the bar. He died in New York on March 20, 1902. W.F.J.

JUDGE NOAH DAVIS.

DAVIS, REBECCA HARDING, author; born in Washington, Pa., Jan. 24, 1831. Her parents removed to Alabama while she was quite young, and later settled in Wheeling, then in Virginia. While residing there she wrote her first stories, *Lief in the Iron Mills* and *Margaret Howth*, which attracted much attention. In 1863 she was married to L. Clarke Davis, a Philadelphia editor (died Dec. 14, 1904), and after that date resided in Philadelphia. Among her later novels are *Dallas Galbraith; Waiting for the Verdict; A Law unto Herself; Silhouettes of American Life; Doctor Warrick's Daughters*, and *Frances Waldeaux*. For several years she was an editorial writer for the New York *Tribune*. Richard Harding Davis is her son. G.J.H.

DAVIS, RICHARD HARDING, journalist, son of L. CLARK DAVIS and REBECCA HARDING DAVIS (q. v.); was born in Philadelphia on April 18, 1864, and was educated at Lehigh University and Johns Hopkins University. He began newspaper work in Philadelphia, where his father and mother were leaders of that profession, and then removed to New York and became a reporter for the *Evening Sun*. For a time he was on the staff of *Harper's Weekly*. During the war with Spain he essayed correspondence from the front in Cuba, and in the Russo-Japanese War he received a similar commission. In addition to his newspaper work he has written many short stories for magazines, and several novels, books of travel, plays, etc. Among his books are *Stories for Boys; Van Bibber and Others; The Rulers of the Mediterranean; The Princess Aline; Three Gringoes in Venezuela; About Paris; Soldiers of Fortune; The Exiles and Other Stories; The West from a Car Window; Our English Cousins; Cinderella; Gallagher*, and *The King's Jackal*. W.F.J.

DAVIS, WILLIAM MORRIS, geologist; born in Philadelphia, Pa., Feb. 12, 1850, a grandson of the noted reformer, Lucretia Mott. He was educated at the Lawrence Scientific School, Harvard, graduating in 1869, and was an assistant at the National Observatory, Cordova, Argentina, 1870–73. In 1876 he was appointed a teacher in Harvard University and in 1890 became professor of geology there. He is an editor of *Science; American Naturalist*, and *American Journal of Science*. G.J.H.

DAVIS STRAIT, a body of water separating Greenland from Baffin Land, about 180 miles in width, and connecting Baffin Bay with the Atlantic Ocean. A branch of the Arctic current flows through this strait southward along the Atlantic coast of America. It is important as a whaling region.

DAVITT, MICHAEL, founder of the Irish Land League, born in 1846 near Straid in County Mayo, Ireland, of poor parents. His father was the victim of a policy of eviction, and Michael Davitt was but four years of age when he saw his home destroyed. His father and mother took him to England, being so poor that they had to beg through the streets for bread. They settled at Haslingden, in Lancashire, and here the child was sent to a mill to work. An accident destroyed his right arm and turned him to books for self-education. In 1866 became connected with the Fenian movement, being concerned in the abortive attempt to seize Chester Castle. In 1870 he was sentenced to 15 years' imprisonment for treason felony, but was released on ticket of leave in 1877. In 1879 he founded, in conjunction with Charles S. Parnell, the Irish Land League. He made a tour of the United States on behalf of that organization in 1880, and on his return to England was again arrested on his

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old sentence and held in prison for 15 months. On the day of his release, May 6, 1882, Lord Frederick Cavendish and Mr. Burke were assassinated in Phœnix Park, Dublin. Mr. Davitt, with Parnell and Dillon, issued a manifesto condemning the murders. While he was in prison he was elected a member of Parliament, but was not permitted to take his seat. Mr. Davitt wrote frequently on subjects both literary and political, and actively engaged in the cause of Irish nationalism. In 1892 he was elected to Parliament, but vacated on account of bankruptcy. He was elected without opposition in 1895 and resigned in 1899. He died May 30, 1906.

DAVOUT, Louis Nicolas, incorrectly spelled Davoust; was born on May 10, 1770, in Burgundy, and was a schoolmate of Napoleon Bonaparte. He went to Egypt with Bonaparte and greatly distinguished himself, being the hero of the battle of Aboukir. Upon his return to France he was made a general in 1800 and a marshal in 1804, and was created Duke of Auerstädt in 1808 and Prince of Eckmühl in 1811. He rendered services of the most brilliant and valuable character at Austerlitz, Eckmühl, Wagram, and in the Russian campaign. As governor of Poland he was harsh and tyrannical, and incurred the censure but did not forfeit the confidence of Napoleon. After the retreat from Moscow he was governor of the Hanse towns, at Hamburg, and during the Hundred Days he was minister of war. After Waterloo he commanded the remnant of the imperial army and would have made a last desperate stand for the defence of Paris had he not been ordered to yield to the Allies. In 1819 he was made a peer of France, and commanded the esteem of men of all parties. He died on June 1, 1823. W.F.J.

DAW, a member of the crow family. See Jackdaw, Vol. XIII, p. 542.

DAWES, Henry Laurens, an American statesman; born in Cummington, Mass., Oct. 30, 1816. He graduated at Yale in 1839, became a school-teacher, and later edited the *Greenfield Gazette* and *Adams Transcript*. He studied law, and was admitted to the bar in 1842. He was a member of the Massachusetts House of Representatives in 1848, 1849, and 1852; served as State senator in 1850; was a member of the State Constitutional convention in 1853; and district attorney of the Western District of Massachusetts, 1853–57. He sat in the national House of Representatives as a member from Massachusetts from Dec. 7, 1857, to March 3, 1875. He was elected to the United States Senate as a Republican to succeed Charles Sumner (whose unexpired term had been filled by William B. Washburn) and took his seat March 4, 1875. He was re-elected in 1881 and 1887, and served until March 3, 1893. He had first gone to Congress from North Adams, but from the 38th Congress he had been located at Pittsfield. He served as chairman of the United States Commission to the Five Civilized Tribes of the Indian Territory from 1893 to 1903, on the 5th of February of which latter year he died at Pittsfield. E.E.T.

HENRY L. DAWES.

DAWES ACT. See Indian Affairs, in these Supplements.

DAWKINS, William Boyd, scientist; was born at Buttington, England, on December 26, 1838, and was educated at Oxford. He was geologist on the geological survey of Great Britain in 1861–69, curator of the Manchester Museum and lecturer in Owens College in 1870, and since the latter date has been a consulting geologist in questions of mining and civil engineering, and has lectured much in all parts of the world. He traveled in America and Australia for some years, and delivered lectures at the Lowell Institute, Boston, in 1880. He is the author of *Cave Hunting; Early Man in Britain*, and *British Pleistocene Mammalia*. W.F.J.

DAWSON, a town, the capital of Terrell Co., Ga., 25 miles N.W. of Albany, on the Central of Georgia and the Columbus Southern railroads; has a factory of railroad cars, and is the seat of the South Georgia Male Institute. Pop. 1890, 2,284; 1900, 2,926.

DAWSON. See Klondike, Vol. XXVII, p. 509.

DAWSON, George, an English lecturer; born in Saint Pancras, in 1821. He was graduated from the University of Glasgow, studied theology and became pastor of Mount Zion chapel in Birmingham in 1844. In 1847 he assumed charge of an independent congregation called "The Church of the Savior." He became widely known as a literary lecturer and in this capacity attained the very highest popularity. His extempore lectures were models of concise and strenuous style. Unfortunately he published nothing more permanent than sermons and addresses, but his fresh earnestness and unflinching honesty of belief made him one of the most influential of the early disciples of Emerson and Carlyle. He retired from the lecture platform in 1875 and died in Birmingham in 1876. A *Life of George Dawson* was published in 1882. W.M.C.

DAWSON, George Mercer, a Canadian geologist and author; born in Pictou, Nova Scotia, August 1, 1849. He was the eldest son of Sir J. William Dawson (q.v.). He was graduated from the McGill University and studied geology at the Royal School of Mines, London, England. Here he acquired the Forbes medal in palæontology, the Murchison medal in geology and held the Duke of Cornwall's scholarship. In 1873 he was appointed geologist and naturalist for the North American Boundary Commission, publishing the results of his work in 1875, under the title *Geology and Resources of the Forty-ninth Parallel*. He was engaged in explorations and surveys,

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particularly in British Columbia and the Northwest Territories from 1875 to 1880, and in 1887 had charge of the Canadian Yukon Expedition. He made elaborate reports on the coal-measures of the Northwest Territories and British Columbia. In 1891 he was appointed one of the Behring Sea Commission to investigate the seal fisheries, and in 1893 went to Paris as Canadian member of the Behring Sea Arbitration Commission. In 1895 he was appointed chief director of the Canadian Geological Survey. In 1893 he was president of the Royal Society of Canada, and was decorated with the Order of Saint Michael and Saint George. He wrote for numerous scientific periodicals including the *Canadian Naturalist; The Transactions of the Royal Society of Canada*, and *The Quarterly Journal of the Geological Society of London*. He died in Ottawa, Canada, March 2, 1901. W.M.C.

DAWSON, Sir J. William, a Canadian geologist; born at Pictou, Nova Scotia, Oct. 13, 1820. He was educated at Pictou College and Edinburgh University. In 1842 he accompanied Sir Charles Lyell in his scientific explorations in Nova Scotia, where he made some valuable discoveries in palæontology. In 1843 he contributed a paper on the rocks of eastern Nova Scotia to the Geological Society of London; this was followed in 1844 by a paper on the newer coal formation. In 1845, besides exploring and reporting on the iron-mines of Londonderry, Nova Scotia, he published a paper on the coal formation plants of that province. He has discovered and described a number of fossils, of which the most important is named *Eozoön Canadense* (q.v., Vol. IX, p. 338), the oldest known form of animal life. It may be said that previous to this discovery the Laurentian rocks were regarded as devoid of animal remains, and were therefore called "azoic." For this term Dr. Dawson substituted "eozoic." From 1847 to 1849 he published *On the Triassic Red Sandstones of Nova Scotia and Prince Edward Island; On the Coloring Matters of Red Sandstones; On Erect Calamites, found near Pictou; On the Metamorphic Rocks of Nova Scotia;* and a *Handbook of the Geography and Natural History of Nova Scotia*. In 1850 Dr. Dawson became superintendent of education for his native province, and five years afterward was appointed principal of McGill University, Montreal, a position which he resigned in 1893. In 1852 he again accompanied Sir Charles Lyell in his geological researches in Nova Scotia and New Brunswick, examining the well-known Joggins mine, where he found the remains of *Dendrerpeton Acadianum* and of *Pupa Vetusta*, the former being the first reptile found in the coal formation of America, and the latter the first known Palæozic land-snail. In 1856 he prepared a description of the Silurian and Devonian rocks, visited Lake Superior, and wrote a paper and report on the copper regions of Maimanse and Georgian Bay. He devoted much attention to the study of fossil plants and Carboniferous reptiles, and to the physical and organic conditions of the more recent geological formations, and published many memoirs on these subjects in the *Transactions* of the Royal Society of Canada, of which Dr. Dawson was the first president, in the journals of the Geological Survey of Canada, as well as in many foreign scientific periodicals. He was also a large contributor to the *Canadian Naturalist*. In 1858 he published, under the title of *Archaia*, a series of *Studies on the Cosmogony* and *Natural History of the Hebrew Scriptures*, in which he went through the whole narrative of the six days of creation, and translated the language of Genesis into the modern scientific dialect. Among his later and popular works are *The Story of the Earth and Man* (1872); *The Dawn of Life* (1875); *The Origin of the World* (1877); *Fossil Men and their Modern Representatives* (1878); *The Chain of Life in Geological Time* (1880); and a *Handbook of Geology* (1884). In 1882 he received the Lyell medal of the Geological Society of London, was created companion of the Order of St. Michael and St. George, and became president of the American Association for the Advancement of science. He received the degrees of M.A. and LL.D. from the University of Edinburgh and of LL.D. from McGill University. In 1885 he was elected president of the British Association for the Advancement of Science, and an honorary fellow of the Geological Society of Edinburgh, and of the Philosophical Societies of Glasgow, Liverpool, Manchester and Leeds. His more recent works are *Modern Science in Bible Lands* (1888); *The Geological History of Plants* (International Scientific Series, 1888); *Modern Ideas of Evolution* (1890); *Salient Points in the Science of the Earth* (1893); and *The Canadian Ice Age* (1893). See Foraminifera, Vol. IX, p. 337. He died at Montreal, Nov. 19, 1899. G. Mercer Adam.

DAY, George Edward, educator, was born at Pittsfield, Mass., on March 19, 1815, and was graduated from Yale College in 1833. Five years later he was graduated from the Yale Divinity School and became an assistant instructor in Hebrew there. From 1840 to 1851 he was a Congregational pastor at Marlboro and Northampton, Mass.; from 1851 to 1866 professor of Biblical literature in Lane Theological Seminary, Cincinnati; from 1866 to 1888 professor of the Hebrew language and literature at Yale, and from 1888 to 1895 dean of the Yale Divinity School, then professor emeritus. He was secretary of the American Bible Revision committee, translated Van Oosterzee's *Biblical Theology of the New Testament*, and edited Oehler's *Biblical Theology of the Old Testament*. Died July 2, 1905. W.F.J.

DAY, Holman Francis, author; born in Vassalboro, Me., Nov. 6, 1865; received his preparatory education at the Oak Grove Seminary, Vassalboro, in 1877–82, and at the Coburn Classical Institute, Waterville, Me., in 1882–83; was graduated at Colby College in 1887; in 1889 accepted the position of manager and editor of publications for the Union Publishing Company at Bangor, Me. He held this office for two years and then became proprietor and editor of the

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Dexter (Me.) *Gazette*. Afterwards he was a special writer and reporter for the Lewiston (Me.) *Journal*. He was also the Maine representative of the Boston *Herald*. Subsequently he was managing editor of the Lewiston *Daily Sun*. In 1901–04 he was major and military secretary on the staff of Gov. John F. Hill of Maine. His publications include *Up in Maine; Pine Tree Ballads*, etc. G.J.H.

DAY, James Roscoe, clergyman and educator, was born at Whitneyville, Maine, on October 17, 1845, and was educated at Bowdoin College. He entered the ministry of the Methodist Episcopal Church, and served in pastorates in Portland, Maine, Boston, and New York City, with marked success. In 1893 he was elected chancellor of Syracuse University, in which place he still remains. He has contributed greatly to the material development and educational expansion of that institution, has secured large additions to its endowment, and has taken an active part in many public affairs. He has been a delegate to several general conferences of the M. E. Church. At that of 1900 he was a prominent candidate for the office of bishop, and at that of 1904 he was elected a bishop, but immediately declined the honor, preferring to remain in the Chancellorship of Syracuse University. W.F.J.

DAY, Jeremiah, an American educator; born in New Preston, Connecticut, August 3, 1773. He was graduated from Yale College in 1795, studied theology, became a professor at Williams College, and in 1801 was elected to the professorship of mathematics in Yale College. From 1817 to 1846 he was president of the college. He published *An Introduction to Algebra* (1814), and *Navigation and Surveying* (1817). He died in New Haven, August 22, 1867. W.M.C.

DAY, Thomas, an English author; born in London, June 22, 1748. He was educated at Charterhouse School and at Oxford. He embraced the principles of Rousseau, and his manners and some of his theories were eccentric. He advocated American independence and parliamentary reform, and opposed slavery. He is perhaps best known by his boys' story, *Sandford and Merton*, which had an extraordinary vogue. He died at Wargrave, Eng., Sept. 28, 1789. E.E.T.

DAY, William Rufus, American lawyer and statesman; born at Ravenna, Ohio, April 17, 1849.

WILLIAM R. DAY.

His father was Chief Justice Luther Day, for many years a prominent lawyer in Ohio; and his maternal and paternal grandfathers were Supreme Court Justices. In 1870 he graduated at the University of Michigan; he afterward studied law there, and was admitted to the Ohio bar in July, 1872. In October, 1872, he formed a partnership with William A. Lynch, and commenced practice in Canton, Ohio, where he soon formed a friendship with Major William McKinley, afterwards President. In 1886 he was elected Judge of the Court of Common Pleas of the ninth judicial district of Ohio, but, for financial reasons, resigned in 1887. In 1889 he was appointed judge of the United States District Court for northern Ohio, but declined the office in consequence of ill health. In April, 1897, he was appointed first assistant Secretary of State, and on April 26, 1898, Secretary of State. On the conclusion of the war with Spain, Judge Day was, on Aug. 26, 1898, appointed chairman of the peace commission, and with his colleagues ably conducted the nogotiations at Paris, from October 1 till the signature of the treaty on December 10. On Feb. 25, 1899, he was appointed judge of the Sixth Judicial Circuit. On Aug. 24, 1875, Judge Day was married to Miss Mary E. Schaefer, of Canton, and has had four children, all boys.

DAY-LILY, the common name of *Hemerocallis*, a genus of plants of the family *Liliaceæ*, having yellow funnelform ephemeral flowers, grassy, linear leaves, a thick pod, and roundish black seeds with a hard and brittle coat. *H. fulva* and *H. flava* are common garden forms, both natives of the Old World, the former having become naturalized in the United States.

DAYS OF GRACE, days given by law to the acceptor of a bill of exchange or the maker of a promissory note, as additional time in which to make payment. By the law-merchant, the maker of a bill of exchange is entitled to days of grace. This allowance was formerly made as a favor, but the custom grew into law. By the statute, in England, making promissory notes negotiable, days of grace were also given. This statute has been adopted in most of the states of the United States, though in some it has been since repealed. Where days of grace are allowed in the United States, the maturity of a negotiable instrument is determined by adding three days to the term for which the instrument runs. If the last day of grace is Sunday or a legal holiday, the instrument falls due on the preceding day. Days of grace are not allowed upon notes or bills payable on demand. See also Bill, Vol. III, pp. 581–583.

DAYTON, a city of Campbell Co., Ky., on the Ohio river, opposite Cincinnati; has manufactories of ropes, shoes, and cigars, and several distilleries. Population 1890, 4,264; 1900, 6,104.

DAYTON, a mining town, the capital of Lyon Co., Nev., on the Carson river, 11 miles N. E. of Carson City; is engaged in silver mining, and contains a number of quartz-mills. Population 1900, 458.

DAYTON, a city, capital Montgomery Co., Ohio, the terminus of seven railroads. It manufactures cotton and woolen goods, oil, flour, machinery, railroad cars, paper, stoves, hollow-ware, agricultural implements, furniture, carriages, etc. In 1900 it had nearly 1,100 manufacturing establishments, with a combined capital of over $28,000,000, and an annual product of $35,700,000. It has an admirable system of public schools, also a high school, two Catholic schools, several high-grade preparatory schools for boys, and Deavor's College for boys. Its public buildings are beautiful and imposing, and include the county courthouse, jail, public markets, and the National Soldiers' Home. The jail is of stone, and cost $400,000. Popula-

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tion 1890, 61,220; 1900, 85,333. See DAYTON, Vol. VI, p. 746.

DAYTON, a city and the capital of Rhea County, eastern central Tennessee, 34 miles N.N.E. of Chattanooga, on the Cincinnati, New Orleans and Texas Pacific railroad. It is in a coal and iron mining region, and has smelting-furnaces, brickyards, flouring-mills, machine-shops and other industries. Population 1900, 2,004.

DAYTON, a town and the county seat of Columbia County, Washington, in the south-eastern part of that state. It lies in a rich agricultural region, between the Blue Mountains and the Snake River. It is reached by the Washington and Columbia River and the Oregon railroad and Navigation Company railroads. Its population was 2,216 in 1900. W.F.J.

DAYTON, WILLIAM LEWIS, an American statesman; born in Baskingridge, N. J., Feb. 17, 1807. He graduated at the College of New Jersey in 1825; studied law in Gould's Law School, Litchfield, Conn., and commenced practice in Trenton, N. J., in 1830. He was State senator, 1836–37; judge of the supreme court from Feb. 28, 1838, to Nov. 1, 1841, when he resigned; was appointed United States senator (to take the place of Samuel L. Southard, deceased), and was subsequently elected to the seat, serving from July 6, 1842, to March 3, 1851; was nominated in 1856 for Vice-President on the Frémont ticket; was attorney-general of New Jersey, 1857–61; and was appointed minister to France by President Lincoln, March 18, 1861, a position he held until his death in Paris, Dec. 1, 1864. E.E.T.

DAZA, HILARION, a Bolivian soldier; born in Sucre in 1840. In 1857 he enlisted as a private soldier in the battalion of Colonel Balsa and won frequent and rapid promotion. On November 24, 1870, by an act of treachery, he deprived President Melgarejo of his office, and defeated him in an engagement fought in January, 1871. He was then practically the arbiter of the destinies of the country for a number of years, and on May 4, 1876, he became president in place of Frias. His administration was marked by much discord. He provoked a war with Chile in 1879, and on March 1, he set out at the head of his troops, leaving the government in charge of Senor Güerra, minister of foreign affairs. On December 27, having been called to Arica for a consultation by Admiral Montero, Daza received the news that during his absence his army had rebelled and deposed him, and on his return voyage to La Paz he heard at Arequipa, in January, 1880, of a revolution at the capital, which proclaimed General Norciso Campero as his successor. He then went to Paris, but after a few years returned to Peru and Bolivia, and in the latter country was assassinated, February 28, 1894. W.M.C.

DEACONESS, an order of women, in the early centuries, connected with the Roman Catholic Church, but abolished by that church during the twelfth century. The modern order of deaconesses is not necessarily connected with any church. The members are generally middle-aged women of some leisure who devote their time to the care of the poor and visitation of the sick. For the ancient order, see DEACON, Vol. VII, p. 3. The order of to-day found its beginning in 1836 at Kaiserswerth, Germany, where the first "Deaconess Home" was established by Theodor Fliedner, one of the most prominent of the theologians of the German Church. The order founded by him had no connection with the church. The "Home" served both as a central refuge, headquarters and training-school. Similar institutions were afterward founded by Fliedner in various parts of Europe. The first home at Kaiserswerth has remained the central mother-house. The Church of England and the Protestant Episcopal Church in the United States have established the deaconess order as a part of their church governments. The Lutheran Church in America recognizes the order. In connection with that church there is maintained at Philadelphia the Drexel Home for Deaconesses, erected in 1888 by the generosity of J. D. Lankenau of that city. Within recent years the Congregationalists, in some of their churches, have given the order recognition. Other churches, while agreeing with the purposes of the institution, do not feel justified in incorporating it in the church government. The deaconess order, on the whole, is an independent society of charitable women, and they include in their number many trained nurses. See also METHODIST CHURCHES, in these Supplements.

DEAD FREIGHT, the compensation paid by the merchant who freights a whole ship to the shipmaster for the space which is not occupied. It is rather a claim for damages for the loss of freight, and consequently, apart from positive stipulation, the shipmaster has no lien for dead freight over the goods on board. His claim must, consequently, be made effectual by a personal action against the freighter.

DEAD-LETTER OFFICE. See POST-OFFICE, Vol. XIX, p. 596.

DEADLY NIGHTSHADE. See BELLADONNA, Vol. III, p. 469.

DEAD-NETTLE, the common name of *Lamium*, a genus of herbaceous plants of the family *Labiatæ*, having a five-toothed calyx, the upper lip of the corolla arched and the lower lip three-lobed. The name is given for a certain resemblance to the true or stinging nettle. The species are natives of the Old World, but in the United States *L. amplexicaule* is a common weed, and *L. album* and *L. maculatum* are cultivated for their handsome flowers.

DEAD-OIL OR CREASOTE. See Vol. VI, pp. 492–93.

DEAD-RECKONING. See NAVIGATION, Vol. XVII, p. 271.

DEADWOOD, a city and the county seat of Lawrence County, South Dakota, on the western border of that state. It lies among the Black Hills and headwaters of the Cheyenne River in a mineral region of exceptional richness. The silver and gold deposits of the Black Hills were discov-

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ered in 1875–77, and there was at once a great influx of prospectors, who founded Deadwood and many other places in its vicinity, making Deadwood, however, the center of the entire district. The Fremont, Elkhorn and Missouri Valley railroad has since been built, giving direct access to the place, and Deadwood is now the seat of considerable manufacturing and other industries. Its population was 3,498 in 1900. W.F.J.

DEAF MUTES, EDUCATION OF THE. In 1895 there were in the United States 80 schools, including both private and public, for deaf mutes. These schools had 9,304 mutes in attendance. See also DEAF AND DUMB, Vol. VII, pp. 5–13.

DEAFNESS. See EAR, Vol. VII, p. 514.

DEAL-FISH. See RIBBON-FISHES, Vol. XX, p. 546.

DEALS, a term used more in Great Britain than in the United States, and especially of the lumber of fir trees. In the United States a deal is a plank or timber 12 feet long, 11 inches wide, and 2½ inches thick. In England a deal is lumber not exceeding 3 inches in thickness and 9 inches wide. For the various kinds of fir-deal, see FIR, Vol. IX, p. 194.

DEAN, FOREST OF, England, anciently occupied the greater part of Gloucestershire west of the Severn, but is now confined to a hilly area of about 22,000 acres between the River Wye and the estuary of the Severn. It was formerly a royal forest reservation and is still a crown domain, which, divided into six parochial districts, gives its name to a parliamentary division (population, 58,000). It incloses a number of plantations, locally termed "walks" of oak, beech, and other trees, and orchards yielding famous cider apples. In the days of wooden ships, the oak plantations were reserved for the use of the royal navy, but are now maintained chiefly for their yield of bark for tanning purposes. During the reign of Charles I, the forest privileges were sold to Sir John Wintour, who almost depleted the wood supply, but after the Restoration, Parliament ordered its reafforestation. Within its limits are deposits of magnetic iron ore which have been worked since the Roman occupation, and valuable coal also is mined (see COAL, Vol. VI, p. 48). Several railroads traverse the district and promote the export of its products, which also include building, milling, grinding, and other prepared stones. The inhabitants are mostly miners, once notorious for their lawlessness. The ancient privileges, now curtailed, are an interesting phase of English local customs and usages; among them were freedom from county taxes, and residence and work for a year and a day, making immigrants free miners with exclusive grants of mining privileges on the crown mines. C.L.S.

DEAN, GILBERT, jurist and legislator, was born at Pleasant Valley, Dutchess Co., N. Y., about 1821, studied at Amenia Seminary, and was graduated from Yale College in 1841. He then studied law at Pine Plains, and began practice at Poughkeepsie, N. Y., in 1844. He rose to a conspicuous place at the bar of the state, and also became a political leader. From 1851 to 1855 he was a Representative in Congress from New York state, and in the latter year became a justice of the supreme court of the state of New York. At a later date he served for a term in the State Assembly. He died at Poughkeepsie in 1870. W.F.J.

DEANE, CHARLES, author, was born at Biddeford, Maine, on November 10, 1813, and engaged in a mercantile career in the city of Boston, in which he was successful and amassed a fortune. In 1864 he retired and devoted himself to a literary career at Cambridge, Mass. There he produced several valuable historical works, dealing with the foundation of the Plymouth colony, Governor Hutchinson and his works, and Sebastian Cabot's geographical researches. Mr. Deane continued to reside at Cambridge until his death, which occurred on November 13, 1889. W.F.J.

DEANE, JAMES, an American geologist; born in Coleraine, Mass., Feb. 14, 1801. He removed to Greenfield, Mass., in 1822, studied medicine, and practised there from 1831 till his death. He was a frequent contributor to the *Boston Medical and Surgical Journal*, and he made some interesting researches into the morality and hygiene of ovariotomy. In 1835 he discovered fossil footprints in the red sandstone of the Connecticut River valley, which aroused considerable scientific discussion, and a spirit of skepticism on the part of British geologists and naturalists. This doubt was dispelled by the exhibition of casts of the footprints before the English Geological Society. He died in Greenfield, June 8, 1858. E.E.T.

DEANE, JOHN HALL, lawyer and philanthropist, was born in Canada and came to the United States in boyhood. He studied at the University of Rochester, but left it to enlist as a private in the Federal army in the Civil War. He was captured at Gettysburg and was in a military prison for some time. After being exchanged he served in the navy, then became a lawyer and settled in New York City, where he also engaged in commerce. He has given $100,000 to the University of Rochester, and other large sums to numerous Baptist institutions, including churches, schools, and asylums. W.F.J.

DEANE, SILAS, an American diplomatist; born in Groton, Conn., Dec. 24, 1737. He graduated at Yale in 1758 and engaged in mercantile pursuits. He was a delegate from Connecticut to the Continental Congress, 1774–76. In March of the latter year he was sent by Congress to France as a political and financial agent, and with instructions to ascertain the temper of the French government concerning the rupture with Great Britain, and to obtain supplies of military stores. His mission was, however, ill-conducted, and he made many extravagant contracts. In September he was commissioned ambassador with Franklin and Lee, negotiated and signed a treaty with France, and secured the services of Lafayette, De Kalb, and other foreign officers. He

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was recalled in 1777 (John Adams succeeding him), and, being charged with financial irregularity by Lee, an investigation of his conduct was ordered by Congress. He evaded answering several charges on the ground that his papers were in France, and, returning thither, found the French government embittered against him. He then made his way to Holland, and thence to Great Britain, where, greatly impoverished, and smarting under a sense of injustice, he died in Deal, Kent, Aug. 23, 1789. In 1842 Congress vindicated him by awarding a considerable sum of money to his heirs. E.E.T

DEARBORN, HENRY, an American soldier; born in Hampton, N. H., Feb. 23, 1751. He was engaged in the practice of medicine at Portsmouth, N. H., when on April 20, 1775, he heard the news of the battle of Lexington. Raising a company of 60 volunteers, he marched to Cambridge, 65 miles distant, and arrived there the next day. He was made a captain, served at Bunker Hill, and accompanied Arnold on his expedition against Quebec, where he was made prisoner. Being exchanged in March, 1777, he served as major under Gates at the capture of Burgoyne, and distinguished himself and his regiment by a charge at the battle of Monmouth, in 1778. He served in Sullivan's campaign against the Indians in 1779, with the army of New Jersey in 1780, at Yorktown in 1781, and in garrison at Saratoga in 1782. He was appointed by Washington United States marshal of the District of Maine in 1789; served in the United States House of Representatives, 1793–97; was Secretary of War under Jefferson, 1801–09; collector of customs at Boston, 1809–12, in which year he was appointed senior major-general in the United States Army. He commanded at the capture of York, Can., 1813, and later in the city of New York. He was minister to Portugal, 1822–24, and died in Roxbury, Mass., June 6, 1829. E.E.T.

DEATH, the cessation of life in animals or plants, when the vital functions cease to perform their work. In a human being, death may result from natural decay, as in old age, or from failure of the heart, the lungs, or the brain. See NUTRITION, Vol. XVII, p. 705.

DEATH-ADDER. See SNAKES, Vol. XXII, p. 209.

DEATH-BED DECLARATION. See WILL, Vol. XXIV, p. 605; EVIDENCE, Vol. VIII, p. 649.

DEATH, CIVIL. Death from a legal point of view, is either natural or civil: the former being the cessation both of physical life and of the legal rights which attach to it; the latter, the cessation of the legal rights whilst the physical life remains. A man was said to be civilly dead, in England, when he had been attainted of treason or felony, or had abjured the realm, or was banished, or became professed in religion by going into a monastery. In these events his property devolved as if he were naturally dead. The doctrine of civil death was abolished in England in 1870 except as to cases of outlawry, in which it seems still to be applicable.

DEATH'S-HEAD MOTH. See BUTTERFLIES, Vol. IV, p. 530.

DEATH VALLEY. See CALIFORNIA, Vol. IV, p. 618, and AMARGOZA DESERT in these Supplements.

DEATH-WATCH, a ticking or rapping noise produced by various insects, particularly *Anobium*, in houses. From the fact that the sound is, in consequence of the prevailing quietude, oftenest heard during times of sickness and anxiety, it has been regarded as indicative of approaching death. See COLEOPTERA, Vol. VI, p. 120.

DEBATABLE LAND, Great Britain, the level moorland district, bounded by the Esk and Sark, on the western border of England and Scotland, formerly claimed by both nations, hence the name. In 1542 a dual royal commission adjudged the upper half to Scotland and the lower to England. It was long a haunt of outlawed freebooters who were effectually eradicated in the 17th century by the deportation of the chief clan to Ireland. Gretna Green, the former haven of eloping lovers, is on the Sark at the border line, 9 miles northwest of Carlisle. C.L.S.

DEBAY, AUGUSTE HYACINTHE, a French painter and sculptor; born at Nantes, 1804. In 1824 he secured the grand prize of the Academy of Fine Arts. Among his more notable pictures are *The Field of the Cloth of Gold*, for the Museum of Versailles; *The Battle of Dreux*; and others of equal merit. His masterpieces in sculpture are the mausoleums of the Archbishop Affre and the Countess of Damas, and the statue of Perrault for the new Louvre; In 1843 Debay executed works for the Church of Saint Peter. at Chaillot, and in 1861 the pediment of the fountain of Saint Michel. He died in 1865.

DEBAY, JEAN-BAPTISTE-JOSEPH, a French sculptor; born at Malines, in 1779. He was a pupil of the Academy of Fine Arts, and chevalier of the Legion of Honor. His works in the Hôtel de Ville and library at Hautes are well known. Among his more important productions are an equestrian statue of Louis XIV for the city of Montpellier; *Pericles*, in the garden of the Tuileries; *Charles Martel*, in the Museum of Versailles; *Colbert*, at the Palace of the Luxembourg; *Saint Sebastian*, in the Church of Saint-Merri; *Saint Matthew*, in the cathedral of Arras. He died in 1864.

DEBLAI. See FORTIFICATIONS, Vol. IX, pp. 378, 384.

DEBORAH, the name of two Biblical characters. The first, mentioned in Genesis xxxv, 8, and xxiv, 59, lived about 1857 B.C. She left Bethuel with Rebekah, and to all indications was Rebekah's nurse. She is mentioned by name but once; on the occasion of her burial under the tree Allonbachuth, at Beth-el.

The second, of whom mention is made in Judges iv and v, lived about 1316 B.C. She was an Israelitish prophetess, called by some a judge. She it was who predicted the death of Jabin, king of Canaan, an enemy of Israel. In all probability, she was a member of the tribe of Ephraim.

DE BOW, JAMES DUNWOODY BROWNSON, journalist; was born at Charleston, S. C., on July 10, 1820, was left an orphan in childhood, but by

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his own exertions was enabled to be graduated from Charleston College in 1843. He practiced law for a short time, and then devoted himself to journalism and literature. He edited the *Southern Quarterly Review;* in 1845 established *De Bow's Review* at New Orleans; in 1848 was made professor of political economy in the University of Louisiana; was superintendent of the seventh census of the United States; compiled a volume entitled *A Statistical View of the United States;* contributed to the *Encyclopædia Britannica*, and was a strong advocate of the secession of the Southern states. During the Civil War he was the agent of the Confederate government for the purchase and sale of cotton. After the war he became president of the Tennessee Pacific Railroad Company, and resumed the publication of his *Review*. He died at Elizabeth, New Jersey, on February 27, 1867. W.F.J.

DEBS, EUGENE V., an American labor leader; born in Terre Haute, Indiana, in 1855, and educated in the public schools, and when 16 years old began work as a painter and railroad fireman. When 26 years old he was chosen a member of the state legislature, where he secured the passage of several laws in the interest of labor. He was grand secretary and treasurer of the Brotherhood of Locomotive Firemen for 14 years. Always an earnest advocate of a federation of railway men, the United Order of Railway Employees was formed through his efforts, and the American Railway Union was organized by him in Chicago, June 20, 1893. It prospered, and became the largest body of railway men in the world, and won a victory in its strike against the Great Northern railway.

In July, 1894, the American Railway Union, under Debs's guidance, espoused the cause of the Pullman Palace Car Company's workmen in their strike for higher wages, and after failing to secure arbitration, ordered a boycott of all Pullman cars, which precipitated a great railroad strike, with Chicago as a storm-center. Cars were derailed or burned and trains stopped by strike sympathizers until President Cleveland ordered Federal troops to the scenes of disturbance to enforce the decrees of the United States Courts, and to prevent interference with the mail service and interstate commerce. Then traffic was gradually resumed with new men and the strike called off. Debs and his fellow-directors of the American Railway Union were indicted for conspiracy, but the trial jury disagreed. They were sentenced to six months in jail by Judge Woods of the United States circuit court, for contempt of court in violating an injunction. An appeal was taken to the United States supreme court, but the decision was confirmed. Debs was a nominee on the Socialist ticket for President in 1900, receiving 87,814 votes, and again in 1904, when he received 402,286 votes.

*DEBT, UNITED STATES NATIONAL. The principal of the public debt at the outbreak of the war was only $64,842,288; the net ordinary receipts about $55,000,000 per annum. To meet the expenses of the war, Congress passed the act of July 17, 1861, in accordance with the suggestions of the Secretary of the Treasury, under which there were issued $50,000,000 bonds, redeemable in 20 years, bearing 6 per cent interest; $139,999,750 treasury notes, called 7.30's, payable in three years, bearing $7\frac{3}{10}$ per cent interest; and $50,000,000 Treasury notes, payable on demand, not bearing interest. The latter were subsequently increased to $60,000,000. These loans were favorably received, and were taken at a little less than par in gold by the state banks, and $189,321,350 of them were refunded into 20-year 6-per-cent bonds, authorized by act of Aug. 5, 1861. When Congress convened on Dec. 2, 1861, the financial condition of the government was more alarming than at any period during the war.

The above-mentioned act of July 17, 1861, gave the Secretary of the Treasury ample authority to borrow money on the credit of the government, but he could not deal with the system of state banks then existing in the several states. He was forbidden by the Subtreasury Act of 1846 to receive notes of state banks, and was required to receive into and pay from the Treasury only the coin of the United States; but by the act of Aug. 5, 1861, he was permitted to deposit, to the credit of the Treasurer of the United States, in such solvent specie-paying banks as he might select, any moneys obtained from loans, the moneys thus deposited to be withdrawn only for transfer to the regularly authorized depositories, or for the payment of public dues, as he might deem expedient. He had, however, no authority to receive from individuals or banks any money but coin. The coin received from the Boston, New York and Philadelphia banks in payment of their subscriptions to the government loans to the amount of nearly $150,000,000, had to be sent all over the United States to meet public obligations, and when thus scattered was not readily returned to the banks, thus exhausting their resources and their ability to loan again.

Mr. Chase, the Secretary of the Treasury, in December, 1862, estimated that there would be needed for the support of the government to June 30, 1863, $277,000,000; for the following year $900,000,000. Thereupon Congress undertook to provide this vast amount, mainly by borrowing, and passed an act, approved Feb. 25, 1862,—the most important loan measure enacted during the war,—authorizing the issue of $150,000,000 United States legal tender notes, of which $50,000,000 were to be in lieu of the demand Treasury notes already described, and the issue of $500,000,000 bonds, redeemable, at the pleasure of the United States, after 5 years, and payable 20 years from date, bearing 6 per cent interest. These were what were known as the 5-20 bonds. The amount of these bonds was subsequently increased $11,000,000.

An act approved July 11, 1862, authorized an additional issue of $150,000,000 legal tender notes. The act of March 3, 1863, authorized the issue of $900,000,000 of bonds, redeemable in

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10 years, and payable in 40 years, known as the 10-40's, bearing 5 per cent interest, specifically exempt from taxation by or under state or municipal authority; also, $400,000,000 interest-bearing Treasury notes, $150,000,000 more of the legal-tender notes, and $50,000,000 of fractional notes. The act of June 30, 1864, authorized an additional loan of $400,000,000, the rate and period to be fixed by the Secretary of the Treasury. All these loans were disposed of at not less than par in the paper currency of the country, and, with the duties and taxes imposed, furnished the means for funding the floating debt and finishing the war. The ascertained debt of the country reached its highest point Aug. 1, 1865, being then, less cash in the Treasury, $2,756,431,571.

Immediately upon the close of the war, with its enormous expenditures, the receipts from taxation began to give relief, but by an act of March 3, 1865, a further issue of $600,000,000 of the so-called 7.30 notes and an indefinite amount of 6-per-cent bonds was authorized, into which might be converted maturing loans and obligations.

The refunding act of July 14, 1870, authorized the issue of $200,000,000 5-per-cent bonds, $300,000,000 4½-per-cent bonds and $1,000,000,000 4-per-cent bonds, all payable, principal and interest, in coin, into which to refund bonds bearing a higher rate of interest. The act of Jan. 20, 1871, increased the amount of 5-per-cent bonds to $500,000,000. By Aug. 24, 1876, all of these 5-per-cent bonds had been sold for refunding purposes, and on that day the sale of $40,000,000 4½'s was contracted for like purpose. On June 9, 1877, the 4-per-cent bonds were placed on the market, and met with much favor. Of the subscriptions received, $45,000,000 of gold coin was reserved to provide for the resumption of specie payments, as authorized by the act of July 14, 1875.

On the 11th of April, 1876, the Secretary of the Treasury, under the authority given in the act of Jan. 14, 1875, sold $50,000,000 of 4½-per-cent bonds for gold coin, also to be used for resumption purposes.

The immediate effect of the resumption of specie payments which followed was to advance the public credit, making it possible to rapidly fund all the bonds of the United States then redeemable into bonds bearing 4 per cent or less interest.

The act of Jan. 25, 1879, extended the process of refunding to the 10-40 bonds bearing interest at the rate of 5 per cent, amounting to $195,000,000, and the act of February, 1879, authorized the issue of ten-dollar certificates of deposit convertible into 4-per-cent bonds.

In April, the refunding operations were for the time concluded, all the 5-20 and 10-40 bonds having been refunded. On the 1st of March, 1881, a bill "to facilitate the refunding of the national debt," having passed both Houses of Congress, was sent to President Hayes, who returned it to Congress with his disapproval. The bill provided for the issue of 3-per-cent bonds, to be exchanged for maturing bonds bearing 5 and 6 per cent, and also provided that no bonds should be taken as security for bank circulation except the 3-per-cents provided for in the bill. This latter provision was the chief objection of the President to the bill, as, in his judgment, the security was insufficient. Thus Congress adjourned without making any provision for refunding the large amount of bonds that became due on or before the 1st of July. These, however, were called in, from time to time, by Secretary Windom, for payment from the surplus revenue, but permission was given the holders of the bonds to have them continued, at the pleasure of the government, with interest at the rate of 3½ per cent. Nearly all the holders preferred to retain their bonds, and thus they were refunded with an annual saving in interest of over ten million dollars.

By a provision of the National Bank Act of July 12, 1882, the Secretary of the Treasury was authorized to receive the 3½-per-cent bonds, and to exchange therefor 3-per-cent bonds. The 3½-per-cent bonds then outstanding amounted to $449,324,000. These were mostly exchanged for 3-per-cents, and all were subsequently paid, from time to time, by surplus revenue. The 4½-per-cent refunding bonds have also been paid from surplus revenue, except about $25,000,000, continued at 2½ per cent, and also a considerable portion of the 4-per-cent bonds.

The bonds sold by the Cleveland administration to reinforce the gold reserve were 5 and 4 per cents, of the description authorized by the refunding act of 1870.

The total interest-bearing bonded indebtedness of the country, March 1, 1896, was $822,615,170, not including about $25,000,000 of 4-per-cent bonds sold, but not then delivered.

See FINANCES OF THE UNITED STATES, in these Supplements. JOHN SHERMAN.

TITLE OF LOAN.	AUTHORIZING ACT.	RATE.	WHEN REDEEMABLE.	OUTSTANDING MARCH 1, 1896.
Funded Loan of 1891	July 14, 1870, and Jan. 20, 1871	4½ per cent—Cont'd at 2%	Option U. S.	$25,364,500
Funded Loan of 1907	July 14, 1870, and Jan. 20, 1871	4 per cent	July 1, 1907	559,634,300
Refunding Certificates	Feb. 26, 1879	4 per cent		48,720
Loan of 1904	Jan. 14, 1875	5 per cent	Feb. 1, 1904	100,000,000
Loan of 1925	Jan. 14, 1875	4 per cent	Feb. 1, 1925	137,567,650
Aggregate of interest-bearing debt, exclusive of United States bonds issued to Pacific railroads				$822,615,170

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DEBTS OF VARIOUS COUNTRIES. The following table shows the indebtedness of foreign nations, in the years 1890 and 1900, in U. S. currency:

NAMES OF COUNTRIES.	NET DEBT.		DEBT PER CAPITA.	
	1890	1900	1890	1900
Argentina (1901).	$284,867,069	$434,921,005	$70.40	$90.40
Austria-Hungary.	2,866,339,539	2,485,817,723	70.80	56.75
Belgium (1901) .	380,504,099	530,179,630	63.10	77.55
Bolivia	14,763,367	2,009,415	12.38	1.12
Brazil	585,345,927	621,762,500	41.80	43.50
Chile	85,192,339	116,250,000	31.96	42.80
Colombia	63,451,583	18,777,061	16.36	4.70
Denmark	33,004,722	58,660,456	15.66	23.80
France (January 1, 1901)	4,564,808,000	6,019,320,500	120.65	156.00
Germany—				
Empire proper.	77,577,719	604,800,000	1.57	10.70
Bavaria.	335,503,105	365,043,304	60.03	59.00
Hamburg	59,202,946	105,570,520	94.85	137.26
Prussia (1901)	1,109,384,127	1,650,700,614	37.03	47.08
Saxony	143,897,747	219,291,862	41.11	52.21
Würtemberg	107,735,500	123,792,137	52.93	56.50
Great Britain and Ireland (1901)	3,350,719,563	3,528,619,390	87.79	84.81
India	881,003,592	1,022,217,618	3.27	3.47
Cape of Good Hope	110,817,720	157,048,775	77.56	68.83
Mauritius	8,464,662	5,946,420	22.92	16.05
Natal	22,028,424	45,095,715	45.76	48.58
Canada	237,533,212	265,493,807	47.51	49.36
New S. Wales	233,289,245	326,664,965	214.87	240.64
New Zealand (1901)	184,898,305	242,788,755	298.01	317.00
Queensland	129,204,750	179,492,070	333.46	356.65
South Australia	202,177,500	130,658,900	321.00	360.31
Tasmania	23,335,345	42,555,025	147.46	246.72
Victoria.	179,614,005	241,904,295	161.63	201.43
W. Australia	6,509,736	63,547,150	150.23	348.10
Gréece	107,306,518	173,795,796	49.06	71.40
Guatemala	10,825,836	26,273,468	7.59	16.66
Haiti	13,500,000	28,447,916	14.06	23.41
Honduras	63,394,267	93,808,110	146.77	159.67
Italy	2,324,826,329	2,665,024,950	76.06	81.85
Japan	305,727,816	251,483,625	7.83	5.74
Mexico	113,606,675	180,858,418	9.98	13.35
Netherlands	430,589,858	462,155,775	95.56	89.23
Nicaragua	1,711,206	4,595,474	4.28	9.19
Paraguay	19,633,013	43,528,590	59.56	69.08
Peru	382,175,655	23,795,880	145.77	51.61
Portugal	633,426,840	915,308,742	130.66	168.60
Rumania	180,145,800	286,403,103	32.75	48.44
Russia	4,010,018,074	3,282,738,820	30.79	25.44
Salvador	6,033,300	10,854,876	9.05	10.77
Servia	60,811,330	84,480,536	30.20	33.78
Spain	1,251,453,696	1,930,300,000	73.85	107.20
Sweden & Norway				
Sweden	64,220,807	87,414,405	13.53	17.01
Norway	13,973,752	62,977,020	7.13	28.11
Switzerland	10,912,925	18,484,877	3.72	5.57
Turkey (1901)	729,507,200	793,877,285	34.70	25.58
Egypt	517,278,200	513,570,900	75.88	52.29
United States	1,552,140,205	2,136,961,092	24.78	28.00

See NATIONAL DEBT, Vol. XVII, pp 249–254.

DECACHORD, a sort of guitar, with ten strings, similar to the common instrument, only larger in the body and with a broader finger-board. It was generally triangular in shape, and was much used by the ancient Greeks, and is still used in some parts of Greece to-day.

DECADENCE (literally, "a falling into decay"), a term referring to those works of art produced after the school to which they belong has passed the period of its highest excellence. In the days of Pericles, art in all its branches attained its greatest perfection in Greece, and the many exquisite works produced at a later date belong, more or less conspicuously, to the decadence of Greek art. Art and literature culminated in Rome in the days of Augustus, and obvious and rapid decadence followed. The school of the Renaissance again came into perfection with Raphael; even the Caracci belong to its decadence, and the decline continued through the rococo of Louis Quinze, till throughout Europe art became almost extinct, and in England it probably reached as low a point at the beginning of the reign of George IV as it ever reached in any civilized country.

DECAGON, a plane geometrical figure of ten sides. A regular decagon is one with equal sides and equal included angles. See GEOMETRY, Vol. X, p. 340.

DECAISNE, JOSEPH, botanist; was born in Belgium on March 18, 1807, and was educated as a physician and botanist. For many years he was connected with the Paris Museum of Natural History, and in 1851 was made director of the Botanical Garden in that city. There he paid much attention to the physiology of potatoes, yams, madder, and other plants of value for food or in the arts. He wrote a *Systematic Botany*, a treatise on the diseases of potatoes, and other works. He died February 8, 1882. W.F.J.

DECAISNEA, a genus of plants of the family *Berberidaceæ*. There is but one species, found in the Himalaya Mountains, where it grows at an elevation of 7,000 feet, and is the only one of the family which is not a climber. From the root project several straight branches, like walking-sticks, bearing pinnate leaves two feet in length, which stand out horizontally. The green flowers, growing in racemes, are unisexual, and the yellow fruit, having a length of about four inches and a diameter of one inch, resembles a short cucumber and contains large black seeds. The soft, milky pulp is sweet and wholesome, and is eaten by the inhabitants of the region.

DECALCOMANIA, the process of transferring designs upon various fabrics. The design is called, in the trade, "decalcomanie." The first use to which this class of work was put was the marking of glass clock-dials, some thirty years ago. An American carriage-painter was the first to use decalcomanie for the ornamentation of vehicles. The superior merit of transfers soon became known to all the trade in any way connected with the use of paints and enamels, until now they are used altogether on carriages, agricultural implements, sewing-machines, bicycles, stoves, safes, scales, typewriters, pianos, refrigerators, iron and wooden machinery, japanned and wooden articles, advertising and window signs, and a score of other articles. The lithograph is made in reverse on prepared paper, and when it is desired to make the transfer, varnish is applied to the face of the decalcomanie and it is firmly pressed upon the article to be decorated. Upon the application of moisture, the chemical preparation joining the design and the paper upon which it is fixed softens,

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and the paper is withdrawn, leaving the design permanently transferred. It is then coated with varnish, or, in the case of transferring upon silk, with cement, which renders it water-proof and durable. Many hundreds of thousands of dollars' worth of these transfers are used annually in the United States, where they are now manufactured, but until recently Germany was the only source of supply.

DECALITER. See WEIGHTS AND MEASURES, Vol. XXIV, p. 517.

DE CAMP, JOHN, naval commander, was born in New Jersey in 1812, and entered the navy in 1827. He spent his life in active service, and was successively promoted to be lieutenant in 1838, commander in 1855, captain in 1862, and commodore in 1867. He was placed upon the retired list in 1868, and was made rear-admiral, retired, in 1870. Before the Civil War he served largely in foreign waters, including South American, West Indian and African, and at the New York navy-yard. In the Civil War he was attached to the Mississippi and North Atlantic squadrons and commanded the *Iroquois*. After the war he commanded the Pensacola and Philadelphia navy-yards. He died on June 24, 1875. W.F.J.

DE CANDOLLE, ALPHONSE LOUIS PIERRE PYRAMUS, a Swiss botanist, son of Augustin Pyramus De Candolle (q.v., Vol. VII, p. 18); born in Paris, Oct. 27, 1806; died April 9, 1893. In 1831 he became professor of botany in the Academy of Geneva, but resigned a few years later. He was elected president of the International Botanical Congress at London in 1866, and in the following year of the congress at Paris. He held important offices in several scientific societies. He was decorated with the cross of the Legion of Honor. He published a number of valuable treatises; among them, *Introduction to the Study of Botany* (1835); *Rules for the Nomenclature of Botany* (1867); *History of Science and Scientists* (1872); *The Beginning of Plant Cultivation* (1883); and edited his father's *Elementary Theory of Botany*, and continued his *Introduction to Natural History*.—His son, ANNE CASIMIR PYRAMUS, botanist, was born in Geneva, Feb. 26, 1836. He assisted his father in the *Introduction* and other works, and has written, as the result of his own investigation, *Production of Cork* (1860); *Structure of the Leaves of Dicotyledonous Plants* (1879); and *Recent Investigations of the Piperaceæ* (1882). He was made an honorary doctor of the University of Rostock.

DECAPITATION. See GUILLOTINE, Vol. XI, p. 233; and CAPITAL PUNISHMENT, in these Supplements.

DECAPODA. See MOLLUSCA, Vol. XVI, p. 694.

DECATUR, a village of central northern Alabama, the capital of Morgan County, situated on the Tennessee River, 75 miles N. of Birmingham, on the Louisville and Nashville and Memphis and Charleston railroads. It has an academy, churches, hotels, lumber-mills and a basket factory. Population 1890, 2,765; 1900, 3,114.

DECATUR, a small village of northwestern-central Georgia, the capital of De Kalb County; 5 miles N.E. of Atlanta, on the Georgia and Seaboard Air Line railroads, and is the home of many people who do business in that city. It has schools, churches, a furniture factory, and some agricultural trade. Population 1900, 1,418.

DECATUR, a city of eastern central Illinois, and capital of Macon County (see DECATUR, Vol. VII, p. 18). Decatur has seven lines of railway, a system of water-works, a large woolen mill, three flouring-mills, two breweries, a planing-mill, and manufactories of iron, carriages, engines and boilers, farming implements, furniture, linseed-oil, bagging, etc. It has an excellent system of public schools, a high school, a Roman Catholic academy and a convent. Population 1880, 9,547; 1890, 16,841; 1900, 20,754.

DECATUR, a city and the county seat of Adams County, Indiana, on the eastern border of that state. It lies on the St. Mary's River, a tributary of the Maumee, in an agricultural region, 22 miles southeast of Fort Wayne, and 100 miles northeast of Indianapolis. It is reached by the Erie, the Grand Rapids and Indiana, and the Toledo, St. Louis and Kansas City railroads. Its population in 1900 was 4,142. W.F.J.

DECATUR, a village of Van Buren County, southwestern Michigan, 23 miles S.W. of Kalamazoo, on the Michigan Central railroad. It has a foundry, tannery, and manufactures lumber and flour. Population 1900, 1,356.

DECATUR, a village, and the capital of Wise County, northern central Texas, situated 65 miles N.W. of Dallas, on the Fort Worth and Denver City railroad. Flour is here manufactured. Population 1900, 1,562.

DECATUR, STEPHEN, an American naval officer; born in Newport, Rhode Island, in 1751. He was the father of Commodore Stephen Decatur (q. v.). He commanded a privateer during the Revolution and in 1798 while captain of the *Delaware* captured two French ships. In 1800 he was placed in command of an American fleet of thirteen vessels. In 1801 he retired to Philadelphia, where he died November 14, 1808. W.M.C.

DECATUR, STEPHEN, an American naval officer; born in Sinnepuxent on the Chesapeake River, Maryland, January 5, 1779. He saw early service at sea on his father's ships and entered the navy at the age of nineteen, as a midshipman. He made three voyages to the Mediterranean under Commodores Dale, Morris, and Prebel. He arrived the third time just after the frigate *Philadelphia*, which had run aground on the Barbary coast, had fallen into the hands of the Tripolitans. He immediately formed the project of recapturing or destroying her, and having obtained the con-

STEPHEN DECATUR.

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sent of Commodore Preble, he sailed for Syracuse, February 3, 1804, in the *Intrepid* with 70 volunteers, accompanied by the United States brig *Syren*. In a few days he arrived at the harbor of Tripoli, which he entered in the evening alone, as he was unwilling to wait for the boats of the *Syren*, which was several miles distant. The enterprise was extremely hazardous, for the *Philadelphia* was moored within half gunshot of the Turkish castle and of the principal battery. Two cruisers and several gunboats were close at hand. His object was not suspected, until he was almost alongside the frigate, when the Turks were thrown into the utmost confusion. Decatur sprang aboard with his men and the Turks were soon overpowered. About twenty men were killed; many jumped overboard; and the rest were driven to the hold. After setting fire to the ship, Decatur retreated and soon got beyond the reach of the enemy's guns which had opened a fire upon him from the batteries and castle and two corsairs. For this daring exploit the American Congress gave him a vote of thanks and a sword, and the President immediately sent him a captaincy. At the bombardment of Tripoli in the following year, he distinguished himself by the capture of two of the enemy's boats, which were moored along the mouth of the harbor and immediately under the batteries. When peace was concluded with Tripoli, Decatur returned home in the *Congress*, and afterward succeeded Commodore Barron in the command of the *Chesapeake*. In the war between Great Britain and the United States, his chief exploit was the capture of the British *Macedonian*, commanded by Captain Carden. In January, 1815, he attempted to sail from New York, which was then blockaded by four British ships; but the frigate under his command was injured in passing the bar, and was captured by the whole squadron, after a running fight of two or three hours. He was released after the conclusion of peace, and was appointed one of the Board of Naval Commissioners at Washington. During the year 1819 he had a quarrel with Commodore James Barron, resulting in a challenge from Barron. They fought at Bladensburgh, March 22, 1820. Decatur was mortally wounded and died within a few hours. Consult Waldo's *Life and Character of Stephen Decatur* (1822). W.M.C.

DECATURVILLE, the county seat of Decatur County, western Tennessee, 50 miles E. of Jackson. It is the seat of a seminary. Its industry is handling the products of the neighborhood, corn, cotton, pork and lumber. Population, 1895, nearly 500.

DECAZES, Elie, Duc de, a French statesman; born Sept. 28, 1780, at St. Martin-de-Laye. During the Consulate he moved to Paris and held several offices under Napoleon I. After the fall of Napoleon he sided with the Bourbons, was, in 1815, appointed Minister of Police, and, in 1818, Prime Minister by King Louis XVIII. Accused of complicity in the assassination of Duc de Barry, he was forced to resign in 1820, but was made a duke and appointed ambassador to London, which post he gave up in 1821. After the revolution of July, 1830, he sided with the Orleanists, and was made grand referendary of the Chamber of Peers. In 1848 he retired from active politics, and died Oct. 25, 1860, at Decazeville, which town he had founded. G.A.S.

DECEIT, a fraudulent misrepresentation by one person, whereby another, who has no means of detecting the fraud, is deceived and suffers injury thereby. An action may be maintained by one person against another, who is chargeable with deceit, to recover the damages he has suffered by reason of the misrepresentation. In an action for deceit it is necessary to show the fraudulent intent, the injury which has resulted from the act, and that the person deceived did not have the means of detecting the fraud. The intent will generally be presumed to be fraudulent if the representation was untrue, and known to be untrue by the party making it, especially if made in response to inquiries by the party to whom the representation was made, or for the apparent purpose of influencing his acts. Actions for deceit are of frequent occurrence in cases where fraudulent representations as to the financial responsibility of another induce the party deceived to extend credit, whereby he sustains a loss. In such cases the party guilty of the fraud must pay the loss. See False Pretenses, in these Supplements.

DECHAMPS, Victor Auguste Isidore, prelate; was born at Melle, Belgium, on December 6, 1810. He entered the Roman Catholic priesthood, was noted as a pulpit orator, became bishop of Namur in 1865, archbishop of Mechlin in 1867, and a cardinal in 1879. He was a leader of the Ultramontane faction of the church. He died at Mechlin on September 29, 1883. W.F.J.

DECIDUOUS TEETH or MILK-TEETH. See Mammalia, Vol. XV, p. 354.

DECIDUOUS TREES, those trees which lose and renew their leaves every year. In cold and temperate countries the fall of leaves in autumn and the restoration of verdure to the woods in spring are among the most familiar phenomena of nature. For deciduous ornamental trees, see Arboriculture, Vol. II, pp. 280, 281.

DECIMATION, a Roman military punishment, rarely inflicted at the present day. When a considerable body of troops committed some grave military offense, which would be punished with death if committed by an individual, the punishment was awarded to one-tenth of them by lot, instead of the whole number, in order that the army might not be too much weakened.

DECIPIUM, a new element discovered by Delafontaine in 1878. Its atomic weight is about 171. It is very rare and little is known about its properties.

DECIUS, Gajus Messius Quintus Trajanus, Roman emperor from 249–251 A.C.; born in 201 at Bubalia, Lower Pannonia. He was a senator under Emperor Philip, who sent him to suppress a revolt of the legions in Moesia. This accom-

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plished, the troops forced him to accept the imperial crown. In the struggle for supremacy Philip lost his throne and life at Verona in 249. During his short reign Decius persecuted the Christians with the utmost cruelty. In 251 he fell against the Goths in the battle of Forum Trebonii. G.A.S.

DECIUS MUS. See MUS, Vol. XVII, p. 70.

DECKER, SIR MATTHEW, a political economist; born at Amsterdam toward the end of the seventeenth century; died in 1749. In 1702 he went to London and the next year was naturalized as an English subject. Having embarked in commerce, he attained much success. In 1716 he became baronet, three years after which he entered Parliament as member for Bishop's Castle. He is best known among political economists by his theory of a tax on houses, by which all revenue was to be raised. He published, in 1743, a pamphlet on the subject, which attracted much attention. He wrote, also, *Causes of the Decline of the Foreign Trade* (1744); and *Considerations on High Duties* (1743).

DECLARATION, in law, is a technical term referring to the first pleading filed by the plaintiff in a suit at law. It corresponds to the bill in a suit in chancery. It must contain, in proper legal form, a specification of the claim upon which the plaintiff relies, so stated as to apprise the opposite party of the nature of the plaintiff's demand against him. This pleading is sometimes called the complaint, especially in states which have adopted a code of procedure.

The primary meaning of the word is a statement made concerning a transaction by a party thereto, or who has some interest in the transaction. Testimony as to the declarations of a party interested in a transaction or in the fact stated is frequently admitted as evidence. Thus when the fact in question is, whether the declaration was made, evidence of the declaration is admissible. So in cases of the declarations of deceased persons nearly related to the parties in question, as to questions of pedigree. Also as to matters of public or general interest, as in case of reputation. Declarations made by a party against his interest are also original evidence. See also DECLARATION, Vol. VII, p. 20. As to dying or death-bed declarations, see EVIDENCE, Vol. VIII, p. 649; and WILL, Vol. XXIV, p. 605.

DECLARATION OF INDEPENDENCE. The Continental Congress, in session at Philadelphia (for an account of which see UNITED STATES, Vol. XXIII, p. 785), on July 4, 1776, unanimously adopted the following:

DECLARATION OF INDEPENDENCE.

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume, among the powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident: that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness. That, to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that, whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute a new government, laying its foundation on such principles, and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established should not be changed for light and transient causes; and, accordingly, all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security. Such has been the patient sufferance of these colonies, and such is now the necessity which constrains them to alter their former systems of government. The history of the present king of Great Britain is a history of repeated injuries and usurpations, all having, in direct object, the establishment of an absolute tyranny over these states. To prove this, let facts be submitted to a candid world:

He has refused his assent to laws the most wholesome and necessary for the public good.

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained; and when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the legislature,—a right inestimable to them, and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses repeatedly, for opposing, with manly firmness, his invasions on the rights of the people.

He has refused, for a long time after such dissolutions, to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise; the state remaining, in the mean time, exposed to all the danger of invasion from without and convulsions within.

He has endeavored to prevent the population of these states; for that purpose obstructing the laws for naturalization of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands.

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers.

He has made judges dependent on his will alone for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of new offices, and sent hither swarms of officers to harass our people and eat out their substance.

He has kept among us, in times of peace, standing armies, without the consent of our legislature.

He has affected to render the military independent of and superior to the civil power.

He has combined, with others, to subject us to a jurisdiction foreign to our constitution, and unacknowledged by our laws; giving his assent to their acts of pretended legislation:

For quartering large bodies of armed troops among us;

For protecting them, by a mock trial, from punishment for any murders which they should commit on the inhabitants of these states;

For cutting off our trade with all parts of the world;

For imposing taxes on us without our consent;

For depriving us, in many cases, of the benefits of trial by jury;

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For transporting us beyond seas to be tried for pretended offenses;

For abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries, so as to render it at once an example and fit instrument for introducing the same absolute rule into these colonies;

For taking away our charters, abolishing our most valuable laws, and altering, fundamentally, the powers of our governments;

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection, and waging war against us.

He has plundered our seas, ravaged our coasts, burnt our towns, and destroyed the lives of our people.

He is, at this time, transporting large armies of foreign mercenaries to complete the works of death, desolation, and tyranny already begun, with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation.

He has constrained our fellow-citizens, taken captive on the high seas, to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

He has excited domestic insurrections amongst us, and has endeavored to bring on the inhabitants of our frontiers the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes and conditions.

In every stage of these oppressions we have petitioned for redress, in the most humble terms; our repeated petitions have been answered only by repeated injury. A prince whose character is thus marked by every act which may define a tyrant is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them, from time to time, of attempts made by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them, by the ties of our common kindred, to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They, too, have been deaf to the voice of justice and consanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind, enemies in war,—in peace, friends.

We, therefore, the representatives of the United States of America, in General Congress assembled, appealing to the Supreme Judge of the World for the rectitude of our intentions, do, in the name and by the authority of the good people of these colonies, solemnly publish and declare, that these United Colonies are, and of right ought to be, free and independent states; that they are absolved from all allegiance to the British crown, and that all political connection between them and the state of Great Britain is, and ought to be, totally dissolved; and that, as free and independent states, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent states may of right do. And, for the support of this declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other our lives, our fortunes and our sacred honor.

The Declaration was signed as follows:

New Hampshire.
JOSIAH BARTLETT.
WILLIAM WHIPPLE.
MATTHEW THORNTON.

Rhode Island.
STEPHEN HOPKINS.
WILLIAM ELLERY.

Massachusetts.
JOHN HANCOCK.
SAMUEL ADAMS.
JOHN ADAMS.
ROBERT TREAT PAINE.
ELBRIDGE GERRY.

Connecticut.
ROGER SHERMAN.
SAMUEL HUNTINGTON.
WILLIAM WILLIAMS.
OLIVER WOLCOTT.

New York.
WILLIAM FLOYD.
PHILIP LIVINGSTON.
FRANCIS LEWIS.
LEWIS MORRIS.

New Jersey.
RICHARD STOCKTON.
JOHN WITHERSPOON.
FRANCIS HOPKINSON.
JOHN HART.
ABRAHAM CLARK.

Pennsylvania.
ROBERT MORRIS.
BENJAMIN RUSH.
BENJAMIN FRANKLIN.
JOHN MORTON.
GEORGE CLYMER.
JAMES SMITH.
GEORGE TAYLOR.
JAMES WILSON.
GEORGE ROSS.

Delaware.
CÆSAR RODNEY.
GEORGE READ.
THOMAS MCKEAN.

Maryland.
SAMUEL CHASE.
WILLIAM PACA.
THOMAS STONE.
CHARLES CARROLL of Carrollton.

Virginia.
GEORGE WYTHE.
RICHARD HENRY LEE.
THOMAS JEFFERSON.
BENJAMIN HARRISON.
THOMAS NELSON, JR.
FRANCIS LIGHTFOOT LEE.
CARTER BRAXTON.

North Carolina.
WILLIAM HOOPER.
JOSEPH HEWES.
JOHN PENN.

South Carolina.
EDWARD RUTLEDGE.
THOMAS HEYWARD, JR.
THOMAS LYNCH, JR.
ARTHUR MIDDLETON.

Georgia.
BUTTON GWINNETT.
LYMAN HALL.
GEORGE WALTON.

DECLARATION OF INDULGENCE. See ENGLAND, Vol. VIII, pp. 313, 314.

DECLARATION OF RIGHTS. See BILL OF RIGHTS, Vol. XX, p. 569.

DECLARATION OF WAR, a formal announcement of the beginning of hostilities between two states. It was the custom of the Romans to issue some formal declaration acquainting the citizens of Rome with the commencement of war. Later, in the days of feudalism and knighthood, it was the practice to send a herald to the state upon which war was to be made, who made an oral declaration of the reasons for the war and of its immediate beginning. In modern times, before the invention of the telegraph and the construction of the railroad, ample notice was given not only to the enemy, but also to the neutrals engaged in commerce with the belligerents. It is now no longer customary to send the enemy a formal announcement, but notice is given neutral states, and the citizens of the governments about to engage in war are notified by their own governments. The need of such declaration no longer exists, owing to the telegraph and other modern inventions. The power of declaring war rests, in the United States, with Congress.

DECLINATION. See ASTRONOMY, Vol. II, p. 668.

DECLINATION NEEDLE, a magnetic needle which, when suspended or made to rest on a point so that it can move in a horizontal plane, rests in a line connecting two fixed points of the horizon; to which position, when turned aside in any direction, it invariably returns after several oscillations. These two points at certain places on the globe are the north and south points of the horizon, although there is usually a slight deviation from these points. A magnetic meridian is the vertical plane passing through the points on the horizon indicated by the needle; and a similar plane, passing through the north and south points, is called the astronomical meridian of the place. See MAGNETISM, Vol. XV, pp. 220, 239.

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DECLINOMETER. See METEOROLOGY, Vol. XVI, p. 167.

DECOLORIMETER, an instrument by which the power of portions of bone-black, or animal charcoal, to abstract coloring matter is ascertained; a measurer of the effects of bleaching-powder. It is a graduated tube charged with a test-solution of indigo or molasses.

DECOMPOSITION, a term in chemistry signifying the separation of more simple substances from a compound. Thus the red oxide of mercury, when heated, resolves into mercury and oxygen, thus undergoing decomposition; and water under a current of voltaic electricity is decomposed into hydrogen and oxygen. See *Chemical Action*, under CHEMISTRY, Vol. V, pp. 411, 412.

DE CONINCK, PIERRE LOUIS JOSEPH, a French artist; born at Méteren, France, Nov. 22, 1828. He studied under Leon Cogniet. He exhibited at Rome in 1855, and at the Paris Salon in 1857. He obtained medals in the Salons of 1866, 1868, 1875, and at the Universal Exposition of 1889, and was made a chevalier of the Legion of Honor. Among his paintings are *Moccoli*: *The End of the Carnival at Rome* (1877); *Portrait of a Trappist* (1885); *Cornelia* (1878); and *The Gardener* (1889).

DECORAH, a city and the county seat of Winneshiek County, Iowa, in the northeastern part of that state. It lies on the Iowa River, in a level agricultural country, and is reached by the Chicago, Milwaukee and St. Paul railroad. Its population was 3,246 in 1900. W.F.J.

DECORATED STYLE. See (ENGLISH GOTHIC) ARCHITECTURE, Vol. II, pp. 372–375.

DECORATION DAY, also called MEMORIAL DAY, is an anniversary set apart on May 30, soon after the Civil War, for the decoration of the graves of soldiers with flowers, and the delivery of memorial orations. It has been made a legal holiday in most of the states, and in recent years has lost much of its solemn significance, being given up largely to out-of-door sports and merrymaking. W.F.J.

DECORATIVE ART. See MURAL DECORATION, Vol. XVII, p. 40; POTTERY, Vol. XIX, pp. 629–644; JAPAN, Vol. XIII, pp. 598–602.

DE COSTA, BENJAMIN FRANKLIN, clergyman and author, was born at Charlestown, Mass., on July 10, 1831, and entered the ministry of the Protestant Episcopal Church in 1857. He was rector at North Adams, Mass., and at Newton Lower Falls, and a chaplain in the army in the Civil War. Afterward he edited successively the *Christian Times*, the *Episcopalian*, and the *Magazine of American History*. For eighteen years he was an Episcopalian rector in New York City. Then, in 1899, he joined the Roman Catholic Church. He organized in 1884, and was first president of, the White Cross Society, was an active worker in the temperance cause, and was an officer of the Huguenot Society. He was the author of a number of books, including *The Pre-Columbian Discovery of America by the Northmen*, *The Northmen in Maine*, *The Moabite Stone*, *Verrazano, the Explorer*, and *The Rector of Roxburgh*, a novel. W.F.J.

DECREPITATION, a term applied to the crackling sound heard when a substance like common salt is thrown into the fire. A series of minute explosions occurs, owing to the water between the plates of the crystalline particles becoming expanded by the heat, and ultimately bursting them.

DECRESCENDO, in music, the reverse of crescendo; namely, gradual diminishing of the sound. The execution of the decrescendo is very difficult, whether on one or more notes. Like the crescendo, it is also frequently combined with a slight ritardando, especially in descending passages. It is indicated by *dec.* or *decres.*, or by the mark >.

DECRETALS, FALSE, a collection of forged papal decrees, compiled by a West Frankish priest in the middle of the ninth century, but erroneously ascribed to Isidor of Seville. See CANONIC LAW, Vol. V, p. 16. G.A.S.

DECUSSATION, the crossing of two nerves, rays or lines which meet in a point and then diverge. For *Decussation of the Pyramids*, see ANATOMY, Vol. I, p. 764.

DEDHAM, a suburban town and the county seat of Norfolk County, Massachusetts, 10 miles south of Boston. It lies on the Charles River, is a favorite place of residence, contains some fine public buildings, and has extensive manufacturing industries. It is reached by two divisions of the New York, New Haven and Hartford railroad. Its population in 1900 was 7,457. W.F.J.

DEDICATION, in law, is the act of setting apart land for some public use by the owner, and which the public, or the proper officer on its behalf, accepts for such uses. Thus when the owner lays out and plats a tract of land and devotes certain portions thereof to public streets and alleys, and the public, through its proper officers, accepts the same, this act constitutes a dedication and precludes the owner from exercising control over it. Dedication may be either express, as when made by deed or other formal or direct manner, or it may be implied from the acts of the owner, as when he acquiesces in the use by the public under circumstances which indicate that he intended a dedication.

DE DONIS CONDITIONALIBUS, THE STATUTE, a law passed in England, A.D. 1285, the object of which was to prevent the alienation of property by one who held a limited interest therein. Similar statutes are now enforced in many of the United States.

DEDUCTION. See A PRIORI, Vol. II, p. 187.

DEEMS, CHARLES FORGE, an American clergyman and author; born in Baltimore, Maryland, December 4, 1820. He was graduated from Dickinson College at the age of nineteen, studied theology and was ordained a minister of the Methodist Episcopal Church. He held several pastorates and in 1842 was made professor of logic in the University of North Carolina. Three years later he was appointed professor of chemis-

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try at Randolph-Macon College and from 1850 to 1855 was president of Greensboro Female College. In 1866 he was called to the pulpit of the Church of the Strangers in New York city, where he remained until his death. He was well known as an editor and author and wrote among other works: *Triumph of Peace and Other Poems* (1840); *The Light of the Nations* (1870); *Weights and Wings* (1872); *Chips and Chunks for Every Fireside* (1892). At various times he was editor of the *Southern Methodist Pulpit; The Annals of Southern Methodism*, and *Frank Leslie's Sunday Magazine*. He died in New York city, November 18, 1893. W.M.C.

DEEMSTER. See MAN, ISLE OF, Vol. XV, p. 459.

DEEP BOTTOM, a point on the James River, in Henrico County, eastern Virginia, 12 miles below Richmond. It was a strategic point during the Civil War, and important battles were fought in the vicinity in the year 1864.

DEEP RIVER, a village of Middlesex County, central southern Connecticut, situated near the west bank of the Connecticut River, about 35 miles S. of Hartford, on the New York, New Haven and Hartford railroad. The chief industry is the manufacturing of hardware. Population 1890, 1,297.

DEEP RIVER, of North Carolina, rises in Guilford County, follows a southeasterly course and unites with Haw River at Haywood, to form the Cape Fear River. Deep River is about 130 miles long. In Chatham and Moore counties are found the Deep River coal-beds, a tract of land containing about 40 square miles, lying along the Deep River valley. The coal is of good quality, varying from bituminous to anthracite. Although the coal is abundant, and its location known for over a century, it has not been mined. In the same region good copper and iron ores are found.

DEEP-SEA EXPLORATION. See DREDGE, Vol. VII, pp. 398 et seq.

DEERFIELD, a historic village in Franklin County, northwestern Massachusetts, on the Boston and Maine and New York, New Haven and Hartford railroads. In 1675 it was the scene of "Bloody Brook massacre," and in 1703 the French and Indians burned the village. It is a railroad center, and possesses many attractions of scenery for the tourist. Population 1900, 1,969.

DEE RIVER. See CHESHIRE, Vol. V, p. 511.

DEER LODGE CITY, the capital of Deer Lodge County, western Montana, situated on a creek of the same name, on the Montana Union railroad, about 50 miles S.W. of Helena. The region is mountainous, and gold is found. Population 1890, 1,463; 1900, 1,324.

DEER-MOUSE OR JUMPING-MOUSE, a genus of American rodent quadrupeds, allied to mice and to jerboas. See JERBOA, Vol. XIII, pp. 636, 637.

DEER PARK, a township of Orange County, southern New York, drained by the Neversink River and intersected by the New York, Lake Erie and Western railroad. The Delaware River bounds it on the southwest. Pop. 1900, 11,317.

DEER, VIRGINIA. See CARIACOU, in these Supplements.

DE FACTO, a legal term used to denote a condition actually existing, or a thing which has been done. It is frequently used in contradistinction to *de jure*, which means, of right. Thus an officer *de facto* is one who in fact exercises the functions of the office with apparent right, but who is not actually qualified in law as such officer. A *de facto* government is one completely established, and actually exercising control, but whose control is not recognized as permanent or rightful.

DEFAULT, in law, is the failure of the defendant in a suit to appear in proper time and make his defense, or of the plaintiff to prosecute his claim against the defendant. Upon default of the defendant, judgment by default may be rendered against him, in accordance with the claim set forth in the declaration. Upon default of the plaintiff, a nonsuit may be entered against him. Usually, in suits to recover a definite liquidated sum of money, a judgment may be entered against the defendant upon his default in pleading to the action without the hearing of proofs, provided the plaintiff has filed with his declaration an affidavit of the amount due him. Default, in its general sense, means the failure of a party to perform a duty or undertaking.

DEFEASANCE, a collateral instrument, usually made at the same time or in connection with the same transaction as another conveyance, and which contains conditions which, if performed, will defeat the estate created by the other deed. Thus a bond for the reconveyance of an estate upon the payment of a certain sum at a specified time, and delivered at the same time the estate is conveyed, is a defeasance, and if the condition is performed by the payment of the money at the time agreed, the deed of conveyance will be defeated. An instrument of defeasance must be of as high a nature as the principal deed, and must be recorded, to be binding as against a stranger without notice.

DEFENDER OF THE MARRIAGE TIE, the title of a functionary of the Roman Catholic Church, the nature of whose duties is indicated by the title. In that church marriage has always been regarded as a sacrament, which is properly to be celebrated by the authorized clergy and by nobody else, and which, therefore, is not to be annulled by divorce, by the civil power, or by any power short of the Pope himself through a special dispensation, which latter has very seldom been granted, and then only for extraordinary causes. In order to maintain the sanctity of marriage against the growing practice of civil divorce, Pope Benedict XIV, in 1741, created the office of *Defensor Matrimonii*, the holder of which serves as an attorney or referee, to prevent if possible what the church regards as a violation of the sacrament. Such officers were not established in America until 1884, but since then they

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have been multiplied in numbers until each diocese contains one. They have no authoritative status under the civil law, but are often able to employ their offices with effect in dissuading Catholics from seeking divorce in the courts. W.F.J.

DEFENSE, the resistance of an attack. Self-defense, in case of an attack with force, when the person attacked cannot otherwise avoid injury, is a natural right which the law recognizes. A man is also permitted to repel force by force for the purpose of protecting his family and property. If one kills an assailant while protecting himself, his family, or even his property, and while using only means proportionate to the occasion, he will be justified, provided the act from which he attempts protection would if carried out, constitute a felony.

DEFIANCE, capital of Defiance County, northwestern Ohio, on the Maumee River, where it is joined by the Tiffin, about 50 miles S.W. of Toledo, and about 44 miles N.E. of Fort Wayne, Indiana. It is on the Wabash railroad, the Wabash and Erie canal, and the Baltimore, Pittsburgh and Chicago railroad. It publishes two weekly newspapers, and contains a seminary for women, and several manufactories. Population 1890, 7,694; 1900, 7,579.

DEFLAGRATION, a sharp, quick combustion; an example is the rapid combustion of ignited charcoal, where a nitrate, such as nitrate of potash, or a chlorate, such as chlorate of potash, is thrown thereon. As chlorates do not occur naturally, it follows that deflagration with a natural salt indicates a nitrate; and if the deflagration be accompanied by a violet flame, it is characteristic of nitrate of potash (ordinary niter or saltpeter); and if by a strong yellow flame, it is indicative of a nitrate of soda (cubical niter).

DEFORCEMENT, in English law, an abatement, intrusion, disseisin or discontinuance, or any other wrong whatsoever, whereby he that has the right to the freehold is kept out of possession.

DE FOREST, JOHN WILLIAM, author, was born at Humphreyville, Conn., on March 31, 1826, studied privately, and spent many years in foreign travel. He served in the Civil War and rose to the rank of major in the volunteer army. Since 1850 he has been a prolific writer, chiefly of novels but also of some historical works and of many magazine articles. Among his works are a *History of the Indians of Connecticut*, *Miss Ravenel's Conversion*, *Kate Beaumont*, *The Wetherell Affair*, *Justine Vane*, *A Lover's Revolt*, and *The Bloody Chasm*. W.F.J.

DEFREGGER, FRANZ VON, a noted German *genre* painter; born at Stronack, Tyrol, April 30, 1835. He studied at Innsbruck, Munich and Paris, and became a pupil of Piloty in 1867. The most famous among his pictures are *The Last Levy* (1874); *The Tyrolese Landsturm in the War of 1809*, *Returning Home* (1876). Appointed professor at the Munich Academy, 1878. G.A.S.

DE FUNIAK SPRINGS, a town and the county seat of Walton County, Florida, is the seat of an important summer school, and is reached by the Louisville and Nashville railroad. Its population was 1,661 in 1900. W.F.J.

DEGENERATION, ANIMAL. See ZOÖLOGY, Vol. XXIV, p. 850. In PLANTS. See BOTANY, Vol. IV, p. 116.

DEGER, ERNST, a German historical painter; born at Bockenheim, April 15, 1809; died Jan. 27, 1885, at Düsseldorf. He was a pupil of Schadow at the Düsseldorf Academy. The greater part of his work was in Scriptural illustration, especially in church decoration, notedly at the Church of St. Apollinaris at Remagen, and the Chateau at Stolzenfels. He was one of the group of artists known as "Nazarites," and was a member of the Munich and Berlin academies.

DE GIERS, NICHOLAS, statesman; was born in Russia on May 21, 1820, entered the service of the ministry for foreign affairs in 1838, and for many years was connected with Russian interests in Turkey, the Balkan States and Egypt. In 1875 he returned to St. Petersburg as an undersecretary of foreign affairs, and in 1882 succeeded Prince Gortchakoff as foreign minister. In that office he pursued a policy of peace and friendship with Germany and Austria-Hungary. He died on January 26, 1895. W.F.J.

DE GOEJE, MICHAEL JAN, a Dutch Orientalist; born in Dronryp, Aug. 13, 1836. He began the study of Arabic under the tuition of his father, and afterward under the famous Arabist, Dosy, professor at the University of Leyden. He himself was appointed, in 1869, professor of Arabic at the University of Leyden. He has published numerous new editions of Arabic texts, with translations and glossaries. Among these may be mentioned *Jakubi*, a description of Africa and Spain; *Beldâdhori*, a history of the conquest of Syria; and a series of historical and geographical notes on the Orient.

DEGOLLADO, SANTOS, soldier and statesman, was a native of Mexico and came to the fore at the downfall of Santa Anna and the first rise of Benito Juarez to power. In 1858 he became minister of war in the cabinet of Juarez, having formerly been "minister of government." In the fall of the same year he took the field as chief commander of the Juarist forces against Miramon and the reactionary party, and captured Guadalajara after a month's siege but was soon driven out of it again. The next spring he inflicted a defeat upon Miramon, but was in turn himself defeated and his army dispersed. Again, in November, 1859, he was signally defeated, and the Liberal cause seemed lost. The genius of Juarez, however, saved the day, in spite of the incompetence of Degollado, and even inspired the latter to renewed exertions. In the early part of 1861 Degollado took a leading part in the crushing defeat of Marquez and Mejia, and the reactionary forces were reduced to mere bands of marauders. One of these bands, however, in June of that year, captured him and put him to death in a manner equivalent to simple murder. W.F.J.

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DEGREE, in music, expresses the intervals of notes from one another on the stave. When on the same line or space they are in the same degree. The interval of a second note is one degree, the interval of a third two degrees, and so on, irrespective of the steps being tones, or semitones, or whether they are natural, flat, or sharp, so long as they represent a further line, or space, on the stave. They are in different degrees when, though the same note on an instrument, they are called by different names, as F sharp and G flat.

W.R.B.

DEGREES, ACADEMICAL. See EXAMINATIONS, Vol. VIII, p. 680.

DE HAAS, MAURICE FREDERICK HENDRICK, painter; was born in Holland on Dec. 12, 1832, and became a pupil of Louis Mayer, the celebrated marine painter, under whose instruction he made rapid progress. In 1854 he visited England, and in 1859 came to the United States and opened a studio in New York, where he spent the rest of his life. He ranked among the best marine painters of his time, and examples of his work are to be found in the best public and private art galleries. He was a member of the Rotterdam Academy and of the Academy of Design in New York. He died on Nov. 23, 1895. W.F.J.

DE HAAS, WILLIAM FREDERICK, painter, and elder brother of M. F. H. De Haas (q. v.); was born at Rotterdam, Holland, studied art, and came to America, where most of his work was done. He especially excelled in seacoast landscapes, and painted some notable pictures of the New England and Nova Scotian coasts. He died in 1880. W.F.J.

DE HAVEN, EDWIN JOHN, an American explorer and naval officer; born in Philadelphia, Pennsylvania, in 1819. He entered the marine service when a boy and in 1839 accompanied Commodore Wilkes' expedition to the South Seas. Later he was in command of the first expedition sent to the Arctic in search of Sir John Franklin. He died in Philadelphia, October 2, 1865.

W.M.C.

DEIANIRA, the daughter of Œneus, king of Calydonia, and Althaia, sister of Meleagros, became the wife of Hercules, after his victory over her wooer, Acheloos. See HERCULES, Vol. XI, p. 649. G.A.S.

DEI GRATIA (Lat., "by the favor of God"), a formula taken from several apostolical expressions in the New Testament. It is believed to have been first formally used by the bishops at the Council of Ephesus, A. D. 431. Afterward it came to be appended by archbishops, bishops, abbots, abbesses, deans, monks, and even chaplains, to their titles, in letters and other documents, as an humble expression of dependence on the Most High. After the middle of the thirteenth century, the higher clergy wrote *Dei et Apostolicæ Sedis gratia*, "By the favor of God and the Apostolic See." In the British Islands this style was generally dropped about the time of the Reformation, but it was occasionally given to the archbishops of Canterbury and York, even after the beginning of the seventeenth century. It has also been used by monarchs, having in their minds a special significance as expressing the idea of the "divine right of kings."

DEJAZET, VIRGINIE, a French actress; born in Paris, Aug. 30, 1798. From 1831–43 she played at the theatre of Palais-Royale. In 1859 the Boulevard Theatre of Les Folies Nouvelles was named after her, and was the scene of her triumphs up to 1865. She died in Paris, Dec. 1, 1875. In her best period she was a model of delivery, expression and manner of representing. G.A.S.

DE KALB, a city and the county seat of De Kalb County, Illinois, in the northern part of the state. It lies on a branch of the Kishwaukee River, about 60 miles west of Chicago, on the Chicago and Northwestern railroad, and is the seat of considerable manufactures, chiefly of agricultural implements and other supplies for the rich farming region which surrounds it. Its population was 2,579 in 1890, and 5,904 in 1900.

W.F.J.

DE KALB, JOHN, BARON, a Bavarian general who entered the French army, and, accompanying Lafayette to America, fought under Washington and Gates; born July 29, 1721, in Hüttendorf, Bavaria; killed in battle at Camden, South Carolina, Aug. 19, 1780. He was induced by Silas Deane to join the American forces, and upon his arrival in America was made a major-general by Congress. He was under Washington at Valley Forge and in New Jersey until 1780, when he was sent to aid General Gates in the South. He was mortally wounded, Aug. 16, 1780, while heading his forces in resisting an attack by Cornwallis. A statue has been erected to his memory in Annapolis, Maryland.

DE KAY, CHARLES, an American novelist and journalist; born July 25, 1848, at Washington, District of Columbia, a grandson of the poet, Joseph Rodman Drake. He became literary editor of the New York *Times* in 1877, and held that position until 1894, when he was appointed United States consul to Berlin. He has published *The Bohemian* (1878); *Hesperus*, and Other Poems (1880); *Love Poems of Louis Barnaval* (1883); and *Barye: Life and Works* (1889).

DE KAY, JAMES ELLSWORTH, physician and naturalist, was born in Portugal, the son of American parents, in 1792, and studied medicine in New York and Edinburgh. He practiced in New York, and was one of the founders of the Academy of Medicine. He devoted much attention to natural history, and wrote a monumental work in five volumes on the zoölogy of the state of New York, the data for which he secured by personal investigations in all parts of the state. He visited Turkey and wrote a book of his impressions of that country. He was a close friend of Halleck, Drake, Eckford, and other prominent men of his day. He died at Oyster Bay, Long Island, on November 21, 1851. W.F.J.

DEKKER, EDUARD DOUWES, was born in Amsterdam in 1820, and served the Dutch government in the East Indies. He then became a

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novelist, essayist and publicist, under the pen-name of "Multatuli." In his story, *Max Havelar*, he exposed the abuses of Dutch administration in the Indies. He died in 1887. W.F.J.

DE KOVEN, JAMES, clergyman, was born at Middletown, Connecticut, on September 19, 1831, and was educated at Columbia College (1851) and at the General Theological Seminary of the Protestant Episcopal Church (1854). He entered the priesthood of the Protestant Episcopal Church, had charge of the church at Delafield, Wisconsin, and in 1859 was made warden of Racine College in that State. There he introduced the wearing of caps and gowns, as in the English universities, and organized the first surpliced choir in the west. He was successful in his administration of the college, and enlarged its buildings and enhanced its prosperity. His extreme High Church views and practices, however, involved him in some controversies, and caused the house of bishops to refuse to confirm his election as bishop of Illinois in 1875. He was a man of fine scholarship, marked eloquence, and exceptional charm of conversation and manner. He died at Racine on March 19, 1879. W.F.J.

DE KOVEN, REGINALD, an American musical composer; born in Middletown, Conn., April 30, 1859. After several years spent in study at Stuttgart under Speidl, and at Paris under Mathias and Durand, he attended King's College, Oxford, and was graduated in 1879. He again went to Stuttgart and studied under Lebert and Pruchner. His original idea had been to become a professional pianist, but he gave this up and devoted himself to composition, in which he took a front rank among opera and song writers. His first composition was a song, *Margery Daw* (1882). He afterward published over one hundred songs; among them, *Oh, Promise Me; Winter's Lullaby; Indian Love Song; Ask What Thou Wilt;* etc. But it is perhaps for his operas that Mr. De Koven is best known. Among them are *Robin Hood* (1890); *Don Quixote* (1889); *The Fencing-Master* (1892); *Rob Roy* (1894); and *The Mandarin* (1896). He became musical critic for the New York *World*.

DE KROYFT, SUSAN HELEN (born Aldrich), was born at Rochester, N. Y., on October 29, 1818, was educated at the Lima, N. Y., Seminary, and married Dr. William De Kroyft, who was killed by an accident upon their wedding day. She became blind through grief and entered the New York Institution for the Blind, where she served as organist. She has written a number of books, including *A Place in Thy Memory*, *The Story of Little Jakey*, *Mortara*, and *The Foreshadowed Way*. W.F.J.

DELABORDE, HENRI, a French historical painter; born at Rennes, May 2, 1811; a pupil of Delaroche; a member of the Institute, an officer of the Legion of Honor, and perpetual secretary of the Academy of Fine Arts, and gained a high reputation as a writer and art critic. Among his paintings are *The Confessions of St. Augustine* (1853); *The Death of St. Monica* (1838); and *The Taking of Damietta* (1841). He contributed to the *Revue des Deux Mondes*, and his published works include *Studies of the Fine Arts in France and Italy* (1864); *The Collections of Engravings in the National Library* (1875); and *A Compendium of the Origin, History and Processes of Engraving* (1882). He died in 1899.

DELAFIELD, EDWARD, physician, was born in New York City on May 17, 1794, and was educated at Yale (1812) and at medical schools in New York, London and Paris. He was a prominent member of his profession in New York for many years, was one of the founders of the New York Eye and Ear Infirmary in 1821 and of the New York Ophthalmological Society in 1865. He was for a time president of the College of Physicians and Surgeons, and of Roosevelt Hospital. He died in New York on February 13, 1875. W.F.J.

DELAFIELD, FRANCIS, physician, son of Edward Delafield (q. v.), was born in New York City on August 3, 1841, and was educated at Yale (1861), the College of Physicians and Surgeons, New York (1863), and in London, Paris and Berlin. He has long been connected with Bellevue Hospital, in New York, and with the College of Physicians and Surgeons. He was the first president of the Association of American Physicians and Pathologists. W.F.J.

DELAFIELD, RICHARD, soldier, a member of the family of that name which has given many men of eminence to New York, was born in New York City on September 1, 1789, and was graduated from West Point in 1818. He served on the boundary commission under the treaty of Ghent, was engaged in fortification work and harbor improvement for some years, and in 1838 was made superintendent of the West Point Academy, where he did an invaluable work. From 1845 to 1855 he was again engaged in fortification and harbor works, and then went abroad to observe and report upon the Crimean War and European methods of warfare. On his return home he was again in charge of West Point. During the Civil War he was chiefly engaged in staff duties in New York and Washington. He was brevetted major-general in 1865, retired in 1866, and died on November 5, 1873. W.F.J.

DELAGOA BAY. For over half a century there have been intermittent attempts to establish communication between the Transvaal and Delagoa Bay. All failed, however, till 1887, when a company was formed in London to work a concession from the Portuguese government for the construction of a railway from Delagoa Bay to the Transvaal frontier. The line was partly opened in 1888, and in July, 1895, was finished to Pretoria, in the Transvaal, a distance of 350 miles, and to Johannesburg, four hundred miles from the bay. See DELAGOA BAY, Vol. VII, p. 36.

DE LANCEY, JAMES, jurist, son of Stephen De Lancey, founder of the family in America, was born in New York City in 1703, and was educated in England, at the University of Cambridge. He was admitted to the bar in London, and then returned to America and settled in New York. He became a member of the colonial

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council in 1729, and in 1730 was the chief author of the "Montgomery Charter" of the city of New York. In 1733 he was made chief justice of New York. He was made colonial governor in 1753–55, and again in 1757, serving on the latter occasion until his death, which occurred in 1760. His name is borne by one of the streets of New York City. W.F.J.

DE LANCEY, WILLIAM HEATHCOTE, clergyman, was born at Mamaroneck, N. Y., on October 8, 1797, and was graduated from Yale College in 1817. He entered the Protestant Episcopal ministry in 1819, and in 1822 went to Philadelphia as the chief aid and "adopted son" of Bishop White. In 1828 he became provost of the University of Pennsylvania, and filled the place for six years. He then returned to the ministry, and in 1839 was chosen first bishop of the new diocese of western New York. In 1852 he visited England and was the first American bishop to take part officially with English bishops in services in St. Paul's cathedral and Westminster Abbey. He died on April 5, 1865. W.F.J.

DE LAND, Florida, a town, the seat of Volusia County, and the terminus of a branch line of the Savannah, Florida & Western, and Silver Springs, Ocala & Gulf railroad, 108 miles south of Jacksonville. It is a winter resort, the seat of the John B. Stetson University, and a sugar-cane, orange, peach, melon, etc., and lumber growing center, with supplemental manufacturing industries. Population, 1900, 1,449. C.L.S.

DELAND, MARGARETTA WADE (CAMPBELL), author; born in Allegheny, Pa., Feb. 23, 1857; was educated at Pelham Priory, New Rochelle, N. Y., and afterward studied in Cooper Union, New York city. In 1878–79 she was a teacher of industrial design in the Girls' Normal College, New York. She was married in 1880 to Lorin F. Deland, of Boston, Mass. Her prose works were *John Ward, Preacher* (1888); *Florida Days* (1889); *Sidney* (1890); *Philip and His Wife* (1894); *Old Chester Days*, a series of sketches, etc. G.J.H.

MARGARETTA W. DELAND.

DELANE, JOHN THADEUS, a British editor; born in London, Oct. 11, 1817; died there, Nov. 22, 1879. He was graduated at Oxford in 1839. He made starts in several professions, and finally drifted into journalism. He became a member of the staff of the London *Times*, and in 1841 its editor. His connection with that paper and his influence are given under NEWSPAPERS, Vol. XVII, p. 428.

DELANO, COLUMBUS, statesman, was born in Vermont in 1809, removed to Ohio, practiced law, was elected to Congress in 1844, was commissary-general of Ohio in 1861, member of the Ohio legislature in 1863, was elected to Congress in 1864 and 1866, in 1869 was appointed Commissioner of Internal Revenue, and in the same year was made Secretary of the Interior. He held the latter office until 1875, after which he became a banker and farmer. Died Oct. 23, 1896. W.F.J.

DE LA RAMÉE, LOUISE, best known by her pen-name of OUIDA, novelist; was born in England in 1840. She has written many romances of great but unequal power. Among her earlier and melodramatic ones are *Strathmore; Chandos; Under Two Flags; Idalia*, and *Tricotrin*. Others dealing with social intrigues were *Moths; In a Winter City; Wanda*, etc. Among her later works are *Don Gesualdo; Moufflou; The Tower of Taddeo; The Silver Christ*, and *The New Priesthood*. She has devoted much attention to humanitarian work. Some of her romances have been dramatized. W.F.J.

LOUISE DE LA RAMÉE.

DELATOR, an informer or accuser. The original use of the term was for any kind of a carrier, but soon it was applied only to those who brought evil reports. In Rome the delatores held sway for a time and were paid for their services by the government. They apprehended assassins and accused persons of crimes. They brought accusations against various public officials, a great many times wrongfully. They became such an evil under Domitian that the next emperor, Nerva, ordered them to be driven out.

DELAUNAY, CHARLES EUGÈNE, a French astronomer; born April 9, 1816, at Lusigny, professor of higher mechanics at the Polytechnical School of Paris and at the Sarhonne; was drowned Aug. 5, 1872, at Cherbourg. See Vol. XVI, p. 827, and Vol. X, p. 201. G.A.S.

DELAUNAY, EMANUEL. See ANTRAIGUES, COMTE D' in these Supplements.

DELAUNAY, LOUIS ARSÈNE, a French actor, probably the greatest of the French actors of his day. He was born in Paris, March 21, 1826. He began his stage life in 1846, at the Odéon. He was chosen by many of the French playwrights for the first presentation of their work. He created the part of Hernani, in Hugo's play of that name, and the part of Télémaque, in *Ulysse*. Was made a chevalier of the Legion of Honor, and in 1877 professor of dramatic oratory at the Conservatory. Retired in 1887. Died Sept. 22, 1903.

DELAVAN, a railroad town of Tazewell County, northern central Illinois, about 157 miles S.W. of Chicago, on the Chicago and Alton and the Peoria, Decatur and Evansville railroads. It has a variety of manufactories and a population (1890) of 1,176 (1900), of 1,304.

DELAVAN, a village of Walworth County, Wisconsin, in the southeastern part of the state.

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It lies on Lake Delavan, and is reached by the Chicago, Milwaukee and St. Paul railroad, 48 miles S.W. of Milwaukee, and 75 miles N.W. of Chicago. It contains a state asylum for the deaf and dumb. Population, 1900, 2,244. W.F.J.

DELAVAN, EDWARD CORNELIUS, reformer, was born in Schenectady County, New York, in 1793, became a wine merchant and hotel proprietor, the well-known Delavan House at Albany, N. Y., having been built by him. After a prosperous career in such businesses he became converted to the temperance cause, and joined Dr. Eliphalet Nott, of Union College, and others in organizing the first state temperance society in New York. He lectured and wrote much in behalf of temperance, and spent in that interest freely the fortune he had made in wine selling. He was involved in numerous law suits on account of his zeal in attacking the liquor dealers, but was invariably successful in them. He was the founder of the *Journal of the American Temperance Union*. He died on January 15, 1871. W.F.J.

DELAWARE. For general account and history up to 1870, see Vol. VII, pp. 39, 40. The

STATE SEAL OF DELAWARE.

climate of Delaware is mild and healthful, except in the extreme south, where some fever is occasioned by the swamps. The temperature ranges from 30° to 38° in winter, and from 69° to 74° in summer. The average rainfall is about fifty inches. Agriculture is the chief industry in the middle and southern portions of the state, while manufacturing is the prevailing occupation of the inhabitants in the northern part. The census reports of 1900 give the following facts relative to the principal agricultural products of Delaware. The number of acres in cereals, etc., was 473,962.

	Bushels.	Value.
Indian corn	4,736,580	$1,725,452
Wheat	1,870,570	1,247,055
Oats	131,960	43,337
Potatoes	414,610	221,411
Hay and forage (tons)	128,193	989,848

The total number of farms is given as 9,687, their acreage as 1,066,228, with a total valuation of $34,436,040. The farm implements and machinery were valued at $2,150,560, and the live-stock at $4,111,054. The estimated value of farm products was $9,190,777. In 1900, the number of farm-animals, with their value, was as follows: Horses, 28,132, value $1,725,515; mules, 4,635, value $339,951; milch cows, 32,591, value $993,972; oxen, 21,589, value $346,913; sheep, 11,764, value $43,588; swine, 46,732, value $234,472. The soil, climate and proximity to market all combine to make fruit-growing profitable, and peaches, apples and the small fruits all yield large crops and find a ready market in New York and Philadelphia. In 1900, the peach crop was a greatly reduced one in contrast with former years, apples and pears, in part, taking their place. Immense quantities are canned, this industry being one of Delaware's most profitable lines of export. The strawberry crop also adds largely to the aggregate of the annual value of agricultural products.

The census returns show Delaware to have (in 1900) 1,417 specified manufacturing industries, with an aggregate invested capital of $41,203,239, employing 22,203 hands, paying in wages $9,263,661,

STATE CAPITOL, DOVER, DELAWARE.

and producing $45,387,630 worth of goods. The principal industries were the manufacture of cotton goods, car-building, the manufacture of chemicals and fertilizers, foundries and machine-shops, flouring-mills, iron and steel works, leather goods, etc. Over eighteen hundred hands were employed in ship-building, the shipyards at Wilmington being especially extensive. In sea-fisheries large capital is invested and many persons engaged. The oyster industry alone has some five hundred vessels and boats constantly employed throughout the season.

The number of miles of railroad in operation in 1899 was 349, with a capital of more than $7,500,000. The mileage was a little less than 18 per 100 square miles of territory.

At the beginning of 1900 the total state assets were $1,118,509, the total liabilities $769,750. The school fund was $115,442, having been much depleted during the three years preceding by the expenditure of $42,187 for the purchase of free textbooks for the schools of the state. In 1895 there were six thousand colored children of school age in the state, who had never had the privileges of attending a public school. The total number of children within the school age (5 to 18 years) was, at the time of the enumeration in 1900, 40,400; enrolled in the schools, 22,254; average daily attendance, 15,938. The state college at Newark is conducted at an expense of about forty thousand dollars per year. The agricultural ex-

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periment station, in connection with the college, receives as government aid about $35,000 annually. There is also a college at Wilmington, and a separate institution for colored students.

Among state institutions are the State Hospital for the Insane, at Farnhurst, with about 250 patients, the Industrial School for Girls, and the Industrial School for Boys. The deaf and dumb, the blind, and feeble-minded children are maintained in institutions outside the state, their support being provided for by annual appropriations.

There are about 300 churches in the state, the Methodist denominations leading in point of numbers. Of the 43 newspapers published in the state at the beginning of 1899, 6 are daily, 1 semi-weekly, 29 weekly, 3 semimonthly, and 4 monthly.

Wilmington, the principal city of Delaware, had a population (1900) of 76,508; Dover, the capital, 3,329; Newcastle, 3,380. Important towns and villages are Smyrna, Middletown, Milford, Seaford, Lewes, Delaware City, and Newark. Population of State 1890, 168,493; 1900, 184,735, of which 153,977 were white, 30,697 colored, 51 Chinese and 9 Indians.

A new state constitution went into effect on June 10, 1897.

The nickname given Delaware is the "Blue Hen State" and the state flower adopted is Peach Blossom.

The following is a list of the governors of Delaware from 1789:

Joshua Clayton	1789–96	William B. Cooper	1840–44
Gunning Bedford	1796–97	Thomas Stockton	1844–46
Daniel Rogers	1797–98	Joseph Maul	1846
Richard Bassett	1798–1801	William Temple	1846–47
James Sykes	1801–02	William Thorp	1847–51
David Hall	1802–05	William H. Ross	1851–55
Nathaniel Mitchell	1805–08	Peter F. Causey	1855–59
George Truett	1808–11	William Burton	1859–63
Joseph Haslett	1811–14	William Cannon	1863–67
Daniel Rodney	1814–17	Gove Saulsbury	1867–71
John Clarke	1817–20	James Ponder	1871–75
Jacob Stout	1820–21	John P. Cochran	1875–79
John Collins	1821–22	John W. Hall	1879–83
Caleb Rodney	1822–23	Charles C. Stockley	1883–87
Joseph Haslett	1823–24	Benjamin T. Biggs	1887–91
Samuel Paynter	1824–27	R. J. Reynolds	1891–95
Charles Polk	1827–30	J. H. Marvil	1895
David Hazzard	1830–33	W. P. Watson	1895–97
Caleb P. Bennett	1833–36	E. W. Tunnell	1897–1901
Charles Polk	1836–37	John Hunn	1901–05
Cornelius P. Comegys	1837–40	Preston Lea	1905 —

DELAWARE BAY is the broad estuary of the Delaware River (q. v.), opening into the Atlantic Ocean between Cape May, New Jersey, and Cape Henlopen, Delaware, these being called the Capes of the Delaware. It is nearly 30 miles long, from the capes to Ship John Light, and nearly 30 miles wide at the widest part. It contains many shoals, which are marked with lights, but has a good ship channel 30 feet deep, leading from the river to the ocean. A great breakwater has been built at Cape Henlopen, sheltering the bay from storms. W.F.J.

DELAWARE OR DE LA WARR, THOMAS WEST, BARON, was born in England on July 9, 1577, and was educated at Oxford. In 1597 he entered Parliament and later served valiantly in the army in Holland and in Ireland. In 1602 he succeeded to the barony of De la Warr, and became a privy counsellor of Queen Elizabeth. He was one of the founders of the colony of Virginia, and in 1609 was appointed its governor and captain-general for life. In the summer of 1610 he reached the colony with succor just in time to save it from ruin and abandonment. His governorship was wise, but brief, for he went home with shattered health in 1611. In March, 1618, he started back to Virginia, but died on the way. The state and river of Delaware were named for him. W.F.J.

DELAWARE CITY is a village in Newcastle County, Delaware, in the northern part of the state. It lies on the Delaware River, twelve miles from Wilmington, at the terminus of the Chesapeake and Delaware canal, opposite the city of Salem in New Jersey, and is reached by the Philadelphia, Wilmington & Baltimore railroad. Its population in 1900 was 1,132. W.F.J.

DELAWARE INDIANS. For history, see INDIANS, Vol. XII, p. 870. The Delawares, with the exception of a scattered remnant in Ontario, Canada, are a part of the Cherokee Nation, in the Indian Territory, and number about 1,700.

DELAWARE RIVER, a river which rises in Delaware County, southern New York, flows westward till it reaches Pennsylvania, when it becomes the eastern boundary of that state. Its general course is southward, though it makes several turns toward the east and west. Near Shroudsburg, Pennsylvania, it breaks through the Kittatinny Mountains, at the Delaware Water Gap (q.v.), a place of remarkable beauty of scenery. Trenton and Philadelphia are the most important points on the river, Trenton being the head of navigation.

DELAWARE RIVER OR GRASSHOPPER CREEK, a river of northeastern Kansas, rises in Nemaha County, flows south-southeast and empties into the Kansas, 12 miles above Lawrence. Its length is about 75 miles. Its valley is very fertile and coal is found in the vicinity.

DELAWARE WATER GAP, one of the most beautiful bits of natural scenery in America, is the point where the Delaware River breaks through the Kittatinny range of the Appalachian Mountains, between Mount Minsi and Mount Tammany, through a gorge 1,000 feet deep. The name is also borne by a village. W.F.J.

DE LA WARR, EARLS OF, a family of the British nobility, whose family name is West. The De la Warrs succeeded the Gresleys in the manorial rights of the town of Manchester, England. The title of Baron De la Warr was first given Sir Reginald West in the thirteenth century. The title was changed to Baron West in 1343, but reverted to De la Warr in 1579. The present (1896) Earl of De la Warr is Reginald Windsor Sackville. His eldest son and heir, bears the courtesy title of Viscount Cantelupe.

DELBRÜCK, MARTIN FRIEDRICH RUDOLF, statesman; was born in Berlin on April 16, 1817, and was educated at Magdeburg, Halle, Bonn and Berlin. He practiced law with distinguished

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success, and then entered the civil service of the Prussian government. He was connected with the ministry of finance, and also that of commerce. In 1864 he negotiated important commercial treaties, and in 1867 was made president of the federal chancellery of the North German Bund. In this office he gained great influence among all the German states, and was thus enabled to induce them to unite in the present German Empire during the war of 1870–71. He was the principal author of the imperial constitution, and was chancellor of the empire from 1871–76. He remained a prominent member of the Reichstag until 1880, when he retired. W.F.J.

DELCASSÉ, THÉOPHILE, French statesman and minister for foreign affairs, was born at Pamiers, March 1, 1852. He began his career as a journalist on the staff of *La Republic Française*, writing chiefly on foreign affairs. In 1889 he was elected to the French chamber; in 1894 he became minister for the colonies; in 1898 minister for foreign affairs; and again, in 1899, he was selected for the same office in the Waldeck-Rousseau Cabinet, succeeding M. Hanotaux. He advocated French colonial expansion, dealt skilfully with affairs in Africa, in the Nile Valley, and at Fashoda. He resigned as foreign minister, June 6, 1905, owing to the Anglo-French-German disturbance over Moroccan affairs and disapproval of his policy.

DELEGATED GENERAL CONFERENCES. See METHODIST CHURCHES, Vol. XXVIII, p. 79.

DELEGATION, in law, means the transfer of a power or right by one or more persons to another. Any person capable of acting for himself may delegate the authority to another to act for him in most matters which concern his own rights. But when a bare power has been given to one, he cannot, as a rule, delegate it to another, for the reason that his principal has relied upon his ability and skill in granting the power. The question of the right of an agent to delegate his authority as an agent so as to bind his principal is a question frequently before the courts, and its determination depends chiefly upon the character of the agency.

DELESCLUZE, LOUIS CHARLES, a French communist, was born at Dreux, Oct. 2, 1809. His extreme political opinions made him obnoxious to the authorities, and he was repeatedly imprisoned, fined, and on one occasion banned from the country. His journal, *Le Réveil*, started in 1868 to advocate the doctrines of the International, brought him again into trouble. In the infamous history of the Paris Commune he played a prominent part, and upon his head rests, in great part, the guilt of its most execrable atrocities—the murder of the hostages. He was killed on the last barricade, May 28, 1871.

DE LESSEPS, FERDINAND. See LESSEPS, FERDINAND DE, in these Supplements.

DELFSHAVEN OR DELFTSHAVEN, Netherlands, a fishing and shipbuilding town of South Holland, on the Maas, 2 miles west of Rotterdam. Here on July 22, 1620, the Pilgrim Fathers embarked for Southampton to proceed to America. Population, 13,200. C.L.S.

DELFTWARE. See POTTERY and PORCELAIN, Vol. XIX, p. 651.

DELGADA OR PONTA DELGADA, the largest town of the Azores Islands, on the island of São Miguel. Lat. 37° 40′ N., long. 25° 36′ W. The anchorage here in the roadstead has been greatly improved by the building of the breakwater, and the town has a considerable trade, exporting wheat, maize and oranges. Population, 17,940.

DELHI, a village and the capital of Delaware County, southern New York, on the west branch of the Delaware River, on the New York, Ontario and Western railroad. It contains manufactories of sash and blinds, carriages and woolen goods. Population 1890, 1,564; 1900, 2,078.

DELIBES, CLÉMENT PHILIBERT LÉO, French composer; born Feb. 21, 1836, at St. Germain-du-Val, Sarthe; entered the Paris Conservatoire in 1848, and in 1855 produced an operetta, *Deux Sacs de Charbon*. At the Grand Opéra, where he became second director in 1865, his music for the ballet *La Source* (1866) met with great success, and his ballet music for *Coppélia* (1870), his finest work, secured his position as a composer. He wrote music for a third ballet, *Sylvia* (1876), and for three light operas, *Le Roi l'a Dit* (1873), *Jean de Nivelle* (1880), and *Lakmé* (1883), his chief success. In 1880 he was appointed professor of composition in the Conservatoire, and became a member of the Académie des Beaux-Arts and an officer of the Legion of Honor. Died in Paris, Jan. 17, 1891.

DELIQUESCENCE (Lat., *deliquesco*, to melt down). When certain saline substances are exposed to the air, and absorb a sufficient quantity of moisture to dissolve them into a liquid, they are said to be *deliquesce*. W.R.B.

DELIRIUM TREMENS, see DELIRIUM, Vol. VII, p. 45. W.R.B.

DELITESCENCE (Lat., *delitescere*, to lie hid). In surgery when a tumor very suddenly and unexpectedly subsides, it is said to terminate in *delitescence*. W.R.B.

DELISLE, GUILLAUME, a French geographer; born in Paris, Feb. 28, 1675; died there, Jan. 25, 1726. He was directed to the study of geography by his father, Claude Delisle, himself a noted geographer. In 1700 he completed the work for which he is famous, the change of the then existing system of geography. This work directed public attention to him, and in recognition of his services he was made "Geographer to the King" by Louis XV. See also GEOGRAPHY, Vol. X, p. 168.—His brother, JOSEPH NICHOLAS DELISLE, a noted astronomer. See LISLE, Vol. XIV, p. 700.

DELITZSCH, ADOLF FRANZ, theologian; born in Leipsic, Germany, Feb. 23, 1813; educated at the University of Leipsic in theology and the Oriental languages. He became a professor at Rostock, and made himself widely known while there by his *History of the Poetry of the Jews* and his translation of the pastoral drama *Il Pastor Fido* into Hebrew. He accepted in 1850 the chair of theology at the University of Erlangen, where he wrote commentaries on some of the Scriptural

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books, etc. He died at Leipsic in March, 1890. G.J.H.

DELITZSCH, FREDERIC, Assyriologist; born in Erlangen, Germany, Sept. 5, 1850; a son of the preceding. He took high rank among German Assyriologists, and occupied at the University of Leipsic the first chair created in Germany for that field of study. Works are: *Assyrian Studies; Assyrian Lectures; Where Was Paradise?; Assyrian Dictionary*, etc. G.J.H.

DELIUS, NICOLAUS, a German Shakespearean critic; born Oct. 19, 1813, at Bremen; studied at Bonn and Berlin, and in 1855, became professor of Romance, Sanskrit and English at the University of Bonn, where he died, Nov. 18, 1888. His works on Shakespeare mark a departure in literature. Among them are *The Works of Shakespeare* (7 vols., 1854–65); *Pseudoshakespearean Dramas* (1856–74); *Shakespeare Lexicon* (1852); *Studies on Romance Literature of the Middle Ages*. G.A.S.

DELLA CRUSCAN ACADEMY, an institution founded in 1582, in Florence, Italy, with a view to purifying and perfecting the Tuscan tongue. See ACADEMY, Vol. I, p. 71.

DELLA CRUSCAN SCHOOL. About the year 1785 there was published *The Florence Miscellany*, a collection of verses written by a number of English residents at Florence as an amusement during their idle hours. The insipidity, affectation and fantastic silliness of the productions transcend all belief, but at that period poetry was at so low an ebb that a crowd soon admired and began to imitate them. The Della Cruscans, taking their name from the academy at Florence, now began to print their works in England, mainly in two daily newspapers, called *The World* and *The Oracle*. These effusions were published in great numbers until 1794, when the keen satire of William Gifford, in his *Baviad*, made the writers appear so ridiculous that their enthusiasm was soon spent. Prominent among these writers were Mrs. Hannah Cowley ("Anna Matilda"), Robert Merry ("Della Crusca"), and Edward Jerningham ("The Bard").

DELMAR, ALEXANDER, author, was born in New York City on August 9, 1836, was educated at New York University, and became a journalist, on the *American Daily Times*, *Hunt's Merchants' Magazine*, *The Financial and Commercial Chronicle*, *The National Intelligencer*, and other periodicals. He founded *The Social Science Review* in 1864. He was director of the U. S. Bureau of Statistics in 1865, and U. S. representative to the international statistical congress in 1872. He has devoted much attention to public finance, and has written a number of books upon that, and other topics, besides many essays and pamphlets. W.F.J.

DEL NORTE, the capital of Rio Grande County, southern Colorado, on the Rio Grande River, and on the Denver and Rio Grande railroad. It is one of the chief towns of southwestern Colorado, and is situated at an elevation of 7,807 feet, amid fine picturesque scenery. This place is the base of supplies for the San Juan mines. Population 1890, 736; 1900, 705.

DE LONG, GEORGE WASHINGTON, naval commander and Arctic explorer, was born in New York City on August 22, 1844, and was educated at the United States Naval Academy, from which he was graduated in 1865. By 1879 he had become lieutenant-commander. In the fall of that year he was selected to command the Arctic expedition sent northward by way of Behring Strait in the ship *Jeannette*, at the instance and at the expense of James Gordon Bennett. (See POLAR REGIONS, Vol. XIX, p. 338. The expedition met with disaster, and after heroic struggles and great suffering De Long died in the Delta of the Lena River, in Siberia, on October 30, 1881. His widow, Emma De Long, published *The Voyage of the Jeannette*, in 1883, and an account of his struggles and death, and of the heroic search for the few survivors of his party, is given by Admiral Melville, who led the relief expedition, in his *In the Lena Delta*. W.F.J.

DELORME, MARION, a Frenchwoman who became notorious in the seventeenth century. She made her house the rallying-point of the chiefs of the "Frondeurs" during the first disturbances of that party, and for this Mazarin was about to imprison her, when she suddenly died. Previous to the time of the Frondeurs she had held sway over the Duke of Buckingham, Cardinal Richelieu, the Duc de Brissac, and others almost as prominent. She was a woman of great beauty and brilliant wit. Victor Hugo made her the subject of one of his historical novels, and her character was represented in the drama *Cinq Mars* (1826), by Alfred de Vigny.

DELORME, PHILIBERT, a French architect; born in Lyons, about 1518; died in 1577. He attracted attention while still in Lyons, and was soon called to Paris, where he designed the Tuileries, the chateaux at Meudon and Anet, and aided in building the chateau at Fontainebleau. He studied in Rome, and, upon his return to France, strove to replace the Gothic styles with those of the Romans. He published one work, *New Inventions for Building Well at Little Expense*.

DELPHI, Indiana, the seat of Carroll County, at the junction of Deer Creek with the Wabash River, and on the Wabash & Erie Canal, the Wabash, the New Albany & Chicago, and the Louisville railroads, 66 miles northwest of Indianapolis. Paper, strawboard, flax, cement, etc., are manufactured. Pop., 1900, 2,135. C.L.S.

DELPHIN CLASSICS. See BIBLIOGRAPHY, Vol. III, p. 568.

DELPHINIDÆ. See MAMMALIA, Vol. XV, p. 401.

DELPHINIUM. See HORTICULTURE, Vol. XII, p. 263.

DELPHINUS, a constellation in the northern hemisphere, near Aquila. It is commonly called "Job's Coffin," on account of its shape; however, the derivation of the name, meaning *a dolphin*, would indicate that the ancients likened it to that fish. Its brightest star is one between the

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third and fourth magnitudes, and four others are of the fourth magnitude.

DELPHOS, a city of Allen County, northwestern Ohio, situated on the Miami canal, and on the Northern Ohio, Pittsburg, Fort Wayne and Chicago, and Toledo, St. Louis and Kansas City railroads. It contains a Franciscan convent, and manufactories of barrels, staves and wheels. Population 1900, 4,517.

DELPIT, ALBERT, a French dramatist and novelist; born Jan. 30, 1849, at New Orleans, Louisiana; originally a contributor to the journals *Musquetaire* and *L'Artagne*, founded by Alexander Dumas. His first poems, *L'apothéose de Lamartine; L'invasion; Le Repentir, ou Récit d'un Curé de Campagne*, obtained the prize of the French Academy. Of his dramas *Le Fils de Coralie* (1880) is the best known. His novels *Les Compagnons du roi* (1873); *La Vengeresse* (1874); *Le Mystère du Bas Meudon* (1876); *Les Fils de Joie* and *Le Dernier Gentilhomme* (1879); *Solange* (1885); *Thérésine* (1888); *Toutes les Deux* (1889); *Belle-Madame* (1892), and *Le Mariage d'Odette* portray Parisian high-life most effectively. His patriotic *Poésies* obtained a prize at the French Academy. He died in Paris, Jan. 4, 1893. G.A.S.

DEL RIO, Texas, the seat of the southwestern Valverde County, on the Sycamore tributary of the Rio Grande, 30 miles south of Brackettville by the Houston to El Paso division of the Southern Pacific railroad. It is in a fruit raising region, and has important irrigation and other works, besides undeveloped mineral resources. Population of precinct (1900), 2,128. C.L.S.

DELSARTE, FRANÇOIS ALEXANDRE NICOLAS CHÉRI, a French teacher of elocution; born in Solesmes, Dec. 19, 1811; died at Paris, July 19, 1871. He studied for the operatic stage, but his voice failed him, and he was obliged to devote himself to giving instruction in elocution. He gave much time to the study of dramatic art, which he carried to the point of asserting the existence of art in all human emotions and motions. His system is known as the DELSARTE SYSTEM. He was the recipient of many honors.

DELSARTE SYSTEM, the name given to a method of general physical training by which the æsthetic and emotional nature of man in its relations to the art of expression is elaborately portrayed. From a somewhat vague statement of its author, François Delsarte, it is possible to detach certain fundamental principles deduced from the scientific postulate that "every outward manifestation is the expression of an inner state,"—a truism to the average understanding. The dominating ideas of the system may be summarized in a series of psychophysical exercises, comprising movements tending to restore debilitated nervous energy, movements calculated to augment nerve-force, movements calculated to harmonize the physical and intellectual powers, the general result being improved health, even and normal development and natural expression. The practical benefit derived from the Delsartean system has been frequently demonstrated, and to dramatists, orators and elocutionists has proved of undoubted efficacy in inculcating methods of vocal utterances and qualities of tone, gestures and expression in keeping with the highest elocutionary art. In the United States the system has gained wide acceptance and study.

DELTA. See GEOLOGY, Vol. X, p. 246.

DELUNDUNG, the native name of the spotted weasel-cat (*Prionodon gracilis*), found in the Malayan regions. It belongs to the civet family (*Viverridæ*). The name *linsang* is often applied. The color is white, with black bands and spots.

DELVINO, a town in the province of Albania, S.E. European Turkey, 47 miles W.N.W. of Janina, in an orange and olive district. Pop., 10,000.

DELYANNIS, THEODORE P., a famous Grecian statesman; born at Kalavryta, in the Peloponnesus in 1826, and died at Athens, June 13, 1905, from the effects of a stab by a gambler enraged at the former's opposition to gambling houses. M. Delyannis studied law in Athens at an early age, entered the government service in 1843, and dating from the revolution of 1862, held many important political positions. He was holding his fourth term of premiership at the time of his death. A.R.R.

DEMAND AND SUPPLY. See VALUE, Vol. XXIV, pp. 53, 54.

DEMAVEND, MOUNT, Persia, a solfatara peak of the Elburz Mountains, the highest in the range, about 35 miles N.E. of Teheran, midway between the capital and the Caspian Sea. It is 19,400 feet high, conical shaped, and its crater-shaped summit yields large quantities of pure sulphur and pumice, which, carried in bags to the town of Demavend at the base, are exported to Amol and the port of Mahmudabad on the Caspian. The highway route from the interior to the Caspian winds through a pass at the eastern base of Mount Demavend. C.L.S.

DEMBEA, TANA, OR TSANA, LAKE, Abyssinia, the main feeder of the Bahr-el-Azrek or Blue Nile, on the Abyssinian Plateau, 6,100 feet above sea-level, is 60 miles long with an average breadth of 25 miles. It contains several islands; Dek Island, the largest, is inhabited. C.L.S.

DEMERARA. See GUIANA, Vol. XI, 221–222.

DEMESNE, in the law of England at the present day, the right which the owner in possession of lands in fee-simple has in his estate. But the original signification of "demesne" was that portion of the lands of a manor which the lord of the manor reserved for his immediate use and occupation. In ancient English law it was a tenure by which all manors belonging to the crown, in the reign of William the Conqueror, were held. See DOMESDAY BOOK, Vol. VII, pp. 303, 304.

DEMETRIUS THE FALSE. See RUSSIA, Vol. XXI, pp. 102, 103.

DEMETZ, FREDERICK AUGUSTE, philanthropist; was born in France on May 12, 1796, and became a lawyer and police judge. His work in the latter office led him to take an interest in the rescue and reformation of juvenile waifs and criminals, and through his efforts a system of agricultural colonies, or farm reform schools, was

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established, which proved fruitful of good results. Demetz visited America in 1836 with De Tocqueville. He died in 1873. W.F.J.

DEMI-BASTION, in fortification, a kind of half-bastion, which frequently terminates the branches of a crownwork or hornwork, and which is also occasionally used in other places. See FORTIFICATION, Vol. IX, p. 383.

DE MILLE, JAMES, author, was born at St. John, New Brunswick, in August, 1837, and was educated at Brown College. He was professor of Greek and Latin at Acadia College in 1860–65, and professor of history and rhetoric at Dalhousie College, Halifax, from 1865 to 1880. He wrote a text-book on rhetoric, a number of boys' books, and several successful novels. These included *Andy O'Hara*, *The Arkansas Ranger*, *A Comedy of Terrors*, *Lost in the Fog*, *The Boys of Grand Pré School*, *The Lady of the Ice*, *Cord and Creese*, *The Living Link*, *The Cryptogram*, and *A Castle in Spain*, the last-named a delightfully humorous and melodramatic extravaganza. His *Dodge Club*, published in 1866, was an inimitable satire upon the experiences of American tourists in France and Italy, and deserves to rank as a classic. All his stories possess the quality of interest in a high degree. He died at Halifax, during his professorship at Dalhousie College, on January 28, 1880. W.F.J.

DEMILUNE OR RAVELIN. See FORTIFICATION, Vol. IX, p. 392.

DEMING, a city of Grant County, southwestern New Mexico, situated on the south bank of the Rio de los Mimbres, about fifty miles below Silver City, on the Southern Pacific and Atchison, Topeka and Santa Fé railroads. It was founded in 1881, in the center of an extensive stock-range. Lead and silver are found in the vicinity in abundance. A United States custom-house is located here, and there is a thriving trade with the mining camps of the district and with Mexico. Population 1900, 1,341.

DEMIURGE. See GNOSTICISM, Vol. X, p. 627; MARCION, Vol. XV, pp. 541, 542.

DEMOCEDES, a Greek physician of Croton, practiced his profession first at Athens and then in Samos. He came as slave to the Persian court, attaining the rank of a physician to King Darius. Sent in 510 B. C. on an expedition for reconnoitering the Greek coast, he effected his escape to Croton. At an uprising against the Pythagorean aristocracy to which he belonged, he was killed in 504. G.A.S.

*DEMOCRATIC PARTY. When the constitution of the United States became the supreme law of the land, the duty of putting in motion the machinery of the new government devolved on its friends, the Federalists. This they did, and in the course of time funded the debt contracted by the Continental Congress, assumed and funded the Revolutionary debts of the states, established a national bank, and began a system of internal taxation. Each of these measures was stoutly opposed as unnecessary, inexpedient or unconstitutional, because power to do them was not expressly given by the constitution. Taken together, they were declared to have a nationalizing tendency, very dangerous to democratic government, and showing a strong leaning toward monarchy. So bitter was the feeling aroused, that Jefferson, with the aid of Madison, began the formation of a party, which they called the *Republican*, and established the *National Gazette* (1792) at Philadelphia, to set forth the principles of the new party.

So far, the Republican party was based on opposition to the domestic policy of the administration. But in 1793 Washington issued his proclamation of neutrality between France and her enemies, and added a new element to popular discontent. Thenceforth the Republican, or as it began to be called, the Democratic-Republican, party was the warm friend of France, and its policy of a decidedly French cast. In 1794 it attempted to provoke war with England, and forced Washington, in the interest of peace, to send John Jay to England to negotiate a treaty. When the treaty was made it was denounced, its negotiator was burned in effigy, and the President attacked with a violence beyond description. In these sentiments a large part of the Republicans did not share, and so long as Washington was willing to serve as President, the people were willing to have him. But in 1796, when he declined a third term, the Republicans formally brought forward Jefferson as a candidate, and succeeded in electing him Vice-President.

The insults from France, and the excitement over the X Y Z Mission and the quasi war (1798–1800), checked their success for the time being. But the Federalists passed (1798) the Alien or Sedition acts. The Republicans replied with the Virginia and Kentucky resolutions, and in 1800 swept the country, elected Jefferson and Burr, and for 24 years retained control of the Federal government. During this period they repealed all internal taxes, bought Louisiana from France (1803), reduced the national debt from $83,000,000 in 1801 to $45,000,000 in 1812, laid the famous embargo of 1807–09, and fought the War of 1812. By these acts the party showed that it was rapidly departing from its old doctrine of strict construction of the constitution, and that it was under the control of a new generation, led by Clay, Adams, Calhoun, Crawford, Grundy and Lowndes.

The disastrous experience of the War of 1812 modified the old policy yet more, and in 1816 the Republicans established the second national bank and laid a protective tariff, which was made more protective still in 1824, and showed a strong desire to spend public money on roads and canals. But against these changes the South revolted. The cotton-growing, tobacco-raising, rice-producing states cared nothing for manufactures,—nothing for internal improvements; and in 1824 the Republican party split into four factions, led by John Q. Adams, Henry Clay, Andrew Jackson and W. H. Crawford. The result was, no election by the electoral colleges; a coalition of the

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Adams and Clay men (both friends to internal improvements and the tariff) and the election of Adams by the House of Representatives; and the rise of two new and unnamed parties,—the "Adams men" and "Jackson men."

With the election of Jackson in 1828 the second wing of the Republican party came into power, and soon took the name of Democratic. It was the old Republican party purged of its progressive element. It stood, therefore, for strict construction of the constitution, and was antibank, antitariff, and against internal improvements at Federal expense. During Jackson's first term, the party as a whole was not ready to accept all these principles, and he was therefore forced to make an unprecedented use of the veto power, in order to defeat internal improvement bills passed by the National Republicans with the aid of Democratic votes. By the close of his administration these had been driven from the party, which then took and held the strict construction views of the constitution.

The memorable events of Jackson's "reign" are his war on the national bank; his defeat of the nullifiers; the passage of the compromise tariff of 1833; the payment of the national debt; the gold act of 1834; the specie circular; the removal of the deposits; the vote of censure by a Whig Senate, and the expunging of it by a Democratic Senate; the distribution of the surplus revenue; and the introduction, in 1832 and 1835, of the national nominating convention as a political institution. At the former (held at Baltimore, in May, 1832), Jackson and Van Buren were nominated; and at the latter (held at Baltimore, in May, 1835), Van Buren and R. M. Johnson.

The wild era of speculation on which the people entered in 1830, aided by the removal of the government deposits from the Bank of the United States, the specie circular and the distribution of the surplus, brought on the panic of 1837, and added to the principles already held by the Democrats the new one of "divorce of bank and state." The pledge was made good by the establishment of the subtreasury system on July 4, 1840.

The political principles which had thus been accepted in the course of 12 years were taken up in 1840 by the national convention of the party, and set forth in its first party platform. A few planks may be mentioned:

1. That the Federal government is one of limited powers.
2. Congress has no power to carry on a general system of internal improvements.
3. Congress has no power to charter a bank.
4. The divorce of bank and state.
5. No protective tariff.

On this platform Van Buren was nominated in 1840, and beaten by the Whigs in the famous "Log-Cabin-Hard-Cider" campaign. For a moment the Democrats seemed to be driven from power; but the death of Harrison (April 4, 1841) put Tyler in the chair, and for four years they continued to defeat Whig measures. In 1844 it again went into power, and elected James K. Polk and G. M. Dallas. Then came the annexation of Texas; the settlement of the Oregon boundary line; the re-establishment of the subtreasury system destroyed by the Whigs; the war with Mexico; the acquisition of new territory; the split in the party on the question of extending slavery into the new territories; and the defeat, in 1848, of Lewis Cass and W. O. Butler. The compromise of 1850 closed the breach, and in 1852 Franklin Pierce and W. R. King were elected; but the Kansas-Nebraska Act of 1854 re-opened it, and, though the party elected James Buchanan and John C. Breckenridge in 1856 (the nominating convention met at Cincinnati, June 2d), the division grew wider, and in 1860 two sets of candidates, John C. Breckenridge and Joseph Lane, and Stephen A. Douglas and H. V. Johnson, with two platforms, were put before the people. The one, the Breckenridge or Southern platform, set forth,—1. That slavery in a territory could not be forbidden by Congress, nor by the territorial legislature, nor by the people in an unorganized territory; 2. That the Federal government was bound to protect slave-owners in their property in slaves in the territories; 3. That the right of the people to decide the question of slavery could not be exercised till they were making their first state constitution. The Douglas platform announced the principle of "popular sovereignty," or the right of the people in a territory to settle for themselves whether that territory should be slave or free.

With its defeat in 1860, the Democratic party lost control of national affairs for a period of 24 years. The party candidates during this period were G. B. McClellan and G. H. Pendleton in 1864; Horatio Seymour and F. P. Blair in 1868; Horace Greeley and B. Gratz Brown in 1872. The war had settled forever the old issues of slavery, and in the 11 years which had since elapsed new economic questions had arisen. On these the Democratic party took its stand, and in 1876 declared for universal amnesty and against negro suffrage, against a protective tariff, and for the payment of the national debt in legal-tender paper (greenbacks), except when expressly made payable in coin. In 1876 it nominated Samuel J. Tilden and T. A. Hendricks, obtained a majority of the popular vote, a majority of the members of Congress (42 out of 76 in the Senate; 149 out of 293 in the House), and claimed to have elected Tilden This the Electoral Commission decided against the Democrats.

In 1880 the party convention (held at Cincinnati June 22d) placed Winfield Scott Hancock and W. H. English in nomination on a platform whose brevity and tameness mark a transition from old issues to new. At the election, 4,447,888 Democratic votes were cast, and 19 states, with 155 electoral votes, were carried. The Republicans secured 214 electoral votes. The long and specific platform of 1884 set forth the new issues very clearly. They were: Economy; lower taxes; tariff reform; honest money, "and a currency convertible into such money without loss"; civi.

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service reform; no more land grants to corporations; an "American policy"; and the "revival of American shipping." The candidates were Grover Cleveland and Thomas A. Hendricks, who were elected by a plurality of 62,683 votes.

Four years later, June 5, 1888, Cleveland was again nominated. Hendricks was then dead, and Allen G. Thurman was nominated for the second place by the convention sitting at St. Louis. The platform was a *résumé* of what the party had done since 1884, and made few pledges for the future. This time the Republicans won, though the Democratic plurality was 100,476

When the national convention met again (at Chicago, June 21, 1892), the great issues before the country were the tariff, the silver legislation of 1890, reciprocity and trusts. The platform of that year, therefore, calls for a tariff for revenue only; a repeal of the McKinley Act and of the Sherman Act; more legislation against trusts; repeal of the ten-per-cent tax on state bank issues; the improvement of waterways; and the protection of railway employees. Again the candidate was Grover Cleveland, with whom was now associated Adlai E. Stevenson, and again the Democrats won, with a plurality of 382,956. Of 444 electoral votes, Cleveland received 277, Harrison 145, Weaver 22.

The party was now in control of the Presidency, the Senate and the House, but the panic of 1893, the Hawaiian policy of the President, the income tax, the Wilson tariff, the action of the party in the Senate on the repeal of the silver-purchasing clause of the Sherman Act, turned the popular feeling against the Democrats, and at the fall elections of 1894 the Republicans regained the House by an immense majority

At the next national convention, which met in Chicago, July 7, 1896, the paramount issue, as presented by a majority of the delegates, was the demand for free and unlimited coinage of silver at the ratio of 16 to 1. The other planks of the platform—tariff for revenue only; income tax; early admission of all territories as states; opposition to bond issues, to government by injunction and to life tenure in the civil service; the demand for Federal control of pools and trusts, etc.,—all these were overshadowed by the dominant cry of "free silver." The debate on this subject culminated in the eloquent speech of William J. Bryan of Nebraska, who was accordingly nominated as the Democratic candidate for President, with Arthur Sewall of Maine for Vice-President. A considerable minority of the delegates, especially those from the Eastern states, stood for the gold standard, and refused to indorse the "free silver" plank of the platform. On August 8th, representatives from thirty-three states met at Indianapolis and issued a call for a "sound money" convention, in the name of the national Democratic party, to be held at Indianapolis, Sept. 2, 1896. The Populist convention at St. Louis (July 27th) also nominated Bryan for President, but refused to accept Sewall, and nominated Thomas E. Watson of Georgia for Vice-President. In November the Democrats were defeated.

J. B. McMaster.

The platform of the Democratic party, in the contest for the Presidency in 1900, was that adopted at the Democratic National Convention held at Kansas City on July 5 of that year. The paramount issue declared was imperialism, which was defined to be "the war of criminal aggression against the Filipinos," together with militarism, construed to be "conquest abroad and intimidation and oppression at home." The other planks in the platform were denunciation of trusts, or private monopolies, which "destroy competition, control the price of all material and of the finished product, thus robbing producer and consumer"; disapproval of the alliance with England, as an entangling alliance and involving the American nation in so-called world politics; the election of senators by the direct vote of the people; repeal of the war taxes; and the immediate restoration of the free and unlimited coinage of silver and gold at the present legal ratio of 16 to 1. The ticket nominated was William J. Bryan, of Nebraska, for President, and Adlai E. Stevenson, of Illinois, for Vice-President. At the Democratic National Convention held early in July, 1904, at St. Louis, Judge Alton B. Parker, of New York, was nominated for President, and Henry G. Davis, of West Virginia, for Vice-President. Each of the tickets was defeated in the respective elections following.

DEMOGEOT, Jacques Claude, man of letters; was born in Paris on July 5, 1808, and adopted a literary career. He was a lecturer at Beauvais, Rennes, Bordeaux and Lyons, and in 1843 was appointed to the chair of rhetoric in the College of St. Louis in Paris, which he filled for the rest of his life. He was the author of *Letters and Men of Letters of the Nineteenth Century* (1856); *History of French Literature* (1857); *French Literature in the Seventeenth Century* (1859), and *History of Foreign Literature* (2 volumes, 1880). He died in Paris on January 9, 1894. W.F.J.

DEMOS. See Nobility, Vol. XVII, p. 540.

DENARIUS. See Numismatics, Vol. XVII, pp. 669, 673.

DENDRITE, the name given to a peculiar branching mineral crystallization on the surfaces of the fissures and joints, or in the surfaces of rocks, having the appearance of moss, and often mistaken for fossil plants. The hydrous oxide of manganese is the mineral that generally assumes this form, occurring frequently in great abundance in limestone, steatite, trachyte and other substances.

DENDROLITES, petrified stems of trees or shrubs found in all parts of the world in the formations called secondary, especially in the coal formation. They vary in size, and may be considered the remains of a former creation. In some instances gigantic stems occur, which often contain branches, fruit and even the impressions of leaves; and in other places mere fragments are found, which bear no resemblance to the trees now growing in the same regions, the fossil stems of beautiful palms having been discovered at Chemnitz, in Saxony, and other similar places. Such woods, when preserved in ancient strata altered by volcanic fire, are changed into agate, or into pitchstone. Opinion is divided regarding their origin.

DENGUE or BREAKBONE FEVER, also called Dandy and Bucket Fever, a disease known in the Southern states of North America, and in the West Indies and Africa, where it was first

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described as having appeared in 1827 and 1828. It is seldom fatal, though very violent in its access, mainly consisting of an attack of inflammatory fever, accompanied by pains of the limbs and muscles. The acute stage lasts seven or eight days. This fever is said to be infectious.

DENIS, JEAN FERDINAND, traveler; born in Paris, Aug. 13, 1798. Through the influence of his father, who was in the French foreign office, he was attached to various diplomatic missions, to prepare himself for which he pursued the study of language and literature, especially those of the East. A journey to South America in 1816 was followed by a number of works on Brazil and neighboring countries. His other travels were restricted to Spain and Portugal, these leading to further descriptive writings. He was appointed librarian to the Ministry of Public Instruction in 1838 and conservator of the St. Genevieve Library in 1841. He died Aug. 2, 1890. G.J.H.

DENISON, a town and the capital of Crawford County, central western Iowa, 64 miles N.N.E. of Council Bluffs, situated on the Boyer River, and on the Chicago and North-Western railroad. It has thriving manufactories and a normal college. Population 1890, 1,782; 1900, 2,771.

DENISON, a city of Grayson County, Texas, in the northeast part of the state, near the Red River. It is sixty-seven miles north of Dallas. It is the center of a rich agricultural and fruit raising region, and has extensive manufactures and railroad commerce. It is also the seat of a convent and a commercial school, and of railroad car and engine shops. It is reached by the Missouri, Kansas and Texas, the Houston and Texas Central, and the Denison and Washita Valley railroads. Its population was 10,958 in 1890 and 11,807 in 1900. W.F.J

DENISON, EDWARD, a British philanthropist; born in 1840; died in Australia, Jan. 26, 1870. He was the son of Edward Denison, bishop of Salisbury, and by reason of his position in society was of great influence in the work to which he devoted his short life—the relief of the poor of London. He lived for eight months in East London, associating with the poor and criminal classes. He organized a school and began the system of education of the poor which has developed into the "university settlements" and "commons." His influence brought about the organization of the present Associated Charities Societies. His health failed him and he died while on a voyage to regain it. See also CHARITY ORGANIZATION, in these Supplements.

DENISON, GEORGE ANTHONY, an English ecclesiastic; born in 1805, in Ossington, Nottinghamshire, England; became vicar of East Brent in 1843, and archdeacon of Taunton in 1851. On a charge of teaching the doctrine of the real presence he was condemned by an ecclesiastical court in 1854 to be deprived of his preferments; but the judgment was quashed by the Courts of Arches and the Privy Council. He became a leader of the High Church party, an opponent of secular education, and an advocate of the confessional. He was for many years editor of the *Church and State Review*, and was chairman of the committee of convocation which condemned Bishop Colenso's works. His principal literary productions are his delightful *Notes of My Life* (1878) and *Mr. Gladstone* (1885).

DENISON UNIVERSITY, an institution for the instruction of men, located at Granville, Ohio. It was organized under the auspices of the Baptist Church in 1831 as a manual-labor school, under the name of Granville Literary and Theological Institute, which in 1845 was changed to Granville College and in 1856 to its present name. Affiliated with it are Granville Academy, a preparatory school, and Shepardson College, a school for women. Denison University had, in 1904, a faculty of 35, with 480 students, and a library of 21,000 volumes. Since the organization 990 have been graduated. It has an endowment of $650,000, and an annual income of $40,000.

DENIZLI, Turkey in Asia, a town in the vilayet of Smyrna, 115 miles by rail east of Smyrna, occupying a slight elevation in a fertile valley surrounded by beautiful gardens. It manufactures morocco and other leather, and has an agricultural trade. Population, 16,900. C.L.S.

DENMAN, GEORGE, an English jurist, the fourth son of Thomas, first Baron Denman (q.v., Vol. VII, p. 70), was born in London, Dec. 23, 1819. He was educated at Repton Grammar school, whence he went to Trinity College, Cambridge, of which he became a scholar and a fellow, taking his B.A. degree in 1842. He was called to the bar in 1846, at Lincoln's Inn. In 1857 he was appointed one of the Cambridge University counsel. He unsuccessfully contested the University in 1856; but was subsequently elected for Tiverton, which he represented, with one interval, until 1872. He promoted and carried bills for assimilating the laws relating to evidence, and for abolishing the disqualifications of witnesses for want of religious belief, and on other grounds. In 1872 he succeeded to a vacancy in the Court of Common Pleas, and on the passing of the Judicature Act in 1875, became a judge in the High Court of Justice. In 1893, after twenty years' service, he retired from the bench; in 1893 was sworn a Privy Councilor, and became a member of the judicial council of the Privy Council. He published a translation, into Greek elegiacs, of *Gray's Elegy* (1871); and a Latin elegiac revision of the first book of *Pope's Homer*. He died in London, Sept. 21, 1896.

DENMARK. For the early history, climate, productions, commerce, etc., of the kingdom of Denmark, see Vol. VII, pp. 70–82. According to the last decennial census, taken Feb. 1, 1901, the total area of Denmark was 15,360 square miles, and the total population 2,464,770. The population in 1870 was 1,794,733, and in 1880 1,980,259. The capital of the kingdom is Copenhagen. Population (1901), with suburbs, 476,806. In Denmark proper the town population has increased from 722,244 in 1890 to 936,565 in 1901, or at the rate of 29.7 per cent; while the rural population has increased

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from 1,450,136 in 1890 to 1,512,975 in 1901, or at the rate of 4.3 per cent The population is almost entirely Scandinavian. Out of every 1,000 persons 469 live exclusively by agriculture, 229 by manufacturing industries, 68 by trade, and 27 by seafaring and fishing.

The revenue for 1901 was $20,002,557 and the expenditure $19,576,740. The financial budget of 1902 provided for a total revenue of $20,204,467 and a total expenditure of $19,203,144. An important feature in the administration of the finances of the kingdom is the maintenance of a reserve fund of a comparatively large amount. On March 31, 1901, the fund stood at $6,855,767. The object of the reserve fund is to place means at the disposal of the government in the event of sudden emergencies. The public debt of Denmark, which was incurred in part by large annual deficits in former years, before the establishment of parliamentary government, and in part by railway undertakings and the construction of harbors, lighthouses and other works of public importance, amounted at the close of the fiscal year, March 31, 1901, to $59,275,556. The investments of the state, including the state railways, amount to about $67,071,194.

The army consists of all the able-bodied young men of the kingdom who have reached the age of 22 years. They are liable to service for eight years in the regular army and its reserve, and for eight years subsequent in the extra reserve. The total peace strength of the army in 1900 was 824 officers and 9,000 men; the total war strength is about 65,000 men.

About eighty per cent of the total area of Denmark is productive. According to latest returns, the total area under corn crops was 3,029,404 acres; potatoes, 128,849 acres; clover, 456,585 acres; bare fallow, 638,116 acres; grass, meads, etc., 2,625,865 acres. The leading crops in 1894 were: Oats, 28,900,000 bushels; barley, 21,760,000 bushels; rye, 15,670,000 bushels; wheat, 4,035,000 bushels; potatoes, 15,900,000 bushels; other roots, 85,453,952 bushels; besides vegetables, hay, and clover. The total value of the produce in 1894 reached $70,971,925. The total imports for the year 1900 amounted to $115,227,665, and the exports to $77,189,424. On July 16, 1893, there were in Denmark proper 410,639 horses, 1,696,190 head of cattle, 1,246,552 sheep, 25,266 goats, and 829,131 swine.

In 1898 there were in Denmark a total length of 1,530 English miles of railway open for traffic, of which 1,067 miles belonged to the state.

The Lutheran remains the established religion. There is complete religious toleration. In 1890 four-fifths of the population belonged to the Lutheran Church. Of the remainder, 4,080 were Jews, 3,647 Roman Catholics, 4,556 Anabaptists, 2,301 Methodists, etc. Education, which is compulsory, has progressed rapidly. In 1892 an agricultural and veterinary college was established at Copenhagen. There are also 22 other agricultural schools, 67 high schools, 31 Latin schools, a college of pharmacy, 99 commercial schools, various art colleges, and the University of Copenhagen, which has about 1,300 students. The colonial possessions of Denmark in the West Indies, were, in 1902, sold to the United States for the sum of $5,000,000.

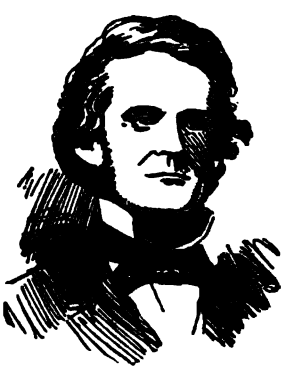
DENNERY or D'ENNERY, ADOLPHE PHILIPPE, a French dramatist of Jewish extraction; born in Paris, June 17, 1811. He was decorated with the Legion of Honor, Dec. 10, 1847, and made officer, Aug. 16, 1859. He produced about 200 pieces from 1831 to 1881, and was the creator of Cabourg, a watering-place in Normandy. Among his dramas are *The Bohemians of Paris* (1842–43); *Marie Jeanne* (1845); *Don César de Bazan* (1849); *Uncle Tom's Cabin* (1853); *Round the World in Eighty Days* (1871); *The Two Orphans* (1875); and *Michael Strogoff* (1880). Died in Paris, Jan. 25, 1899.

DENNEWITZ, a village of Brandenburg, Prussia, 41 miles S. W. of Berlin, where, in 1813, a battle was fought. See AUSTRIA, Vol. III, p. 117.

DENNIE, JOSEPH, an American writer; born in Boston, Mass., Aug. 30, 1768. He graduated at Harvard in 1790, studied law, and commenced practice at Walpole, N. H., but soon abandoned the profession. In 1795 he made an engagement with *The Farmer's Weekly Museum*, a then popular periodical, in which his series of articles entitled *The Lay Preacher* attracted considerable attention. On the failure of the publication he became a candidate for Congress, but was defeated. For a few months he was secretary to Timothy Pickering, Secretary of State; but in 1800, with Asbury Dickins, he commenced the publication, in Philadelphia, of *The Portfolio*. He died in Philadelphia, Jan. 7, 1812. E.E.T.

DENNISON, a village of Tuscarawas County, central eastern Ohio, 28 miles S. of Canton, on the Pittsburg, Cincinnati, Chicago, and St. Louis railroad. It has machine-shops, carshops, and pipe foundries. Population 1900, 3,763.

DENNISON, WILLIAM, statesman, was born at Cincinnati, Ohio, on November, 23, 1815, was graduated from Miami University in 1835, and settled at Columbus as a lawyer in 1840. He became a banker and railroad president, member of the legislature and organizer of the Republican party, and was governor of Ohio in 1860–62. In the latter office he was notably energetic in his support of the national government in the Civil War, sometimes resorting to heroic measures the constitutionality of which were questioned. In 1864–66 he was Postmaster-General of the United States. He was a benefactor of the university which bears his name, at Granville, Ohio. He died on June 15, 1882, leaving the memory of a pure and noble patriot. W.F.J.



WILLIAM DENNISON.

DENS, PETER, a Roman Catholic theologian;

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born near Antwerp, at Boom, in 1690; died at Malines, Feb. 15, 1775. He was parish priest of Saint Rumold's, and president of the College of Malines for forty years. His work, *Theologia Moralis et Dogmatica*, is extensively used as a textbook in the Roman Catholic theological schools.

DENSIMETER, an apparatus for determining the relative density of a substance. In one form, made for testing salt-water, it consists of a pair of opposed telescopes, which are mounted on a frame and pointed toward each other. Between them is placed, in a prism, the salt-water to be tested. The refracting power of the water varies in proportion to the strength of the saline solution, and the exact refraction may be found by noting the angle at which the telescopes have to be swung to come into the line of vision.

C. H. COCHRANE.

DENSITY OF THE EARTH. The density of a body is the ratio of its mass when compared with the same bulk of water. Astronomy and the laws of gravitation have furnished the data for ascertaining the density of the earth, which is now assumed to be about five times that of water. See ASTRONOMY, Vol. II, pp. 693, 694; GEOLOGY, Vol. X, pp. 198, 199.

DENTAL FORMULA. See MAMMALIA, Vol. XV, p. 355.

DENTALIUM. See *Scaphopoda*, under MOLLUSCA, Vol. XVI, p. 688.

DENTARIA OR TOOTHWORT, a genus of plants of the family *Cruciferæ*, with white or rose-colored flowers and a toothed rootstock, from which it derives its name. The rootstock is pungent, and was formerly dried and used as a remedy for toothache. Other common names are *pepper-root* and *crinkle-root*.

DENTATUS, MANIUS OR MARCUS CURIUS, a Roman consul noted for his integrity as well as for martial exploits. He was consul with P. Cornelius Rufinus, 290 B.C. He was consul in 275 and 274, and during his three terms of service conquered the Samnites, Lucanians, Sabines and Bruttians. He was censor in 272 B.C., and while in office did much to improve the public works of the Roman domain. He began the Anio viaduct and built the Velinian canal. See TERNI, Vol. XXIII, p. 206. He died 265 B. C.

DENTEX, a genus of marine fishes, resembling the perch, found in Europe. It reaches a large size, and is an important food-fish.

DENTIL. See ARCHITECTURE, Vol. II, p. 406.

DENTINE. See DIGESTIVE ORGANS, Vol. VII, p. 203.

DENTIROSTRES, an artificial group of birds established by Cuvier. It included those forms with notched upper mandible, such as thrushes, warblers and shrikes.

DENTON, the capital of Caroline County, central eastern Maryland, situated on the Choptank River, 53 miles S.E. of Baltimore. It has an academy. Population 1890, 641; 1900, 900.

DENTON, a city and the county seat of Denton County, Texas, in the northeastern part of the state, about 25 miles north by west from Dallas, and the same distance north by east from Fort Worth. It has some manufacturing industries, and is reached by the Missouri, Kansas and Texas and the Missouri Pacific railroads. Its population was 2,558 in 1890 and 4,187 in 1900. W.F.J.

D'ENTRECASTEAUX ISLANDS, a group off the eastern end of New Guinea, at lat. 10° S., long. 151° E., belonging to Great Britain. The largest is Fergusson; next, Normanby and Goodenough. Area, 1,214 square miles; population, about 12,000.

DENUDATION, IN GEOLOGY. See GEOLOGY, Vol. X, p. 331.

DENVER, a city and the capital of Arapahoe County, central eastern Colorado, and also the capital of the state. It is situated 5,224 feet above sea-level, 12 miles eastward from the foot of the Rocky Mountains, on the south branch of the Platte River, where that stream is joined by Cherry Creek. Denver was settled in 1858 by a party of miners under Green Russell, and by a colony under Gen. J. W. Denver, from whom it received its name. The discoveries of gold, silver and other minerals caused an influx of settlers into the district, of which Denver is the commercial center. A rapid growth increased the population of the city from 4,759 in 1870 and 35,629 in 1880 to 106,713 in 1890. Pop. 1900, 133,859.

Denver is a city of great natural beauty, which has been enhanced by broad avenues, lined with beautiful shade-trees, and fine public buildings and parks. Among the public buildings are the State Capitol, a magnificent structure of gray granite; the County Courthouse, City Hall, the United States Government Building, the Tabor Grand Opera House, and a number of beautiful cathedrals and business blocks. The city has, in addition to one of the most complete public-school systems, Denver University; Wolfe Hall, a seminary for young women; Brinker Institute, a collegiate institution for young men; and a number of lesser private establishments. Large public libraries are established at various accessible points.

Denver is primarily a railroad center, as it is the gateway to the mountains of the West, the mining camps of which obtain all supplies from the city, and the summer resorts cause all travelers in the West to make Denver a starting-point. Sixteen distinct railway systems enter the city. Large ore-refining works, and manufactories to the number of 1,475 are located there, with a capital of over $30,000,000. The city public works have made it perhaps the best drained and watered city in the United States. Over two hundred artesian wells furnish the water-supply. All modern rapid-transit systems and an excellent system of lighting are in use.

DENVER, JAMES WILLIAM, soldier and legislator; born in Winchester, Va., Oct. 23, 1817. He studied engineering and law, and in 1847 raised a company for the Mexican War, in which he served under General Scott as a captain in the 12th United States Infantry. In 1850 he crossed

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overland from Missouri to California, and in 1851 was elected state senator by the people of Trinity County. In 1852 the governor of California selected him to take charge of the train of supplies sent to the destitute emigrants on their way to the Pacific coast, and through his aid hundreds of lives were saved. He was appointed secretary of state of California in 1853; elected to Congress in 1854; and in 1857 was appointed by the President commissioner of Indian Affairs. He was subsequently made governor of Kansas, then in a state of almost civil war, and in less than a year's time succeeded in restoring order. When the territory of Kansas was organized in 1858, its capital city was named Denver, in his honor. He served in the Civil War as brigadier-general of volunteers. He died Aug. 8, 1894. G.J.H.

DEODATUS. See ST. DIE, Vol. XXI, p. 170.

DE PAUW, WASHINGTON CHARLES, manufacturer and philanthropist, was born at Salem, Indiana, on June 4, 1822, of Huguenot ancestry, and grew up in frontier life and work. He became interested in lumber and flour mills, in banks, in army contracts during the Civil War, in woolen mills, and in glass manufacture, and thus amassed a fortune. In 1884 he began giving his wealth to the Indiana Asbury University, the name of which was changed to De Pauw University, and in time it received practically all of his great fortune. He died on May 5, 1887. W.F.J.

DE PAUW UNIVERSITY, an educational institution at Greencastle, Indiana, organized in 1837 under the auspices of the Methodist Episcopal Church. It was originally known as the Indiana Asbury University and changed its name owing to the liberal endowments made the institution by Washington Charles De Pauw (q. v.) At his death he bequeathed the sum of $1,500,000 to the university. In 1904 the institution had 34 professors and instructors and 742 students, and a library containing 35,000 volumes. The president is Edwin H. Hughes. The college campus contains 150 acres. There have been 2,500 graduates since the organization of the institution. There are special schools of law and theology and also a post-graduate school. The school allows elective studies and courses. W.M.C.

DE PERE, a city of Brown County, Wisconsin, in the eastern part of the state, on the eastern bank of the Fox River, a few miles above the entrance of that stream into the head of Green Bay. It has considerable manufacturing industries, and also an extensive commerce by rail and by water, being on the Chicago, Milwaukee and St. Paul railroad, and having lines of steamships on Lake Michigan. Its population was 4,038 in 1900. W.F.J.

DEPEW, CHAUNCEY MITCHELL, an American politician and railroad man; born in Peekskill, N. Y., April 23, 1834. He graduated at Yale in 1856; studied law, and was admitted to the bar in 1858. He was elected to the New York Assembly, 1861–62; and Secretary of State in 1863. In 1866 he was appointed attorney to the New York & Harlem Railroad, and later became general counsel to its successor, the New York Central & Hudson River Railroad and the connecting roads of the Vanderbilt system. He was elected regent of the State University and appointed one of the Capitol commissioners in 1874; and appointed boundary commissioner in 1875. He was president of the New York Central & Hudson River Railroad Co., 1885–99, in which latter year he resigned to become chairman of the board of directors of the allied New York Central, Lake Shore & Michigan Southern, Michigan Central, and the New York, Chicago, & St. Louis railroads. He was a candidate for the Presidency in 1888, but received only 99 votes; was delegate-at-large to the Republican convention in 1892–96, and 1900; was elected to the U. S. Senate in 1898, and re-elected in 1905. He has considerable reputation as a public speaker. E.E.T.

CHAUNCEY M. DEPEW.

DE PEYSTER, ABRAHAM, an American Colonial statesman; born in New York, July 8, 1658. He was mayor of New York between 1691 and 1695, and subsequently became chief justice of the Province and president of the King's Council, in which latter capacity, in 1701, he acted as Colonial governor. He was also colonel of the forces of the city and county of New York, and treasurer of the Provinces of New York and New Jersey. He died in New York, Aug. 10, 1728. E.E.T.

DE PEYSTER, JOHANNES, an American colonist; born in Haarlem, Holland, in the beginning of the 17th century. He was of Huguenot stock, and held many offices of trust and honor under Dutch and English colonial rule, including those of alderman and mayor. He died in New York, one of the richest citizens in the colony, about 1685. See DE PEYSTER, ABRAHAM, *supra*, and DE PEYSTER, JOHN WATTS, his descendants. E.E.T.

DE PEYSTER, JOHN WATTS, soldier and author, was born in New York City on March 9, 1821, and spent much of his early life in Europe, pursuing military and other studies. In 1845 he entered the military service of New York, and later was sent to Europe as special agent to study military organization. Ill health prevented him from serving in the Civil War, but he did much toward the organization of troops and wrote much on military topics. In 1869 he was commissioned brevet major-general by the State of New York. He has been identified with many benevolent works, and has written much on history and military matters. W.F.J.

DEPHLEGMATOR. The principle of all dephlegmators, as used in fractional distillation, is

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based on the fact that when a mixture of two liquids of different boiling-points is distilled, the distillate, at all stages of the process, contains both liquids, the more volatile first predominating, and later the other liquid. Le Bel's dephlegmator consists of a tube with three bulbs or enlarged portions, and a vapor-tube at the top leading to the condenser. It is fitted with several baskets of platinum gauze, in which the liquid collects more rapidly than it can run through into the flask to which the apparatus is fitted. The vapor passing through being brought into contact with the condensed liquid, only the most volatile constituents pass into the condenser. The accumulation of liquid in the gauze baskets necessitates the regular removal of the heating apparatus, and in this respect Henniger's dephlegmator is better. It provides side-tubes for conveying the accumulated liquid from bulb to bulb downward, until it is delivered into the flask. Linnemann's dephlegmator is similar to Le Bel's, the only difference being in the position of the bulbs. Glynsky's dephlegmator makes use of hollow glass balls in place of wire-gauze baskets.

C. H. COCHRANE.

DEPOSIT, a village of Broome County, southern New York, on the Delaware River, and on the Erie railroad. It is situated partly in Broome County and partly in Delaware County. It has flour and planing mills, and stockyards. Population 1890, 1,530; 1900, 2,051.

DEPOSITION, the testimony of a witness set down in writing, and taken by a judge, or by a commissioner specially appointed by him for that purpose. The depositions are answers to questions generally put by the legal representatives of the parties to the suit, under the control of the court or commissioner, and the answers are taken down by the clerk of court, or by a clerk specially appointed for the purpose. By act of Congress, and by statute in the various states, rules have been provided, permitting the taking of depositions in civil cases, where the witness is sick, aged, about to leave the state, or where he resides at a great distance from the place of trial or outside of the state, and in other cases, where it would be impossible or very inconvenient for the witness to attend the trial. This may generally be done by serving the opposite side with reasonable notice of the time and place of taking the depositions, and by obtaining a commission from the court wherein the cause is pending. In criminal cases depositions cannot be taken without the consent of the accused, as the constitution gives him the privilege of requiring the presence of the witnesses.

DEPPING, GEORG BERNHARD, a German-French historian; born at Münster, May 11, 1784, settled in Paris in 1803, where he died Sept. 6, 1853. His works include *History of the Norman Expeditions* (1826); *History of the Jews during the Middle Ages* (1834); *History of the Normans* (1835), and *Romancero Castellano* (1844).

G.A.S.

DEPRETIS, AGOSTINO, an Italian statesman, born near Stradella, Italy, Jan. 31, 1813; died there, July 20, 1887. He became a lawyer and writer for liberal newspapers, and in 1849 civil governor of Brescia. He became pro-dictator of Sicily in 1861, and in 1862 entered Ratazzi's Cabinet. In 1866 he was Minister of Marine, and after the death of Ratazzi, led the opposition in the Chamber. In 1876–77, again in 1879–81, and in 1881 he was Premier of Italy.

DEPREZ, MARCEL, a French engineer and electrician; born in Châtillon-sur-Loing, Dec. 19, 1843. He studied at the Lyceum of St. Louis and at the École des Mines. His first success in transmitting 1½ horse power over wire from Meisbach to Munich, 35 English miles, excited universal attention at the second International Electro-Technical Exposition of Munich, in 1882. In *La Lumière Électrique* he had demonstrated that the appliance of higher tensions of electricity than hitherto applied would be necessary for long distance transmission of electrical power, for industrial purposes, and was the originator of the above described invention. His researches on dynamos have appeared in all principal works. The electro-technics are further indebted to him for the curve, named by himself Characteristic, and for the galvano-meter, called after him Deprez-D'Arsonval. In 1886 he was elected member of the Academy, and in 1890 appointed professor of applied electricity at Paris Conservatory des Arts et Métiers. G.A.S.

DE PROFUNDIS (Lat., "Out of the depths"), the first words of the 130th Psalm, which form a portion of the liturgy of the Roman Catholic Church, and are sung when the bodies of the dead are committed to the grave. It is one of the seven "penitential psalms."

DEPUTY, one appointed by a ministerial officer to exercise the functions of the officer appointing him. A deputy is usually required to take the oath of office, and his acts are of equal force with those of the officer himself. He must act in the name of the officer under whom he is appointed. Sheriffs, marshals, clerks of courts and other ministerial officers are generally authorized to appoint deputies, and are liable for the acts of a deputy performed by him as deputy, or for his neglect. Special deputies are those appointed as deputy for some particular act.

DERAH (dirâ), the unit of measure of length in Egypt—22.37 inches. Its subdivisions are the *kadam*—one-half of a derah, the *adbat*—one-sixth of a derah, and the *kerat*—one-twenty-fourth of a derah. See also WEIGHTS and MEASURES, Vol. XXIV, p. 518. W.R.B.

DERBY, a village of New Haven County, Connecticut, at the junction of the Housatonic and Naugatuck rivers, and on the New York, New Haven and Hartford railroad. It is an important manufacturing center. Its population in 1900 was 7,930. W.F.J.

DERBY, EARLS OF. See MAN, ISLE OF, Vol. XV, p. 461.

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DERBY, EDWARD HENRY SMITH STANLEY, EARL OF, the fifteenth of the title, a British statesman; born in Knowsley, England, in July, 1826; died there, April 21, 1893. He entered Parliament in 1848; in 1852 was appointed Under-Secretary for the Colonies, during the first premiership of his father. During his father's second premiership he was Colonial Secretary, Secretary of State for India and Secretary for Foreign Affairs. He was opposed to an active war policy. While Secretary for India he brought about the transfer of that empire from the East India Company to the crown. He became Minister of Foreign Affairs for the second time, under Disraeli, in 1874, but resigned in 1878 on account of differences with the Prime Minister. He had been until this time a Conservative, but now joined the Liberals, and became Colonial Secretary under Gladstone in 1886. He could not agree with Gladstone's home-rule ideas, and, resigning, joined the Liberal-Unionists in the same year, 1886. He took no further leading part in politics. In addition to his political work, Lord Derby took an active interest in educational institutions in London, and was a promoter of many charitable organizations.

DERBY, ELIAS HASKET, merchant, was born at Salem, Mass., on August 16, 1739, and became a shipping merchant in succession to his father. By the beginning of the Revolution he was a wealthy man and owner of a fleet of seven ships, which he devoted to the patriot cause. He was the chief shipbuilder of those days, and did much for American naval architecture. He pushed American commerce to all parts of the earth, his ships first carrying the American flag to India and China and the Cape of Good Hope. He materially aided in the organization of the United States Navy Department in 1798, and in building a navy, and more than any other man deserves to be regarded as the founder of the American merchant and naval marine. He had a fine home in Salem on the ground now known as Derby Square, and died there on September 8, 1799. His business was left to his son, who bore his name and who had been the commander of one of his ships. The younger Derby also became interested in woolen manufactures and was a pioneer of that industry in America, and the first importer of merino sheep into this country. W.F.J.

DERBY, ELIAS HASKET, lawyer and author, son and grandson of eminent Massachusetts merchants of the same name, was born at Salem, Mass., on September 24, 1803, and was graduated from Harvard College in 1824. He became a leading lawyer, and president of the Old Colony Railroad Company, and was identified with the building of the Hoosac tunnel. During the Civil War he promoted the construction of iron-clad warships. He wrote much for publication, especially for *The Atlantic Monthly* and *The Edinburgh Review*, and was the author of several books and reports. He died in 1880. W.F.J.

DERBY, FREDERICK ARTHUR STANLEY, EARL OF, the sixteenth of the title, an English statesman; born in London in 1841; created Baron Stanley of Preston in 1886, and succeeded his brother as Earl of Derby in 1893. He was educated at Eton, and from 1858 to 1865 served in the army. He entered Parliament from the Preston district of Lancashire in 1865, and has held the following offices as a Conservative: Financial Secretary for War, 1874–77; Secretary of State for War, 1878–80; Secretary of State for the Colonies, 1885–86; president of the Board of Trade, 1886; and Governor-General of Canada, 1888–93. He married the eldest daughter of the Earl of Clarendon in 1864.

DERBY, GEORGE HORATIO, an American soldier; born in Dedham, Mass., April 3, 1823. He graduated at the United States Military Academy at West Point in 1846; was assigned to the ordnance department, and in 1847 was transferred to the topographical engineers. He was severely wounded in the battle of Cerro Gordo; rose to the rank of captain, and was employed on lighthouse-erection duty in the South. Sunstroke incurred in this service shortened his life. He wrote many humorous articles under the titles of *Phœnixiana* and *The Squibob Papers*. He died in New York, July 15, 1861. E.E.T.

DERBY, ORVILLE ADELBERT, geologist; born in Niles, N. Y., July 23, 1851; educated at Cornell University, making two vacation trips with Professor Hardtt to the Amazon. He returned to Brazil as assistant to Professor Hardtt in 1875, and was director of the geological and mineralogical department of the National Museum of Rio de Janeiro from 1880 to 1891. He is a member of the Geological Society of London, associate editor of the *Journal of Geology*, and author of memoirs on the geology of Brazil. G.J.H.

DERBY, SAMUEL CARROLL, educator, was born at Dublin, N. H., on March 3, 1842, was graduated from Harvard College in 1866, and pursued post-graduate studies at Harvard and Johns Hopkins universities. He taught in public schools in 1866–67, and in Dixwell's Latin School, Boston, in 1867–70; and was a professor at Antioch College in 1870–76, and president of that institution in 1877–81. Since the last-named year he has been professor of Latin in the Ohio State University, at Columbus. W.F.J.

DERCYLLIDAS, a Spartan general in the employ of the Asiatic Greeks, 399 B.C. He succeeded Thimbron, and was superseded by Agesilaus in 396 B.C. He was given command of an army to protect the Asiatic Greeks from the Persians. He was successful, and during his term of office captured Atarneus and conquered nine cities of Æolia.

DERELICT, a term, in law, signifying anything forsaken or left unoccupied, or willfully cast away. Where the sea has receded from the shore, the land thus left uncovered is styled derelict. The most common use of the term is its application to a ship which has been wrecked, and has been abandoned by the master and crew without hope of recovery. The mere quitting of a ship for the purpose of procuring assistance from the shore, or other temporary cause, with

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the intention of returning to her again, does not make her derelict.

DERENBOURG, HARTWIG, a French Arabist, son of the following; born in Paris, June 17, 1844. He received the degree of doctor of philosophy from Göttingen University in 1864. He was employed in the French National Library, in the department of manuscripts, from 1866 to 1870. In 1870 he was placed in charge of the courses in Arabic at the College of Oriental Languages, and in 1879 was made professor there. Since 1887 he has been in charge of the department of religious knowledge. Among his writings are *Notes on Arabic Grammar* (1873); *The Science of Religions and Islamism* (1886); and *Literary History of the Old Testament*, a translation (1873).

DERENBOURG, JOSEPH, a French Hebrew scholar, father of the preceding; born in Mayence, Aug. 21, 1811; studied at the universities of Giessen and Bonn, taking his degree at the former. He studied at Paris under Quatremere, Reinaud and Perceval. In 1856 he became reader of Oriental texts for the National Bureau of Printing. In 1871 he was elected a member of the Academy of Belles-Lettres. In 1877 he became director of Semitic languages in the College for Practical Higher Studies. Among his published works are *Two Hebrew Versions of the Lives of Kalilah and Dimnah* (1881); *A History of Palestine* (1867); and a number of other works on kindred subjects.

DE RESZKE, JEAN, a Polish tenor singer; born in Warsaw, Poland, Jan. 14, 1852. He made his *début* in 1874 at Venice. He began as a baritone, but in 1879 came out as a tenor, and as such made a reputation that entitles him to rank foremost among the tenors of his time. He sang at Drury Lane in 1874, and afterward throughout Europe, and in 1891–92 and again in 1896 in United States with the Metropolitan Opera Company.— His brother, EDOUARD DE RESZKE, was born in Warsaw, Poland, Dec. 23, 1856. He began his operatic career under the auspices of his brother, Jean, in Paris, in 1876, at the Théâtre Italien; then in Italy with the Royal Italian Opera Company, and with the French Opera. In 1896 made a successful visit to the United States with the Metropolitan Opera Company. In many of the French, Italian and German operas he sustained leading parts, and established a reputation in the minds of many critics as being the best lyric actor and bass singer on the stage.

JEAN DE RESZKE.

DERG, LOUGH. See DONEGAL, Vol. VII, p. 313.

DERMATOLOGY. See MEDICINE, Vol. XV, p. 806.

DERMATOPHYTA. See VETERINARY SCIENCE, Vol. XXIV, p. 223.

DERMESTES, a genus of beetles including several species, the most common of which is *D. lardarius*, sometimes called the bacon beetle. In both larval and adult forms they are extremely voracious, feeding upon meat or carrion; in both forms also they simulate death. R.W.C.

DERMOPTERA. See MAMMALIA, Vol. XV, p. 405.

DE ROSNY, LEON LOUIS LUCIEN, a French ethnologist and Orientalist; born in Loos, Aug. 5, 1837. He has been a constant and active student of the Oriental languages, especially the Japanese. He has been, to a large extent, instrumental in the organization of the society for the study of American ethnology. He was an attaché of the French Department of Foreign Affairs, in the capacity of interpreter. Since 1886 he has been one of the directors of the College for Higher Study. Among his numerous publications are *An Introduction to the Study of the Japanese Language* (1856); *A Japanese-French-English Dictionary* (1858); and *The Religion of Japan* (1881).

DÉROULÈDE, PAUL, a French writer and politician; born in Paris, Sept. 2, 1846. He first attracted public attention as a writer of patriotic songs. He took part against the Commune in 1870. He next attempted dramatic writing and produced several popular plays. But it is on account of his political actions that he is best known in France. He joined the Boulanger movement, and as chairman of the Patriotic League took a prominent part in all the events which led up to the exile of Boulanger. He had by that time succeeded in being elected to the Chamber of Deputies, and in 1890 attempted to impeach the member who took the seat of Boulanger, and was himself temporarily suspended from the Chamber. He returned to literature, traveled in Italy, and wrote a romance before he again resumed his seat in the Chamber. Among his writings are *Songs of the Soldiers; National Education* (1882); and his romance, *History of Love* (1890).

DERRICK, a form of hoisting-machine often confused with the crane, which it very much resembles. Its peculiar feature, which distinguishes it from other similar machines, is that it has a boom stayed from a central post, which is usually stayed by guys. In its capstan, or winch, it resembles the crane, but in its double set of tackles, one for the load and the other for the boom, it differs from that machine. See CRANE, Vol. VI, p. 485.

DERVISH PASHA, a Turkish statesman and soldier; born at Eyaub, near Constantinople, in 1817, and was considered the first of living Turkish statesmen. He was sent to England and France to study engineering, and when he returned to Turkey in 1842, became chief of the Keban mines and professor of physics and director of the Constantinople Military School. He was for several years employed in the diplomatic service in Persia and the neighboring principalities. He was appointed general of division, and as such served in the war against

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Russia in 1878, taking an active part in the defense of Batoum. The siege was effectually resisted, but it was stipulated by the treaty of peace that Batoum should be ceded to Russia. The civil governor of Batoum, however, incited by the Lazis, refused to surrender it to the enemy, and it became the task of Dervish Pasha to put down the Lazis and to deliver Batoum over to the Russians. Two years later he was called upon to perform a very similar act in the case of Dulcigno and the Albanians. He was the sultan's special commissioner to Egypt in 1882. Died June, 1896.

DERWENTWATER. See CUMBERLAND, Vol. VI, p. 218.

DERWENTWATER, JAMES RADCLIFFE, EARL OF; born June 28, 1689, in Northumberland; grandson of Charles II of England; was one of the leaders of the rebellion of 1715. He was taken prisoner at Preston, and conveyed to the Tower of London; at his trial in Westminster Hall he pleaded guilty and threw himself upon the mercy of the king, but his appeal was rejected and he was beheaded on Tower Hill, Feb. 24, 1716. He was the last earl of Derwentwater.

DERZAVIN, GABRIEL ROMANOWICZ, a popular Russian lyric poet; born July 14, 1743, in Kazan, Russia; died July 21, 1816, at Svanka, Russia, near Novgorod. See RUSSIA, Vol. XXI, p. 114.

DESAGUADERO, the name applied to that part of the largest tributary of the Colorado River, in the Argentine Republic, which lies between Lake Silvero and the mouth of the Tunuyon River. It flows southward, separating the states of San Luis and Mendoza. This section of the river is about eighty miles in length.

DESAGUADERO, the name given to the great valley formed by the dividing of the Andes into two great chains, extending from lat. 13° S. to lat. 23° S., in Peru and Bolivia. It is drained by the lakes Titicaca and Andamarca and their tributaries. It is over 12,000 feet above the sea, the most elevated plateau in the world excepting Tibet. The land is rich in grains and grasses, and has considerable silver, copper and tin ore. The river connecting the two great lakes of the plain is 200 miles in length, and takes its name from the plain.

DE SANCTIS, FRANCESCO, an Italian author, educator and statesman; born March 28, 1817, in Morra Iripino; died Dec. 29, 1883, in Naples. He began his active life as a teacher in Naples, but soon incurred the censure of the government, on account of his political utterances, and was imprisoned for three years, and afterward banished. He returned to Naples in 1860 and engaged in teaching again, but continued his political work more actively than before. He was appointed Minister of Public Instruction. He was a ready writer and speaker. Chief among his published writings is *History of Italian Literature.*

DE SANCTIS, LUIGI, born in 1808, a distinguished prelate of Rome. In 1847 he renounced the Catholic religion, fled to Malta, and commenced to evangelize Italy. In 1852 he was minister at the Waldensian church of Turin, and from 1864–69, the time of his death, professor of the Waldensian faculty of theology at the University of Florence, and editor of the Waldensian periodical *Eco Della Verita.* He wrote *Roma Papale Descritta in Una Serie di Lettere* (1865). G.A.S.

DESCARTES'S RULE OF SIGNS. See ALGEBRA, Vol. I, pp. 480, 481.

DESCENT, the hereditary succession to the title to property. Title by descent is the title which one takes, by operation of law, in the estate of a deceased person as the heir of such person. According to the principles of the ancient feudal system of England, under which much of the common law was developed, the right to the use of land upon the death of a tenant always descended to his issue; hence the term *descent* is applied to any title by inheritance, although, by statute, in many states of this country, the title is sometimes made to ascend. The English rule of primogeniture, whereby the eldest son inherits all the real estate, has been universally abolished in this country, and by statutory provisions of the various states the estate of the parent descends to his issue, both male and female, in equal shares. The rules of descent do not apply to personal property, and this class of property passes to the executor or administrator, by whom the residue, after payment of the debts of the deceased, the costs of administration, and the dower interest, if any, is distributed in equal shares among the heirs. The rules governing descent in the various states are provided by statute, and follow much the same general principles, but differ widely in detail. See INHERITANCE, Vol. XIII, pp. 83, 84.

DESCHAMPS, DE SAINT AMAND EMILE, a French poet and critic; born Feb. 20, 1791, at Bourges, established his fame in 1818 by his brilliant comedies *Selmours* and *Le Tour de Faveur.* He later became the leader of the Romantic School. In 1822–35 appeared from his pen *Études Françaises et Étrangères*, containing original poetry and translations of Schiller's, Goethe's and Shakespeare's works. Died at Versailles, April 22, 1871. G.A.S.

DESCHANEL, ÉMILE AUGUSTIN ÉTIENNE, a French educator and writer, member of the Senate; born in Paris, Nov. 14, 1819. He became professor of rhetoric at the Normal College. He afterward edited, successively, *La Revue Indépendante*, *La Revue des Deux Mondes* and *Le National.* He became interested in the socialism of the time, and for a work on *Catholicism and Socialism*, in 1850, was deprived of his office in the college, and the next year exiled. He lived in Brussels until 1859, when he returned to France and devoted himself to literature, in connection with Victor Hugo. He was elected to the Chamber of Deputies in 1876 and to the Senate in 1881, and became professor of modern literature in the College of France. Among his collected writings are a number of papers on conversation and society, and in a more serious vein, *The Works of Aristophanes* (1867); *Benjamin Franklin* (1882); *The Romanticism of the Classics:* and the *Theater of Voltaire* (1886). He died January 26, 1904.

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D'ESCLOT, BERNARD, a Catalan historian of the fourteenth century; left an interesting chron icle treating on life and deeds of Peter III of Arragonia to the year of his death in 1325. This work, the oldest document of Catalan literature, and as such very valuable, was published by Buchon in the *Chroniques Étrangères Relatives aux Expéditiones Français Pendent le XIII Siècle* (Paris, 1840). G.A.S.

DESERT. See SAHARA, Vol. XXI, p. 157; GOBI, Vol. X, p. 635.

DESERTION, in criminal law, is the offense of abandoning public service in the army or navy. In the United States, any soldier who is guilty of desertion in time of peace is liable to serve for such unexpired period of the term of his enlistment as still remained at the time of his desertion, and may be tried by court-martial and punished in any manner except by death. In time of war, any soldier who has been duly enlisted or has received pay in the army of the United States, and who deserts the service, is subject to the penalty of death, or such other penalty as the court-martial shall direct. The rules as to desertion in the United States navy are much the same. Desertion, in the law of domestic relations, generally refers to the act of a man in abandoning his wife or children. In case of desertion the courts have power to grant alimony to the wife or children, and compel the payment thereof by the husband. Desertion is also ground for divorce, but usually only when continued for such time as the statute may fix. In some states desertion is an offense for which the courts may inflict punishment. See DIVORCE AND MARRIAGE, in these Supplements.

DESJARDINS, PAUL, journalist and reformer; was born in Paris, and became professor of rhetoric in the College of St. Stanislaus and also one of the editors of the *Journal des Debats*. He has devoted much study to social problems, and a compilation of his essays on those topics has been published under the title *Contemporary Notes*. His work and writings along lines of social betterment led some years ago to the organization of the "Union for Moral Action" in Paris, a body which has exerted considerable influence for good. He is a member of a family many of whose members have become distinguished. W.F.J.

DESIMA, ISLAND. See NAGASAKI, Vol. XVII, p. 170.

DESMAN, an insectivorous quadruped, and one of the animals known as the musk-rat. There are two species, *Myogale pyrenaica* and *M. moschata*. R.W.C.

DESMIDIACEÆ OR DESMIDS, a family of one-celled green Algæ, abundant everywhere in fresh waters. The cells are mostly divided into symmetrical halves by a constriction in the middle, or there is at least a symmetrical division of the protoplasmic contents. They multiply by division, sometimes remaining in long filaments, or, by conjugation, they form zygospores. They are of many beautiful forms and markings.

DES MOINES, a city of Iowa, capital of the state and of Polk County (see Vol. VII, p. 112). Having four trunk lines of railway, besides other shorter lines, its traffic facilities are unsurpassed by any other city in the state. For local transportation there are fifty miles of electric-railway trackage and eighty miles of motor-railway trackage. Among the principal public buildings are the United States Federal Court and Post-Office Building, a marble edifice costing $385,000, and the State Capitol, an imposing and commodious structure costing nearly three million dollars. The Young Men's Christian Association has erected a building at a cost of $75,000. The State Agricultural Society has purchased 260 acres of land within the city limits for a permanent location of the Iowa State Fair, upon which it has expended, for the improvement of the ground and the erection of permanent exhibition buildings, $135,000. There are forty public schools, and numerous private schools of high order. The Catholics and Hebrews have each parochial schools, and the Des Moines College (Baptist), the Drake University, Callanan College and the Highland Park Industrial College are located here, and two excellent business colleges. The state library contains 40,000 volumes, and the public library 10,000 volumes. The city is the center of one of the most productive coal areas of the state, there being 29 mines within or near the city limits, from which the output in 1889 was 659 tons. The principal industrial enterprises are flouring and grist mill products, patent medicines and compounds, etc. In 1900 there were 494 manufacturing establishments, with an invested capital aggregating about $7,911,764, and employing over 4,557 workmen. The city enjoys an extensive wholesale trade. Population 1890, 50,067; 1900, 62,139.

DESMONCUS, a tropical American genus of climbing palms, like the rattans of the East Indies. They have alternate pinnate leaves, with long, hooked spines.

DESMOND, EARLS OF. See IRELAND, Vol. XIII, pp. 266, 270, 271.

DE SOTO, a city of Jefferson County, central eastern Missouri, 45 miles S.S.W. of St. Louis, on the St. Louis, Iron Mountain and Southern railroad. Lead and zinc are mined here, and the city exports these products and grain in large quantities. Population 1890, 3,960; 1900, 5,611.

DE SPENSER, HUGH. See EDWARD II, Vol. VII, p. 593.

DESSALINES, JEAN JACQUES, emperor of Hayti; born in Guinea, Africa, about 1760. On the revolt of the blacks in Hayti in 1791 he became adjutant-general to François, and later joined Toussaint L'Ouverture. As lieutenant general he led a successful campaign against Rigaud, and his activity and brutality so attracted the attention of L'Ouverture that he was assigned to the most important movements. He conducted a bloody guerrilla warfare against the French under Leclerc, remarkable in which was his defense of St. Marc. When unable to hold the town, he set it on fire and butchered all the white inhabitants. After

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the treaty of peace Dessalines was created a French general and governor of the southern part of the island, and, it is said, betrayed L'Ouverture to the French, besides butchering his nephew Belair and 300 of his followers. When Rochambeau tortured to death the negro general Maurepas and his family, Dessalines hung, on 500 gibbets, half a regiment of French soldiers. In December, 1803, aided by an English squadron, he definitively expelled the French from the island, and in January, 1804, his army elected him governor-general of the republic. On Oct. 8, 1804, he assumed the imperial crown and plunged into a dissolute career, in which massacre of the whites played a large part. He was killed by his own soldiers, Oct. 17, 1806. E.E.T.

D'ESTREES, GABRIELLE. See ESTRÉES, GABRIELLE D', in these Supplements.

DETAILLE, JEAN BAPTISTE EDOUARD, a French military painter; born in Paris, Oct. 5, 1848. He studied under Meissonier. His first exhibition was in the Salon of 1867, with *A Corner of the Workshop*. This did not bring out the commendation evoked by his *Halt of the Infantry* in 1868. His *Repose During the Drill* and *An Engagement Between the Cossacks and Guards of Honor* gave him a high reputation, and prepared the way for the honors accorded him for his *Retreat* (1873), *Salute to the Wounded* (1877), and *The Passing Regiment* (1874), works executed after the war of 1870 had afforded him ample opportunity for the study of soldiery.

DETAINER. See FORCIBLE ENTRY AND DETAINER, in these Supplements.

DETERMINANTS. See ALGEBRA, Vol. I, p. 455; and HEREDITY, in these Supplements.

DETERMINISM. See SCHOLASTICISM, Vol. XXI, p. 447.

DETINUE, a legal term meaning a form of action which may be maintained against a person for the recovery of personal property which came lawfully into his possession, but which he unlawfully detains, together with the damages which the plaintiff may have suffered by reason of such unlawful detention. It is distinguished from the action of replevin, which can be maintained when the possession of the property was unlawful from the beginning. Like replevin, the action of detinue can only be maintained for such goods as may be fully identified and distinguished from such other goods as may be found with them.

DETMOLD, CHRISTIAN EDWARD, engineer, was a native of Germany, being born in Hanover on February 2, 1810, and was educated in a military academy there; but came to America in early life and practiced the profession of a civil, military, and mining engineer. He was employed by the government in planning and constructing forts, laying the foundation of Fort Sumter, and was one of the architectural engineers of the New York Crystal Palace, in which the first American world's fair was held. Later he was interested in coal mining and metallurgy, and also in politics and literature. He died in New York in July, 1887. W.F.J.

DETMOLD, WILLIAM, surgeon, was a native of Germany, who came to America in early life and devoted himself to surgery, largely orthopædic. In the Civil War he gave his services to the nation as an army surgeon. He was the inventor of several instruments for surgical use, and was a prolific writer for the medical and surgical press. He also interested himself in benevolent works. He died on December 26, 1894. W.F.J.

DE TROBRIAND, PHILIP REGIS, soldier; was born at Tours, France, on June 4, 1816. Dropping his title of Baron, and his family name of De Keredern, he came to America in 1841, and became the editor of the *Revue du Nouveau Monde* and the *Courrier des États-Unis*. At the outbreak of the Civil War he entered the Federal service as colonel of a New York regiment. (He had been educated for a military career in his youth.) In 1862 he was made commander of a brigade; in 1864 he was made brigadier-general, and in 1865 brevet major-general of volunteers. He took a gallant part in the battles of Yorktown, Williamsburg, Fredericksburg, Chancellorsville, and Gettysburg. After the war he entered the regular army; in 1867 was made brigadier-general by brevet, and commanded the district of Dakota, and on March 20, 1879, was retired. He was the author of several volumes. He died on July 15, 1897. W.F.J.

DETROIT, the largest and most important city of Michigan, and the capital of Wayne County. For situation and general description, see Vol. VII, p. 115. The city increased in population from 21,019 in 1850, to 205,669 in 1890, and to 285,704 in 1900. Detroit maintains its position among the most important of the lake ports. It is an important port of entry and customs office. Its docking facilities for vessels are among the best on the Great Lakes. Its marine traffic, which in 1873 amounted to nine million tons had grown to twenty-nine million tons in 1895. From 1890 to 1896 many important municipal enactments, involving the rights of corporations, attracted general attention to Detroit. The manufacturing interests of the city are large. In 1900 there were 2,847 distinct establishments, giving employment to over 45,707 persons. The features which have given Detroit a prominent place among the large cities of the United States, and for which it is noted, are its system of parks and boulevards and its cleanliness. The latter attribute might be called an unavoidable one, as the gentle rise of the ground from the river inland affords a natural system of drainage. This has, however, been augmented by a perfect sewerage system, so that Detroit is the best-drained city of its size in the United States. The system of parks, the largest of which is Belle Isle, a beautiful park of over seven hundred acres, presents an appearance equaled by few cities. Commanding the city and the river is Fort Wayne, designed to be one of the principal fortifications on the northern frontier of the United States.

DETROIT CITY, a village and the county

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seat of Becker County, Minnesota, in the northwestern part of the state, in the lake country, on the Northern Pacific railroad. Its population in 1900 was 2,060. W.F.J.

DETROIT RIVER. See ST. LAWRENCE, Vol: XXI, p. 188.

DÉTROYAT, PIERRE LÉONCE, a French naval officer and journalist, born in Bayonne, Sept. 7, 1829. After his graduation from the Naval College in 1845, he took part in the Crimean and Chinese wars, and was decorated with the cross of the Legion of Honor for his services. He afterward took part in the Mexican campaign; was detailed to the staff of Maximilian and to accompany the Empress Charlotte to France. Trouble with the government caused him to resign his commission. He served during the Franco-Prussian war. Devoting his time mainly to journalism, he edited successively *La Liberté*, *Le Bon Sens*, and *L'Estafette*, and published *The Court of Rome and Emperor Maximilian* (1868) and *French Intervention in Mexico* (1868), etc. Died in Paris, Jan. 19, 1898.

DETTINGEN, on the Main, a village in the Bavarian governmental district of Lower Franconia, on the right bank of the Main, has a population of 900, and an ancient Catholic Church. It is known for the victory of the so-called Pragmatic army over the French, led by Marshal Noailles, on June 27, 1743. The victorious forces were commanded in person by King George II of England. See FRANCE, Vol. IX, p. 516. G.A.S.

DEUTZIA, a genus of Asiatic shrubs, belonging to the family *Saxafragaceæ*. They bear numerous panicles of white flowers, and the under surface of the leaves, branchlets and calyx are covered with stellate hairs or scurf. *D. gracilis*, *D. crenata* and *D. scabra* are common species in cultivation.

DEVA. See ZOROASTER, Vol. XXIV, p. 860.

DEVENS, CHARLES, soldier and jurist, was born at Charlestown, Mass., on April 4, 1820, and was graduated from Harvard in 1838. He was admitted to the bar and soon rose to eminence. In 1848–49 he was a member of the Massachusetts senate, and in 1853 was U. S. marshal for that state. In 1861 he went to the front as major of a battalion. He was badly wounded at Fair Oaks, had a horse shot under him at Antietam, distinguished himself at Fredericksburg, and was brevetted major-general for good conduct at the capture of Richmond. In 1867 he was appointed a judge of the superior court of Massachusetts, and in 1873 a justice of the supreme court. In March, 1877, he became attorney-general of the United States in the cabinet of President Hayes and served until 1881, when he was reappointed to the bench of the supreme court of Massachusetts, and remained there until his death. He was noted as an orator. He died on January 7, 1891. W.F.J.

DE VERE, SIR AUBREY, an Irish poet, the son of the first baronet De Vere; born at Curra Castle, Ireland, in 1788; died there, in 1846. He wrote little until he was 30 years of age, when he published two dramatic poems, *The Duke of Mercia* and *Julian the Apostate*, and subsequently produced several songs; among them, *The Song of Faith*.

DE VERE, AUBREY THOMAS, Irish poet, born Jan. 10, 1814, at Curra Castle, Ireland. He began to write poetry at an early age, his productions attaining considerable popularity. In 1854 he became honorary professor of political and social science in the Roman Catholic University of Dublin. Among his writings are *The Waldenses* (1842), a lyrical tale; *The Search after Proserpine*, a metrical description of his travels in Greece; *Legends of St. Patrick* (1872); and a number of critical essays under the titles *Essays on Poetry* (1887); and later, *Essays Ethical and Literary*. His latter works were a volume of *Poems* (1890) and *Religious Poems of the Nineteenth Century* (1893). He died Jan. 1902.

DE VERE, MAXIMILIAN SCHELE, educator; was born near Wexiö, Sweden, on November 1, 1820, and was for some years engaged in the military and diplomatic services of Prussia. In 1844 he came to America, and was made professor of modern languages and *belles-lettres* in the University of Virginia. He also devoted himself to literature, writing upon a great variety of topics, historical, literary and scientific, and contributing frequently to the best magazines and reviews in America and England. He published *Outlines of Comparative Philology* in 1853 and *Stray Leaves from the Book of Nature* in 1856. W.F.J.

DEVEREAUX, JOHN HENRY, railroad manager, was born in Boston, and in early manhood became engaged in railroad work in the Ohio Valley. During the Civil War he was superintendent of the military railroads for the Union army, until 1864. He was elected president of the Cleveland, Columbus, Cincinnati and Indianapolis railroad in 1873, and of the Atlantic and Great Western railroad in 1874. While in this position in 1877 he distinguished himself by the firm and successful stand which he took against the great railroad strikes of 1877, when more than eight hundred of his men were, through his personal efforts, restrained from joining the strikers and were kept loyally at work. He was elected president of the Indianapolis and St. Louis railroad in 1880, and died on March 17, 1886. W.F.J.

DEVIATION OF THE PLUMB-LINE, a physical phenomenon, the explanation of which is, to a large extent, a matter of conjecture. The phenomenon is, that the plumb-line at some points on the earth's surface is drawn out of the perpendicular. It is thought by some to be due to the attraction of mountains, or large masses of earth, in the vicinity of which the deviation has been noted to occur, but a similar deviation has been noticed on level prairies. The conclusion reached by authorities in geodesy is, that wherever a deviation is noticed, near that point are located large masses of the earth which are of greater density than the earth surrounding them.

DEVIL'S COACH-HORSE. See COLEOPTERA, Vol. VI, p. 118.

DEVIL'S LAKE, the name of a body of water

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and of a small village in the northeastern part of North Dakota. The village is on the Great Northern railroad, 90 miles N.W. of Grand Forks, and is the capital of Ramsey County. The lake, formerly known as Minne-Wakan, forms the boundary between Benson and Ramsey counties. It is 40 miles long, about 10 miles wide, and its surface is 1,467 feet above sea-level. It has no visible outlet, and its waters are saline. Population, 1900, 1,729.

DEVIL WORSHIPERS OR YEZEEDEES, an ancient sect of unknown origin, living in the vicinity of Mosul, Asiatic Turkey. This obscure race appears to be a relic of the ancient Chaldeans, but their creed is a compound of Christianity, Chaldean superstitions and Mohammedanism. They believe in one Supreme God respecting whom they preserve great mystery. They also believe in Satan as chief of the angelic host, and that he is to be propitiated both on account of his present power to do harm and his future power to do good. They believe in the existence of seven archangels next in order after Satan, and that Christ was an angelic being in human shape, but that he did not die on the cross. On New Year's Day the Yezeedees hold a festival in propitiation of Satan. W.R.B.

DE VINNE, THEODORE LOW, printer; was born at Stamford, Connecticut, on December 25, 1828, and at an early age learned the trade of a printer in a country newspaper office. In 1848 he settled in New York city, and was employed in a printing office, of which he soon became foreman and then junior partner. In 1883 he became the head of the firm of T. L. De Vinne and Co., now known as The De Vinne Press, and since that time has made it one of the foremost printing houses in the world. He has been president of the New York Typothetæ, and has written *The Invention of Printing; Historic Types; Plain Printing Types; Correct Composition*, and *Title Pages*. W.F.J.

THEODORE L. DE VINNE.

DEVONIAN AGE. See GEOLOGY, Vol. X, p. 301.

DEVONSHIRE, SPENCER CAVENDISH, EIGHTH DUKE OF, and MARQUIS OF HARTINGTON, son of William Cavendish, Duke of Devonshire, and Count of Burlington, born July 23, 1833. He studied at Eton and Cambridge, and in 1857 entered the House of Commons where he in 1859 effected the downfall of Derby's cabinet. In 1863 he became lord of admiralty under Palmerston, in 1866 under-secretary of state for war under Gladstone-Russell; in 1868 postmaster-general, and in 1871 chief secretary for Ireland under Gladstone. In 1865 he was elected unanimously leader of the Liberal party, when he again served as secretary of state for India from 1880–82, and as secretary of war in 1882. Having resigned in 1885 he seceded from his old party and became head of the Liberal Unionists, which sided with the Conservatives and held the cabinet of Salisbury in power by their support in Parliament. In 1895 he became lord president of council in the third cabinet of Lord Salisbury. G.A.S.

DEVONSHIRE, WILLIAM CAVENDISH, DUKE OF, born April 27, 1808; died in Milnethorpe, Dec. 21, 1891. He was the seventh Duke of Devonshire, succeeding to the title in 1858. Although a member of the House of Commons, and, later by accession to the title, of the House of Lords, he never took a prominent part in politics, devoting himself to business and the manufacture of iron. Possessed of one of the largest estates in England, he was able to carry out large plans, and thereby greatly benefit the industries of the country. The towns of Eastbourne and Barrow-in-Furness are mainly of his building.—His son, LORD FREDERICK CHARLES CAVENDISH, an English statesman, was born at Eastbourne, Sussex, Nov. 30, 1836. He was private secretary to Lord Granville from 1859 to 1864; sat in Parliament for several years; was private secretary to W. E. Gladstone from 1872 to 1873; and financial secretary of the Treasury from 1880 to 1882. Then, as Gladstone's olive branch to Ireland, he was appointed chief secretary to the Lord Lieutenant, but was assassinated, with Under-Secretary Burke, in the Phœnix Park, Dublin, within a few days of his landing, May 6, 1882. His brutal murder excited the indignation of the civilized world, for his qualities had endeared him to many people.

DEW. See METEOROLOGY, Vol. XVI, pp. 125, 126.

DEWDNEY, EDGAR, a Canadian statesman; born in Devonshire, England, in 1835. He removed to British Columbia in 1859 and became an engineer on the Canadian Pacific Railway Survey. In 1868 he was elected to the provincial parliament from Kootenay, and from 1872 to 1878 served in the Dominion Parliament. In 1879 he was appointed Indian commissioner, and in 1888 was minister of the interior. In 1892 he was appointed governor of British Columbia. W.M.C.

DE WET, CHRISTIAN, a Boer general who figured prominently in the closing months of the Boer War as a leader of a guerrilla band of the Orange Free State burghers. His movements in the field were characterized by great mobility, which enabled him and his band of scouts and raiders to elude capture for several months, and to harass British columns in the attempt to run him and his following to earth. His aptitude for guerrilla warfare and ubiquity in turning up at unexpected places were very tantalizing as well as embarrassing to the British.

DEWEY, CHESTER, educator; was born at Sheffield, Mass., on October 25, 1784, and was graduated from Williams College in 1806. In 1808 he became minister of a Congregational Church, and also a tutor at Williams College, and two years later became professor of mathematics and natural philosophy for seventeen years. After filling other professorships he became from

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1836 to 1850 principal of the Collegiate Institute at Rochester, N. Y., and when the University of Rochester was organized he was made its professor of chemistry and natural philosophy. This place he resigned in 1860, because of failing health, but was able thereafter to give much time to scientific research and to the writing of books, chiefly on botany and zoölogy. He died on December 5, 1867. W.F.J.

DEWEY, GEORGE, American admiral. He was born Dec. 26, 1837, at Montpelier, Vt., being the third son of Julius Gemano Dewey, M.D., who was the 9th in descent from the founder of the family, which, originating in Sandwich, England, settled in Dorchester, Massachusetts, in 1633. In 1852 he went to the Norwich Military Academy, Vermont, where he formed the desire of going to Annapolis, which was realized through Senator Foote's nomination. He entered the academy in 1854, where he became known as the "quiet fellow who could do things," graduating in 1858, fifth in his class, excelling in seamanship. As a midshipman he was sent on a two-year trial cruise, on the *Wabash*, to the Mediterranean. On the outbreak of the war he was assigned as lieutenant to the *Mississippi* (Commander Melancthon Smith), which had been Commodore Perry's flagship in the Japan expedition (1852–53). Dewey took a leading part in forcing the passage past Forts Jackson and Phillips, below New Orleans and in sinking the *Manassas*. He displayed that characteristic coolness and confidence that was to stand him and his country in such good stead in 1898. During the attack on Fort Hudson, March 8–9, 1863, the *Mississippi* grounded, and he set fire to her and secured the escape of his men. He was made first lieutenant of Farragut's dispatch-boat. He was present at other operations; and at Fort Fisher, on the *Agawam*, Dec.–Jan., 1864–65, again displayed superior judgment and decision.

GEORGE DEWEY.

In March, 1865, he reached the rank of lieutenant-commander, and served two years in European waters, on the *Kearsarge* and the *Colorado*. In 1868 he was attached to the Naval Academy; in 1870 received his first command — the *Narragansett;* in 1872 became commander; and later (1875–1882) acted on the Lighthouse Board. In 1882 he was put in command of the *Juanita*, of the Asiatic squadron. Promoted to captain in 1884, he was assigned to the *Dolphin*, the first of the "new navy" known as the "White Squadron"; and in 1885 to the *Pensacola*, the flagship of the European squadron. In 1889 he was chief of the Bureau of Equipment and Recruiting; and, afterward, again on the Lighthouse Board. On his advance to commodore, in 1896, he headed the Board of Inspection and Review.

Then came his appointment, in the end of 1897, to the command of the Asiatic squadron, upon receiving which he remarked that he would be the first commodore in Asiatic waters since Perry. For a full account of the events leading up to, and including, the destruction of the Spanish fleet, see MANILA, BATTLE OF, in these Supplements. The result of that engagement is best told in the words of the dispatch he sent to President McKinley: "Manila, May 1.—Squadron arrived at Manila at daybreak this morning. Immediately engaged, and destroyed the following Spanish vessels: *Reina Christina*, *Castilla*, *Don Antonio de Ulloa*, *Isla de Luzon*, *Isla de Cuba*, *General Lezo*, *Marquis del Duero*, *Cano*, *Velasco*, *Isla de Mindanao*, a transport and water battery at Cavité. The squadron is uninjured, and only a few men are slightly wounded." This dispatch was received by the President, May 7, and he at once sent his thanks to the Commodore, notifying him, also, that in recognition of his "splendid achievement" he had been appointed acting rear-admiral. On May 9, the President, in a message to Congress, recommended that the thanks of Congress be awarded to "Acting Rear-Admiral George Dewey for highly distinguished conduct in conflict with the enemy, and to the officers and men under his command." A joint-resolution of thanks was passed, a sword of honor voted to the Admiral, and medals voted to commemorate the victory.

Theodore Roosevelt, in 1889, said that Dewey "partly grasped and partly made his opportunity"; but added, "it was not a fact that it was an accident that he was sent there in 1897, for he was selected as a man who could go into Manila, if necessary." The victory electrified the world, for its startling suddenness and decisiveness. His country could then well recall the Dewey family motto: "A crown to the conqueror is due."

After the battle Dewey proved equal to dealing with the representatives, at Manila, of the foreign powers; and his subsequent action secured for his country the untithed fruits of victory. The results were far reaching, the most important being the raising the prestige of American arms to the highest point, throughout the world. He was created full admiral, March 2, 1899. On his way home, in the fall of 1899, he received ovations wherever he touched with his unscathed squadron; and after his arrival at New York, Sept. 26, 1899, was given a triumph by the city, which was repeated throughout the country, with honors galore. He was spoken of for the Presidency in 1900, but after contemplating the candidacy, discouraged the idea. He presided at the Schley Court-Martial, 1901, and his disagreement with the majority report was perhaps the most notable incident of that affair. In 1905 he declined the invitation to sit on the International Commission convened at Paris to inquire into the firing upon innocent British trawlers by the Russian squadron on its way down the channel. R.C.A.

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DEWEY, Melvil, an American librarian; born in Adams Center, New York, December 10, 1851. He was graduated from Amherst College in 1874, and became acting librarian there. In 1877 he went to Boston where he organized the American Library Association and the Library Bureau. He also established the American Metric Bureau for introducing the metric system of weights and measures, the Spelling Reform Association, and founded the *Library Journal* of which he was the editor from 1876 to 1881. In 1882 he removed to New York city and became librarian of Columbia College. In 1884 he was made director of the Columbia College School of Library Economy, and in 1886 was appointed secretary and treasurer of the University of the State of New York. In 1889 he removed to Albany to become director of the New York State Library. He later organized a library school in Albany. He has published *Educational Laws of New York State* (1892) (revision); *Library School Rules* (1884), and *Decimal Classification and Relative Index* (1885). W.M.C.

DEWEY, Orville, an American clergyman; born in Sheffield, Massachusetts, March 28, 1794. After graduating from Williams College in 1814 he entered the theological seminary at Andover, and completed his course at that institution in 1819, shortly after which he united himself with the Unitarian sect. He had previously been a member of the Congregational Church and had acted as an agent of the American Educational Society in Massachusetts. From 1835 to 1858 he was pastor of the Church of the Messiah, New York city. He published *The Old World and the New; Letters on Revivals; Discourses on Human Nature; Discourses on Human Life; Discourses on the Nature of Religion; Discourses on Commerce and Business; Miscellaneous and Occasional Discourses; The Unitarian Belief*, and *Discourses and Reviews*. He died in Sheffield, Massachusetts, March 21, 1882. W.M.C.

DEWINDT, Harry, English traveler and writer; born in Paris, April, 1856. In 1876–78 he was aide-de-camp to his brother-in-law, Raja Brooke of Sarawak, Borneo; in 1887 he traveled from Pekin to France by land; in 1889 he rode from Russia, through Persia, to India; in 1890 he inspected the prisons of western Siberia; in 1894 he visited the mines and political prisons of eastern Siberia; in 1895, while attempting to travel overland from New York to Paris he nearly lost his life in Bering Strait, but was rescued by a whaler; in 1897 he explored the gold districts of the Klondike and Alaska. He has written *On the Equator* (1882); *From Pekin to Paris by Land* (1887); *A Ride to India* (1890); *Siberia as It Is* (1892); *The New Siberia* (1895); *A Queer Honeymoon* (a novel); and *Through the Gold Fields of Alaska to Bering Straits* (1898).

DEWING, Maria Richards (Oakey), an American artist; born in New York city, October 27, 1855. She studied at the National Academy of Arts in New York and under John Lafarge and Thomas Couture. She is the wife of Thomas Wilmer Dewing (q. v.). Her works include portraits and figure and flower pieces, among them *Violets* (1878); *The Sleeping Child* (1878), and *Mother and Child* (1880). W.M.C.

DEWING, Thomas Wilmer, an American artist; born in Boston, Massachusetts, May 4, 1852. In 1876 he went to Europe and studied under Boulanger and Lefebure in Paris. He returned to the United States in 1879 and settled in New York city where he became widely known as a painter of portraits and figure compositions. His picture *The Days* gained the Clarke prize at the National Academy in 1887. He was elected an associate of the Academy in 1887 and was made an academician in 1888. He is also a member of the Society of American Artists. Among his best known paintings are *The Young Sorcerer* (1877); *A Musician* (1878); *The South Wind* (1878); *Morning* (1879); *The Prelude* (1883); *A Garden* (1884), and *Tobias and the Angel* (1887). He has also painted portraits of leading society women of New York. W.M.C.

DE WINT, Peter, English water-color landscape painter; born of Dutch descent, at Stone, Staffordshire, Jan. 21, 1784. In 1802 he began his training as a mezzotint engraver under John Raphael Smith, the engraver and crayon painter, but he soon took to painting, and in 1807 he entered the Academy schools and exhibited three landscapes. In 1810 he became an associate exhibitor at the Water-Color Society, at whose exhibitions during the next forty years his pictures were among the most attractive features. He was a fine colorist, and his style was broad and individual. He never used body color, and seldom signed his pictures. He also, though rarely, painted in oil. Among his most famous paintings are *The Cricketers; Lincoln Cathedral; Hay Harvest; Nottingham, Richmond Hill; Cows in Water;* and several views of *Lowther Castle*. His *Cornfield* and *A Woody Landscape*, both in oil, are in the South Kensington Museum, where also, as well as in the British Museum and the National Gallery, are many of his water-colors. Died in London, June 30, 1849. See *Memoir*, by Armstrong (1888), and Redgrave's *David Cox and Peter de Wint* (1891).

DE WITT, a post village, capital of Arkansas Co., Ark., on the Arkansas river, 70 miles S.E. of Little Rock; has 3 churches, 3 newspaper offices, and 2 mills. Population 1890, 246; 1900, 318.

DE WITT, a post village in De Witt Co., Ill., 9 miles E. by N. of Clinton; has 2 churches, a newspaper office, and a saw-mill. Population 1900, 253.

DE WITT, Iowa, a city of Clinton County, 19 miles west of Clinton, at a junction of the Chicago, Milwaukee & St. Paul and Chicago & Northwestern railroads. It is an agricultural center and has some supplemental manufactures. Population, 1900, 1,383. C.L.S.

DE WITT, a post village of Clinton Co., Mich., on Lookingglass River, 8 miles N. of Lansing; has 2 churches, a high school, a plough factory, a foundry, a grist-mill and 2 steam saw-mills. Pop., about 400.

DE WITT, a post village of Carroll Co., Mo., on the Missouri River, 83 miles E.N.E. of Kansas

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City; has 5 churches, a newspaper office, a bank, and several factories; has large sandstone quarries in the neighborhood, and ships building stone and farm produce. Population 1900, 550.

DE WITT, a post village of Saline Co., Neb., on the Big Blue River, 13 miles N.W. of Beatrice; has 5 churches, banks, 2 newspaper offices, 2 grain elevators, and 2 grist-mills. Population 1900, 662.

DE WITT, JOHN, educator and classical scholar, was born at Albany, N. Y., on November 29, 1821, and was graduated from Rutgers College in 1838. He studied theology at New Brunswick, N. J., and from 1842 to 1863 was engaged in pastoral work in New Jersey, New York and Michigan. In 1863 he became professor of Oriental literature in the New Brunswick Theological Seminary, and in 1884 professor of Hellenistic Greek and New Testament exegesis. He was also a member of the American committee on the revision of the Old Testament. He is the author of several religious books, including *The Sure Foundation, What is Inspiration?* and *Praise Songs of Israel: A New Translation of the Psalms.* W.F.J.

DE WITT, JOHN, an American theologian; born in Harrisburg, Pennsylvania, October 10, 1842. He was graduated from Princeton in 1861, studied law and afterward studied theology at the Princeton Theological Seminary and the Union Theological Seminary. He was ordained in 1865 and held several pastorates. From 1882 to 1888 he was professor of ecclesiastical history at Lane Seminary, Cincinnati, and from 1888 to 1892, was professor at the McCormick Theological Seminary, Chicago. In 1892 he was appointed professor of church history at the Princeton Theological Seminary. He has written *Sermons on the Christian Life* (1885). W.M.C.

DE WITT, SIMEON, an American topographer; born in Ulster County, New York, December 25, 1756. He was graduated from Rutgers College in 1776 and joined General Gates' army during the Revolution. From 1777 to 1780 he was assistant chief topographer in the American army. In 1784 he was appointed surveyor-general of New York state, which office he held for nearly fifty years. He was made regent of the New York State University in 1798, vice-chancellor in 1817 and chancellor in 1829. He died in Ithaca, New York, December 3, 1834. W.M.C.

DE WITTE, SERGIUS, Russian Minister of Finance, is of German parentage and begun life in a railway office in Southern Russia. His own efforts raised him to the post of director of the railway, and in that capacity he became prominent in political life, afterwards attaining to eminence as an imperial privy councilor. In 1892, he was appointed Minister of Finance, mainly in consequence of his unrivalled power over figures and his knowledge of economics. During his period of office he has done much to improve Russian finances.

DEW-POINT. See HYGROMETRY, XII, 604, 605.

DEXILEUS, a young Athenian soldier, who was killed before Corinth, 394 B.C.

DEXIPPUS, PUBLIUS HERENNIUS, a Greek historian and general. At the time of the invasion of Greece by the Goths in A.D. 262, he was one of the highest officers of Athens. He took command of the Greek forces, and succeeded in driving the Goths out of the country. He afterward wrote an account of this war; also two histories, one of Macedonia from the time of Alexander, and the other a general history from the mythical ages to Claudius Gothicus, A.D. 268. His countrymen erected a statue in his honor.

DEXTER, in Heraldry, is the side of a shield or armorial figure which is to the right of the bearer and to the left of the spectator.

DEXTER, an incorporated post town in Dallas Co., Iowa, 36 miles W.S.W. of Des Moines; has 4 churches, a graded school, a bank, and a newspaper office. Population 1890, 607; 1900, 795.

DEXTER, a post city in Cowley Co., Kansas, on Grouse Creek; has 3 churches, a high school, and a bank. Population 1890, 371; 1900, 380.

DEXTER, a post village in Penobscot Co., Maine, on a small lake, 40 miles W.N.W. of Bangor; has 7 churches, 2 banks, a newspaper office, 5 woolen-mills, 2 foundries and machine shops, and several factories. Population 1890, 2,732; 1900, 2,941.

DEXTER, a post village in Washtenaw Co., Mich., on the Huron river, 9 miles N. W. of Ann Arbor; has 4 churches, a union school, a bank, a newspaper office, 2 flour-mills, a woolen-mill, and a sash and blind factory. Pop. 1890, 879; 1900, 900.

DEXTER, a post village in Stoddard Co., Mo., at a railway junction, 49 miles W.S.W. of Cairo, Ill.; has 4 churches, a public school, a bank, 2 newspaper offices, a flour- and a saw-mill. Pop. 1900, 1,862.

DEXTER, a post village in Jefferson Co., N. Y., on Lake Ontario, at the mouth of the Black River, 7 miles W.N.W. of Watertown; has 4 churches, 4 pulp-mills, 2 paper-mills, 3 wood factories, and a sulphite factory. Population 1900, 945.

DEXTER, EBENEZER KNIGHT, merchant and philanthropist; born at Providence, R.I., April 26, 1773; died there, Aug. 10, 1824. For ten years, including the trying period of the war of 1812, he ably and honestly filled the office of United States marshal for Rhode Island district. He accumulated a fortune in business, and on his death bequeathed to his native city, for the benefit of the poor, the bulk of his property, then valued at $60,000, as a permanent fund, besides forty acres of land on Providence Neck, on which Dexter Asylum, completed in 1830, still stands. He also devised, for use as a training-ground, a large field, on which, in 1894, was erected a statue of the donor, the gift of Henry C. Clark.

DEXTER, HENRY, sculptor, was born at Nelson, N. Y., on October 11, 1806, and worked at the trade of a blacksmith. In 1840 he became a sculptor, and achieved great success, particularly in the execution of portrait busts. He made busts of Longfellow, Agassiz, Dickens, and other eminent men, and of thirty-one of the thirty-three governors of states holding office in 1860, the two exceptions being the governors of California and Oregon. He produced some other pieces of statuary, and painted some pictures. He died at Cambridge, Mass., on June 23, 1876. W.F.J.

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DEXTER, HENRY, newsdealer, was born in Cambridge, Mass., on March 14, 1813. In 1864 he founded the American News Company, of New York, and was its president for many years. He has long been interested in a multitude of religious, philanthropical and educational works. W.F.J.

DEXTER, HENRY MARTYN, clergyman, editor and author, was born at Plympton, Mass., on August 13, 1821, and was educated at Brown University and at Yale (1840). He was graduated from Andover Theological Seminary in 1844, and for six years was engaged in preaching. In 1850 he became a contributor to, in 1851 associate editor, and in 1856 editor of, the *Congregationalist*. He resigned his editorial work in 1866, but resumed it in 1867 and resigned his pastoral charge. He was one of the founders of the *Congregational Quarterly*, and wrote much for its pages. Among his published books are a *History of Old Plymouth Colony*, *Street Thoughts*, *Future Punishment*, *Congregationalism*, *The Polity of the Pilgrims*, *New England Ecclesiastical Councils*, *Pilgrim Memoranda*, *Roger Williams and His Banishment from Massachusetts*, and many others. He edited an exact reprint of *Mourt's Relation*, in which he took a personal interest, being himself a descendant of George Morton, its supposed author. He died on November 13, 1890. W.F.J.

DEXTER, SAMUEL, an American statesman; born in Boston, Mass., in 1761. He graduated at Harvard in 1781; studied law, and was admitted to the bar in 1784. He practised in Lunenburg, Chelmsford, Billerica, and Charlestown, Mass., and later removed to Boston. He was a member of the Massachusetts legislature, 1788–90; served as Federalist Representative, 1794–95; was United States Senator from 1799 to 1800, when he resigned to take the office of Secretary of War, which later he exchanged for that of Secretary of the Treasury. In 1802 he retired from political life and resumed the practice of his profession. In 1814 he was a candidate for governor as a Republican, though he repudiated connection with the party. He was beaten by only 2,000 out of 47,000 votes. He died at Athens, N. Y., May 3, 1816. E.E.T.

DEY. See ALGERIA, Vol. I, p. 499.

DEZFUL OR DIZFUL, Persia, the commercial center of Khùzistàn province on the Dizful River, 30 miles northwest of Shuster. It has interesting Sassanian ruins. Population, 16,000. C.L.S.

DHALAK ARCHIPELAGO. See DAHLAK, in these Supplements.

DHAWALAGHIRI OR DHAULAGIRI, Nepal, a peak of the Himalayas rising between the Gandak and Karnali rivers to a height of 26,826 feet. It was long considered the highest point on the globe, but is surpassed by three other peaks in the Himalayan system. C.L.S.

DHOLE. See INDIA, Vol. XII, p. 779.

DHULEEP SINGH, a Hindu prince, Maharajah of Lahore, born in February, 1837, son of the famous Runjeet Singh, Rajah of the Punjab. Dhuleep was in his sixth year when his father died in 1843, but he had been named as successor, and his mother, the celebrated Ranee Jinda, at once proclaimed his sovereignty. The demoralized state of the regency and its army which attacked British territory in 1845, and again in 1848, on both occasions being defeated, impelled the British Ministry to annex the principality under certain conditions, the young Maharajah receiving an annual pension of four lacs of rupees equal to $200,000. The prince later made his residence in England, professed Christianity, and was naturalized, his mother also living in England until her death in 1863. The prince was married twice and had six children by his first wife. Monetary embarrassments and the refusal of the British government to entertain claims for increase of pension, led to theatrical demonstrations of hostility on his part, in which he vainly attempted to gain the assistance of Russia. He afterwards made his peace with the British government and resided in Paris, where he died October 22, 1893. C.L.S.

DHUNCHEE OR DHANCHI (*Sesbania aculeata*), an annual herbaceous plant of the natural order *Leguminosæ*, much cultivated in India on account of its fiber which is coarser than hemp. It has an erect stem 6 to 10 feet in height. W.R.B.

DHYANI-BUDDHAS. See BUDDHISM, Vol. IV, p. 392.

DIABASE. See GEOLOGY, Vol. X, p. 210.

DIAGEOTROPISM, a term in physiological botany applied to the phenomenon of an organ placing itself in a horizontal position under the influence of gravity; that is, at right angles to the direc tive force of gravity. Such organs are usually dorsiventral, the two surfaces differing from each other. Many leaves, rootstocks, runners, etc., are *diageotropic*.

DIAGNOSIS (Gr., *dia*, through; *gnosis*, knowledge), in general, a scientific determination or discrimination, used in botany for the determination of plants for classification; in medicine, for the determination of diseases by their symptoms. This discrimination of a disease embraces its points of distinction from other diseases, its symptoms, their relation to one another, and to the state of the different organs and functions of the body, in so far as this can be appreciated during life. Diagnosis is usually spoken of in contrast with prognosis, which implies the judgment framed by the physician as to the issues of the disease, and also with prophylaxis, which refers to the warding off of disease when supposed to be impending.

DIAGOMETER, an instrument designed to measure the electro-conductive power of various substances. It makes use of their different conductibility for the determination of their chemical composition. It possesses a magnetised needle carrying a small disc which, in repose, lies against a fixed disc. A current of electricity passing through the liquid to be tested, causes a certain deviation of the needle, which is noted. W.R.B.

DIAGONAL, in plane geometry, a straight line

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joining any two angles, not adjacent, of a rectilineal figure. A line drawn between two adjacent angles would coincide with the boundary line. A triangle has no diagonal, because any two of its angles are adjacent; a four-sided figure has two diagonals; a five-sided, five; a six-sided, nine; etc. The number of possible diagonals in any figure is found by taking three from the number of sides, multiplying the remainder by the number of sides, and taking half of the product.

DIAGONAL SCALE, a device for measuring fractions of units. As it is geometrically true that the inclosing sides of equal angles in equiangular triangles are proportional, a scale is made on which one set of equidistant parallel lines is crossed by another set of parallel lines at the same distance apart, and at an oblique angle to the first set. If the distance on any of the first set of lines between two successive oblique lines represents the unit, the distances on the first set between any oblique line and a line from its foot perpendicular to the first set represent the successive fractions of the unit, the smallest being measured on the first horizontal line above the foot of the oblique line, etc.; thus, seven feet six inches would be measured on the sixth horizontal line between the perpendicular and the eighth oblique line from it.

DIAHELIOTROPISM, a term in physiological botany applied to the phenomenon of an organ placing itself at right angles to the incident rays under the influence of light. Many foliage leaves are *diahelitropic*.

DIALECT. See PHILOLOGY, Vol. XVIII, pp. 790, 791.

DIALECTICS. See LOGIC, Vol. XIV, pp. 793, 794.

DIALOGUE, a discourse between two or more persons, implying more formality and greater unity of subject than a mere conversation. As a literary form, it was oftenest used by the ancients, especially by the Greek philosophers in conveying their instructions. (See LUCIAN, Vol. XV, p. 47.) The Socratic dialogue is a conversation in form of question and answer, in which the person questioned is himself led to propound those ideas which the questioner desires to present to him. The dialogues of Plato might be called philosophical dramas in which the Socratic method of investigation is brought to bear on the speculative subjects discussed. Cicero also used the dialogue frequently. Among modern writers, Fénélon, Machiavelli, Lessing and Berkeley have employed this form. Landor's *Imaginary Conversations* is a happy effort of the kind. However, the state of modern science makes it impracticable to put the dialogue to its ancient use. The drama is dialogue combined with action.

DIALYSIS. See DIFFUSION, Vol. VII, p. 189; and CHEMISTRY, in these Supplements.

DIAMAGNETIC POLARITY. See MAGNETISM, Vol. XV, pp. 268, 269.

DIAMAGNETIC SUBSTANCES. See ELECTRICITY, § 60, in these Supplements.

DIAMAGNETISM. See MAGNETISM, Vol. XV, p. 264.

DIAMOND BEETLE. See COLEOPTERA, Vol. VI, p.

DIAMOND, CAPE, the point on which the citadel of Quebec stands, formed by the confluence of the St. Charles and St. Lawrence rivers. It rises 333 feet above the water.

DIAMOND-CUTTING INDUSTRIES IN THE UNITED STATES. For general article on the diamond industry, and optical properties of diamonds, see DIAMOND, Vol. VII, pp. 140–144. Only a very limited number of diamonds have been found in the United States. They are met with in well-defined districts of North Carolina, Georgia, Wisconsin and California, and all the discoveries thus far have been accidental.

The returns of the census in 1890 showed that there were, in New York, sixteen firms engaged in cutting and recutting diamonds, and in Massachusetts, three. Cutting had also been carried on, at times, in Pennsylvania and Illinois, but was discontinued. In 1889 seven of the New York firms ran on full time, but the others were unemployed part of the time, owing to inability to obtain rough material at a price at which it could be advantageously cut. The firms that were fully employed were generally the larger ones, whose business consisted chiefly in repairing chipped or imperfectly cut stones, or in recutting stones previously cut abroad, which, owing to the superior workmanship at command here, could be recut at a profit, or in recutting very valuable diamonds when it was desired, with the certainty that the work could be done under their own supervision, thus guarding against any possible loss by exchange for inferior stones. The persons employed numbered 236, earning, on an average, $3.55 per day when at work.

The importation of rough and uncut diamonds in 1880 amounted to $129,207, in 1889 to $250,187, and the total for the decade was $3,133,529, while in 1883 there were imported $443,996 worth, showing that there was 94 per cent more cutting done in 1889 than in 1880, but markedly more in 1882 and 1883. This large increase of importation is due to the fact that in the years 1882 to 1885 a number of our jewelers opened diamond-cutting establishments, but the cutting has not been profitably carried on in this country on a scale large enough to justify branch houses in London, the great market for rough diamonds, where advantage can be taken of every fluctuation in the market, and large parcels purchased, which can be cut immediately and converted into cash; for nothing is bought and sold on a closer margin than rough diamonds.

DIAMOND-FIELDS OF SOUTH AFRICA. See CAPE COLONY, Vol. V, p. 38; also KIMBERLEY, *post*, pp. 496–497.

DIAMOND NECKLACE, INTRIGUE OF THE. See ROHAN, Vol. XX, p. 638.

DIAMONDS, ARTIFICIAL. See CHEMISTRY, in these Supplements.

DIANA MONKEY, the name given to a black or grayish West African monkey (*Cercopithecus diana*) because of the distinct white crescent on its forehead. R.W.C.

DIANA, TEMPLE OF. See EPHESUS, Vol. VIII.

DIANE DE POITIERS, mistress of Henry II of France; born Sept. 3, 1499, in the Dauphine;

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became, on the death of her first husband, Louis de Brézé, in 1531, the mistress of Dauphin Henry d'Orléans, afterwards King Henry II. During his entire reign to 1559, her influence at the French court was great. On his death, banished from the French court; she died at her castle of Anet, in 1566. G.A.S.

DIAPASON REGULATOR. The French, who give the name of *diapason* to the tuning-fork, have lately made attempts to use that instrument in connection with clockwork, partly as a means of counting very small intervals of time. M. Duhamel made an arrangement in which a cylinder, by means of a screw-tapped end, was made to advance a little in the direction of the axis; this cylinder was covered with blackened paper and was rotated by means of clockwork. A diapason had a style, or marker, made of a small bit of pointed spring, fixed to the end of one of the prongs. On the diapason being sounded in the usual way, and the spring placed lightly against the cylinder, the style traced a sinuous white line on the black paper. The sinuosities became representatives of minute intervals of time. The diapason regulates the rate of motion of the train of wheels by the equilibrity of the vibration of the prongs, while the train of wheels tends to increase the time during which the prongs vibrate and sound. An index carried by an arbor round a dial may be made to recount or record the vibrations. Brequet's experiments have gone as far as instruments giving two hundred simple vibrations (one hundred double vibrations) per second.

DIAPENSIACEÆ, a small family of mostly arctic or alpine plants, of doubtful affinity, although usually regarded as related to the *Ericaceæ*. They are low, tufted and heath-like, are common to the arctic regions of both hemispheres, and have been apparently stranded on mountain tops, or in other sheltered places, south of the arctics. In North America, *Diapensia* extends from the arctics to the northern mountain peaks of the United States; *Pyxidanthera* occurs in the pine-barrens of New Jersey; while *Shortia* and *Galax* belong to the Alleghanies of the United States, as well as to the mountains of Eastern Asia.

DIAPHRAGM. See MAMMALIA, Vol. XV, p. 368; and RESPIRATION, Vol. XX, p. 490.

DIASTASE. See BREWING, Vol. IV, p. 238.

DIATHERMANCY. SEE ATMOSPHERE, Vol. III, p. 30.

DIATHESIS, a Greek word signifying a disposition or arrangement, and applied by the old medical authors to the predisposition or constitution of the body which renders it prone to certain diseased states. By modern writers on medicine it is used almost synonymously with temperaments.

DIATONIC SCALE. See MUSIC, V. XVII, p. 98.

DIAZ, ABBY MORTON, author, was born at Plymouth, Mass., the daughter of Ichabod Morton. She contributed much to magazines, and wrote many books, chiefly for children and young people. She was a founder and for some years president of the Women's Educational and Industrial Union, of Boston. She died on April 1, 1904. W.F.J.

DIAZ OR DIAS, BARTHOLOMEU, a Portuguese navigator; born in 1445. He was a gentleman of the royal household of John II, where he came in contact with many of the scientific men of the time. In 1486 the king gave him the command of an expedition to explore the western coast of Africa. He soon passed the limit of South Atlantic navigation, taking possession of the country in the name of the king of Portugal, and finally sailed or was blown around the southern extremity of the continent without being aware of it. Returning homeward, he discovered the cape which he called the "Cape of All the Storms," and which was later changed by the king to its present name, the Cape of Good Hope. In December, 1487, he arrived at Lisbon, and at first was received with enthusiasm, but Vasco da Gama was given the preference, under whom Diaz was obliged to serve in the expedition of 1497. Three years later he joined the expedition of Cabral, the discoverer of Brazil, and was drowned in a shipwreck, May 29, 1500.

DIAZ, PORFIRIO, soldier and statesman; was born at Oaxaca, Mexico, on September 15, 1830, being of native Indian blood. He studied law, and then entered the Mexican army in the war with the United States, where, despite his youth, he rose to leadership. Thereafter, in the stormy and almost anarchical period of Mexican history, he was engaged chiefly in political plots and efforts at revolution being almost incessantly against the government and much of the time being practically proscribed as an outlaw. During the Maximilian episode he was one of the most efficient generals of the Republican army, and strongly supported Juarez when the latter became President. He declined to obey Juarez's successor, Lerdo, however, and started a revolution against him, drove him from power, and in May, 1877, had himself proclaimed President. In 1880 he practically dictated the election of Manuel Gonzales as his successor, and throughout his administration was himself the really dominant authority in the republic. In 1884 he was himself re-elected, and he has by successive re-election been retained in the Presidency ever since, being chosen in 1904 for the seventh time. He has been for many years practically a dictator, but his administration has been singularly pure and able, and to him more than to any other man in her history Mexico owes her stability and high prosperity and her secure place among the nations of the world. W.F.J.

PORFIRIO DIAZ.

DIAZ DEL CASTILLO, BERNAL, soldier and historian; was born in Spain about the end of the fifteenth century, and was one of the companions of Cortes on his expedition for the conquest of Mexico in 1519. He was a valiant and skillful soldier, and fought with distinction

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through the whole campaign. He was with Sandoval on his expedition to the north, and with Cortes on his expedition to Honduras to punish Cristobal de Olid for his defection. He is most remembered, however, for his monumental history of the conquest of Mexico, entitled *Historia Verdadera de la Conquista de la Nueva Espana* (3 vols., Madrid, 1632). Though marked with much of the ignorance and superstition of that time, it is instinct with sincerity and with a rare power of vivid narration and description, and is practically an epic in prose, narrated by one of the chief actors in its events. He died in Mexico, in 1593. W.F.J.

DIAZ DE ESCOBAR, NARCISO, poet; was born at Malaga, Spain, on June 25, 1860. He is the author of many lyric poems; of several dramas, including *A Morisco Episode; The Young Men of The Day*, and *Two Husbands and a Wife*, and a volume of *Character Sketches from Madrid.* W.F.J.

DIAZ DE SOLIS, JUAN, adventurer, was a native of Spain and a contemporary of Columbus. He accompanied Coelho in his explorations of the South American coast, and was with Pinzon in Central America, and also in Brazil. He succeeded Amerigo Vespucci as chief pilot of Spain, was the first to explore the Rio de la Plata, and was killed there by Indians in 1513. W.F.J.

DIBRANCHIATA. See MOLLUSCA, Vol. XVI, p. 692.

DICÆUM, a genus of small gaily colored birds, called honey peckers. *D. ementatum* is a typical species and inhabits southern Asia. They build large, pear-shaped nests. R.W.C.

DICE (plural of die, from Lat., *datum*, given) are small cubes of bone, ivory, or wood, which are marked on their six sides with black dots from one up to six in number, the dots so arranged that the numbers on two opposite sides taken together always count seven. Two dice are employed in certain games of chance, such as backgammon, or for settling a dispute, a practice equivalent to "casting lots." Dice are also used in throwing for high stakes. They are shaken in a dice box and then thrown on a table and the number of dots on the uppermost faces decide the game. The invention of dice is very ancient. They have been found in Egypt, were known to the Greeks, and the Romans were so passionately addicted to playing with them that often a whole fortune was staked on a single throw. Gamblers often resort to the practice of adding lead to one side, so that the highest number is almost sure to turn up. On Etruscan dice words indicating numerals were used instead of dots. W.R.B.

DICENTRA, a genus of herbs of the family *Fumariaceæ*, characterized by its corolla being heart-shaped, or two-spurred at base, and its crested seeds. *D. spectabilis*, of eastern Asia is the common cultivated "bleeding heart," with showy pink-red flowers. The common wild species of the United States, with white flowers and delicate compound leaves, are *D. Cucullaria*, or "Dutchman's breeches," with two squared corolla, and *D. Canadensis*, or "squirrel-corn," with heart-shaped corolla. The genus has also been called *Diclytra* and *Dielytra*.

DICEY, ALBERT VENN, an English author; born in 1835; Vinerian professor of law at Oxford University from 1882; a frequent contributor to periodical literature, and a brilliant writer; but known from a remarkable exposition of the law of the British constitution, accorded the highest praise by competent critics. His style is clear, his argument cogent and dispassionate, and his contribution to the literature of his time must be reckoned as important in its bearing upon political questions of moment.

DICEY, EDWARD, journalist, traveler and author; was born in Leicestershire, England, in 1832, and was graduated with distinction from Trinity College, Cambridge. He was a reporter and correspondent of the London *Daily Telegraph*, and for a short time editor of the London *Daily News*. From 1870 to 1889 he was editor of the London *Observer*. He is the author of *Rome in 1860* (1861); *The Battlefields of 1866* (1866); *A Memoir of Cavour; A Month in Russia* (1867); *England and Egypt* (1881); *The Story of the Khedivate* (1902), and other works. He has spent much time in Egypt, and also in South Africa, and has written much for reviews. W.F.J.

DICHLAMDEOUS. See BOTANY, Vol. IV, p. 114.

DICHOGAMY, a term expressing the fact that stigmas and stamens of the same flower become functional at different times, thus preventing close-pollination and necessitating cross-pollination. In cases of dichogamy the flowers are either *protandrous*, in which case the stamens mature and shed their pollen before the stigma is receptive; or *protogynous*, in which case the stigma matures and is receptive before the stamens have fully developed. In these cases it is necessary for pollen to be exchanged between flowers in different stages of development. Examples of protandrous flowers are found among *Umbelliferæ*, *Compositæ*, *Campanulaceæ*, etc.; of protogynous flowers, among species of *Aristolochia*, *Arum*, *Plantago*, in *Scrophularia nodosa*, etc.

DICHOTOMY, LAW OF. See PSYCHOLOGY, Vol. XX, p. 84.

DICHROISM. See MINERALOGY, Vol. XVI, p. 389.

DICHROITE. See MINERALOGY, Vol. XVI, p. 436.

DICK, CHARLES, politician, was born at Akron, Ohio, on November 3, 1858, and entered mercantile life. He became interested in politics, as an officer of the Republican State and National organizations, and in March, 1904, was elected United States Senator from Ohio to succeed Marcus A. Hanna. W.F.J.

DICKENS, CHARLES, an English editor and publisher, son of Charles Dickens, the English novelist, was born in 1837. He was carefully educated, and it being thought that his talents lay more in business than in literature, he was given excellent opportunities for developing his tastes in that direction. He was a protégé of Miss Coutts, afterward Baroness Burdett-Coutts, under whose auspices he was sent to China, and who afterward found an

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opening for him in London. He became interested in an extensive printing establishment, having its headquarters at the Crystal Palace, connection with which he retained after his father's death. His father, without endeavoring to influence his inclinations toward literature, constantly sought to train him in the business management of *All the Year Round*, the journal which he had himself founded, and which he made such a success. The son became proprietor of this popular journal, which suspended publication in 1895. As a public reader of his father's well-known works, and especially in the characterization of the leading parts, he was almost as great a success as was the father. He possessed all the copious notes of the father's "business," and by constant study, and under the latter's careful inspection, he was exceptionally well equipped. He had also the natural gift of oratory and an easy flow of speech. He published a number of handbooks of an informing character—*Dictionaries of London, Paris, The Thames, The University of Cambridge*, and *The University of Oxford*, the series having been commenced in 1879. He edited the *Life of Charles Mathews*, which was chiefly autobiographical (1879). He died at Kensington, July 20, 1896.

DICKERSON, Mahlon, an American statesman; born in Hanover, N. J., April 17, 1770. He graduated at Princeton in 1789, and was admitted to the bar in 1793. He began practice in Philadelphia; was quartermaster-general of Pennsylvania, 1805–08; recorder of the city court of Philadelphia, 1808–10; member of the New Jersey House of Representatives in 1814; governor of New Jersey, 1815–17; United States senator, 1817–33; was appointed Secretary of the Navy, by President Jackson, June 30, 1834, and was reappointed by President Van Buren, serving until June 25, 1838; United States district judge of the District of New Jersey; delegate to the State Constitutional convention, 1844; president of the American Institute, 1846–48. He died at Succasunna, N. J., Oct. 5, 1853. E.E.T.

DICKINS, John, clergyman, was born in London, England, on August 24, 1747, and came to America before the Revolution. He was one of the foremost ministers of the Methodist Episcopal Church, was associated with Bishop of Asbury in founding Cokesbury College, in Maryland, and founded the Methodist Book Concern at Philadelphia. He also suggested the name "Methodist Episcopal." He died at Philadelphia on September 27, 1798. W.F.J.

DICKINSON, Anna, an American lecturer; born in Philadelphia, Pa., Oct. 28, 1842. She was educated at the Friends' Free School; taught in Berks County, Pa., 1859–60; was employed in the United States Mint in 1861. She then lectured on slavery, woman suffrage, and other reforms, and in 1876 went on the stage, essaying Hamlet and other tragedy rôles, but was not successful, and retired from public life. She is the author of *A Paying Investment: a Plea for Education; Mary Tudor*, and *The Crown of Thorns*, both plays. E.E.T.

DICKINSON, Daniel S., an American politician; born in Goshen, Conn., Sept. 11, 1800. In 1806 his family settled in the Chenango valley, N. Y. He began to practice law in Binghamton in 1831; was State senator, 1837–40; lieutenant-governor, 1842–44; delegate to the national Democratic convention, and Presidential elector on the Polk ticket, in 1844; United States senator, 1844–51; delegate to the national Democratic convention, 1852; attorney-general of New York, 1861; delegate to the national Republican convention, 1864; and, later, United States district attorney for the Southern District of New York. He died in New York, April 12, 1866. E.E.T.

DICKINSON, Don M., an American lawyer and politician; born at Port Ontario, New York, Jan. 17, 1846, of New England parents. He was educated in the public schools of Detroit and at the University of Michigan, and was admitted to the bar in 1867. In 1872 he entered the political field as secretary of the Democratic State Central Committee of Michigan, and in the Tilden campaign he acted as chairman of that body. Subsequently he represented his state on the National Democratic Committee, and in 1886 he was appointed Postmaster-General by President Cleveland. On the expiration of his term he resumed the practice of law in Detroit.

DON M. DICKINSON.

DICKINSON, John, an American statesman; born in Maryland, Nov. 13, 1732. He was elected to the Pennsylvania House of Assembly in 1764. In 1765 he was a delegate from Pennsylvania to the first Colonial Congress, and drew up the resolutions passed thereat. In 1768 he published his celebrated *Farmer's Letters to the Inhabitants of the British Colonies*. He was a member of the first Continental Congress in 1774, but he opposed the Declaration of Independence on the ground that compromise was yet possible, and did not sign that instrument. This brought him into public disfavor, but he served as a private soldier in Delaware against the British forces. In 1779 he represented Delaware in Congress; was subsequently president, successively, of the States of Delaware and Pennsylvania, and a member of the Federal Constitutional convention, in which he advocated the adoption of the Constitution. He died in Wilmington, Del., Feb. 14, 1808. E.E.T.

DICKINSON, Jonathan, an American clergyman; born in Hatfield, Mass., April 22, 1688. He graduated at Yale in 1706, and about two years after was installed as pastor of the Presbyterian Church in Elizabethtown, N. J. When the New Jersey churches separated from the synod of Philadelphia in 1741, a charter was procured for the College of New Jersey (now Princeton University). The first classes were opened at Elizabethtown, and Mr. Dickinson

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was elected president. He died in Elizabethtown, Oct. 17, 1747. E.R.T.

DICKINSON COLLEGE, an educational institution at Carlisle, Pennsylvania, founded in 1783 and named in honor of John Dickinson (q. v.). Until 1833 the college was conducted under the auspices of the Presbyterian Church, and since that date has been under Methodist control. In 1904 the college had 33 instructors, 520

DICKINSON COLLEGE.

students and a library of 40,000 volumes. There have been 4,297 graduates since the organization of the institution. The college has production funds to the amount of $400,000 and an annual income of $122,859. There are three courses of study, classical, scientific and modern languages. In 1904 the president of the college was George E. Reed. W.M.C.

DICKSON, SAMUEL HENRY, an American physician; born in Charleston, S. C., Sept., 1798. He graduated at Yale in 1814; studied medicine in Charleston, and during the yellow fever epidemic of 1817 practised for a time. He graduated in medicine at the University of Pennsylvania in 1819. Being instrumental in the establishment of a medical college in Charleston, he was called to the chair of institutes and practice of medicine in 1824. He retired from this position in 1832, but on the reorganization of the institution as the Medical College of South Carolina he was re-elected. In 1847 he was chosen professor of the practice of medicine in the University of New York, but in 1850 he returned to his former chair in Charleston. In 1858 he was called to the chair of the practice of medicine in Jefferson Medical College, Philadelphia. He was the author of *Essays on Life, Sleep, Pain, etc.* (1852). He died in Philadelphia, March 31, 1872. E.R.T.

DICOTYLEDONS. See VEGETABLE KINGDOM, Vol. XXIV, p. 143.

DICTIONARY. In addition to the dictionaries named in Vol. VII, pp. 155–168, the following publications of recent years should be noted:

The Oxford English Dictionary. A new dictionary on historical principles, founded mainly on the materials collected by the Philological Society; edited by Dr. James A. H. Murray and others. The publication of this work was commenced, in sections, in 1888, and had advanced, in the issue of April, 1809, to "Hox—Hwye," being pp. 256–370 of Vol. V. One of the distinctive features of this learned and valuable work is the indication, by dated quotations, of the periods when the different uses of each word began and ended in English literature.

A Dictionary of the English Language, by Rev. James Stormonth (1885). The especial design of this work is to present the correct usage of words, and the words are grouped according to their derivation.

An Etymological Dictionary of the English Language, arranged on a historical basis, by W. W. Skeat, Oxford (1882). This was the best English etymological dictionary issued up to that time.

The Century Dictionary, an encyclopædic lexicon of the English language, edited by Professor William Dwight Whitney of Yale (6 vols., 1891), to which is added a seventh volume, entitled *The Century Cyclopædia of Names.* In 1895 the work was reissued in ten volumes. It contains over 215,000 words and 50,000 phrases, and makes the attempt to give idiomatical phrases and the colloquial as well as the dialectal use of words. Technical words and terms are not only defined with scientific accuracy, but the objects they designate are described and illustrated, after the manner of an encyclopædia, with diagrams and pictures, of which there are 7,500. American writers are largely represented in the 300,000 literary quotations given.

A Standard Dictionary of the English Language, upon original plans (1895), contains about 320,000 words, carefully selected from many other dictionaries, and from several thousand representative authors; and while it gives place to the reform spellings put forth by the American Philological Association and by the American Spelling Reform Association, it does not adopt them. A prominent feature consists in giving the commonest meaning of each word first, while the etymology of words comes last in the order of their treatment. In giving synonyms and antonyms, care has been taken to bring out the distinctions with sharpness, and with especial reference to the correct established usage of the present time. Another feature is, that exact references are given for the quotations used to illustrate the meanings of words. The quotations themselves have been selected from modern standard English and American writers, and some of them are taken from newspapers. The pictorial illustrations have been selected with discrimination, and are drawn by specialists in that line.

The Encyclopædic Dictionary (1888) is styled a new and original work of reference to all the words in the English language, with a full account of their origin, meaning, pronunciation and use, with numerous illustrations. The plan of this work is somewhat in line with that of the *Century Dictionary*, which it preceded, but with the popular feature of being less expensive. The definitions are concise, and the cyclopædic matter easy.

Webster's International Dictionary of the English Language (1890) is a revision of the 1864 edition of Webster's Unabridged, made under the supervision of Noah Porter, LL.D., ex-president of Yale College, and contains many additions and changes,

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made with the primary object of incorporating the new words and meanings of recent origin, especially in the departments of science and technology.

It remains to notice a work "which does greater honor to American scholarship than any other work ever published in the combined fields of sacred and classical learning," *A Greek Lexicon of the Roman and Byzantine Periods*, by Evangelinus Apostolides Sophocles, LL.D., of which a limited edition was printed in 1870 by the munificence of a few wealthy gentlemen, and a memorial edition edited by Prof. C. H. Thayer in 1887. Professor Sophocles was a native Greek, educated at the convent on Mount Sinai, a profound scholar who gave the best years of his life to Harvard University.

DICTIONARY, BIOGRAPHICAL. See Vol. XXIX.

DICYNODONS, extinct reptiles, of the order *Anomodontia*, nearly allied to the ancestral stock from which mammals descended. R.W.C.

DIDACHE OR TEACHING OF THE TWELVE APOSTLES. See APOSTLES, TEACHING OF THE TWELVE, in these Supplements.

DIDELPHIA. See MAMMALIA, Vol. XV, pp. 373, 374.

DIDIUS, SALVIUS JULIANUS. See SEVERUS, Vol. XXI, p. 732.

DIDON, HENRI, ABBÉ, a French priest and author; born at Thouvet, Isere, March 17, 1840; educated at Grenoble Seminary, and a disciple of Lacordaire; became a member of the Dominicans in 1862. Having visited Rome, he returned in 1868 and commenced preaching with great effect in Paris and other cities of France. In 1871 he delivered the funeral sermon at Nancy on Monseigneur Darboy. His first book was *Man According to Science and Faith*, and his first printed sermon, *What is a Monk?* In consequence of some startling sermons in 1879, dealing with the church and society, he was sent into temporary seclusion in the monastery of Carbara, in Corsica. A subsequent visit to Germany and the Holy Land furnished him with themes for *The Germans*, in which he pointed out that theory and practice have nothing in common in the Fatherland; and for *La Vie de Jesus* (1891), opposing the views of Renan, which had an immense circulation and was translated into English. Died March 13, 1900.

DIDYMIUM. See CHEMISTRY, Vol. V, p. 470.

DIDYMUS, a famous Alexandrian grammarian. He flourished during the Augustan Age, and is said to have compiled about 3,500 writings, for which fact he was surnamed "Chalkenteros." He devoted himself chiefly to critical expounding of the works of the older Greek poets and prosaists, foremost, however, to revising of the Homeric text, carried out by Aristarchus. A greater part of the *scholiæ*, *i. e.*, annotations to Greek authors, handed down to the present time, are derived from his pen. G.A.S.

DIEFENBACH, LORENZ, a German philologist and ethnologist; born at Ostheim, Hesse, July 29, 1806; studied theology and philosophy at Giessen, and music and modern languages at Frankfort-on-the-Main. He traveled much, and devoted himself to pastoral work for twelve years. In 1848 he settled at Frankfort, and died there March 28, 1883. His literary industry was enormous, as well in the line of poetry and romance as in the heavy and learned works which have placed him among great scholars. He published, among other works, *Celtica* (1839–41); *Gedichte* (1840); *Lexicon Comparativum Linguarum Indo-Germanicarum* (1846–51); and *Glossarium Latinum Germanicum Mediæ et Infimæ Ætatis* (1857).

DIEFFENBACH, JOHANN FRIEDRICH, a German surgeon; born Feb. 1, 1795, at Königsberg, studied theology at Rostock and Greifwalde, served in the campaigns of 1813–15, after which he devoted himself to the study of medicine and surgery at Königsberg. In 1830 he became surgeon at the Berlin Charité, and, in 1832, professor and director of the surgical clinic. He died Nov. 11, 1847. Besides simplifying the technics of surgery, he improved on many old methods of operating and introduced many new ones in the fields of operative, plastic, and restoring surgery, such as in the forming of artificial noses, lips, eye-brows, and cheeks, the cutting of muscles in cases of squinting and stammering. He wrote *Chirurgische Erfahrungen* (4 vols., 1829–34); *Ueber die Durchschneidung der Sehnen und Muskeln* (1841); *Die Heilung des Stotterns* (1841); *Die Operative Chirurgie* (2 vols., 1844–48), and his principal work, *Der Æther gegen den Schmerz* (1847). G.A.S.

DIEGO-SUAREZ BAY. See MADAGASCAR, Vol XV, p. 169.

DIEL DU PARQUET, JACQUES, a French colonizer and colonial governor; died at St. Pierre, Martinique. Jan. 3, 1658. The date of his birth is unknown. He was a nephew of Pierre d'Enambuc, the colonizer of St. Christopher and Martinique, who, in December, 1638, gave him an appointment as commandant of the latter island, which was quickly confirmed by the French "Company of the American Islands." He was made lieutenant-general and seneschal, and received a grant of thirty pounds of tobacco for each inhabitant. As governor of Martinique he was beset with many difficulties, but confronted them with wisdom and vigor; introduced the culture of the sugar-cane in 1639, and by 1642 had led his people far in the direction of general prosperity, when the island was devastated by a terrible hurricane. In June, 1650, he purchased the island of Grenada from a Carib chief for a few necklaces and casks of brandy, and distributed the lands among his colonists. The vendors, soon repenting of their bargain, made an attack, and were nearly exterminated in the slaughter which ensued. In September of that year he purchased Grenada and its adjacent islets, and also Martinique and St. Lucia from the French government. In 1654, some Hollanders, expelled from Portugal, came from Brazil and desired to join his colony, but by the influence of the Jesuits, who had been there since 1640, were repelled. The same year the Caribs, under the lead of a half-breed, attempted to exterminate the French. Parquet afterward lost St. Lucia, in a sudden attack by the English. Grenada was several times ravaged by the Caribs, and as the French made reprisals, the is-

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land became a scene of fire and carnage. In 1656 he was surrounded and beset, when a Dutch fleet arrived, by whose aid he put the savages to flight; and in 1657 they made submission.

DIELECTRIC. See ELECTRICITY, Vol. VIII, p. 34; also ELECTRICITY, § 7, in these Supplements.

DIELMAN, FREDERICK, a German-American artist; born in Hanover, Germany, December 25, 1847. He removed to the United States in 1859 and was graduated from Calvert College, Baltimore, in 1864. From 1866 to 1872 he served as a topographer and draughtsman of United States Engineers in Fortress Monroe and Baltimore, and in the survey of canal routes over the Alleghanies. He then studied art under Diez in the Royal Academy, Munich, and afterwards opened a studio in New York city. He has contributed largely to *editions de luxe* of Longfellow, Hawthorne, and other writers. His works include, *The Patrician Lady* (1877); *Young Gamblers* (1885), and *A Head* (1886). He was made an academician in 1883. W.M.C.

DIES IRÆ, a famous Latin hymn on the Day of Judgment, beginning with the lines:

Dies iræ, dies illa,
Solvet sæclum in favilla,
Teste David cum Sibylla!

It consists of seventeen stanzas of three rhyming lines each, and a final stanza of four lines. Its inspiration is evidently drawn from the Prophecy of Zephaniah, Chap. I, verses 14–18, and although it is written in mediæval and not classic Latin, the supreme awfulness of its theme, the mingled majesty and piety of its sentiments, and the stately sonority of its verbiage, all mark it as an unsurpassed masterpiece. The very form of the stanzas, and the use of the triple rhymes, give it a technical effectiveness almost unrivaled in literature. Each stanza, said Guericke, makes the soul tremble as with three blows of a hammer. The authorship of the hymn has been much disputed, but it was probably written by Thomas de Celano, a disciple of St. Francis of Assisi, who was born at Celano in the Abruzzi, spent the years 1221–28 in the Rhineland, and died in 1255. The date of its composition is unknown, but its first known appearance in manuscript was in a missal at Venice in 1250. Since the Council of Trent it has been one of the five "sequences" universally used in the Roman Catholic Church, its place being in the Mass in Memory of All the Faithful Dead. Some of the greatest musicians, including Palestrina, Haydn, Cherubini and Mozart, composed special music for it, and innumerable translators have rendered it into English and other modern tongues. Scott paraphrased ts opening stanzas in Canto VI of his *Lay of the Last Minstrel*, and Crashaw, Sylvester, Macaulay, Drummond of Hawthornden, Trench, Dean Stanley, Duffield, Dix and many others have produced translations, some of them of much merit, though none equaling the majesty of the inspired original. W.F.J.

DIESKAU, JOHN ERDMAN, BARON, a soldier of Saxony who served under Marshal Saxe, and afterward at the head of French troops in Canada; born in 1701; died in Surenne, France, Sept. 8, 1767. He was a major-general in the French service, when, in 1755, with about a thousand French and Indians, he entered Lake Champlain to attack Fort Edward, and surprised and defeated the New England troops, under Colonel Williams, sent to oppose him. In the pursuit which followed the victory, his Indians failed him and a desperate conflict with the British ensued, in which, after losing all his men and being severely wounded, he was made a prisoner. After being exchanged in 1763, he returned to France, where he received a pension for meritorious services, and eventually died of his wounds.

DIESTERWEG, FRIEDRICH ADOLPH WILHELM, a German educator; born Oct. 29, 1790, at Siegen, Prussia; died at Berlin, July 7, 1866; studied philosophy, mathematics and history at Tübingen and elsewhere, and settled at Mannheim as private teacher. He became second professor in the secondary school at Worms in 1811; professor in the "Model" school at Frankfort-on-the-Main in 1813; principal of the Latin school at Elberfeld in the same year, and in 1820 director of the normal school at Moers. In 1832 he was called to be superintendent of education in the city schools of Berlin. For political reasons he was partially relieved of these duties in 1847, and wholly retired in 1850; but devoted himself to the cause of education during the remainder of his life. In 1858 he was elected to the Landtag. He early adopted the theories of Pestalozzi, whose life he published in 1846; and the building up of common schools and the training of teachers were his chosen work. He was the author of many schoolbooks, chiefly relating to geometry and algebra, and of *Inspection*; *Stellung und Wesen der Neuen Volkschule* (1846); *Praktischer Lehrgang für den Unterricht in der Deutschen Sprache* (1845); and other publications.

DIET. See DIETETICS, Vol. VII, pp. 174–185.

DIETERICI, FRIEDRICH HEINRICH, a German Oriental scholar; born in Berlin, July 6, 1821; studied at Halle and Berlin, and after publishing a Persian poem, *Mutanabbi et Serfeddaula* (1847), visited Cairo, where he studied Arabic at the school of a sheik; then traveled through Upper Egypt, Mt. Sinai and Palestine, and returned by way of Constantinople, Athens and Trieste. In October, 1850, he was made assistant professor at Berlin, and in March, 1852, interpreter of the embassy from London to Constantinople. In 1851 he published an edition of the Arabic text, of Alfiyyah, and a grammar in Arabic text, with the commentary of Ibn Akie, and afterward published *Anthropology of the Arabs*, and many other works concerning the Arabian people and literature. Died Aug. 19, 1903.

DIETRICH OF BERNE, a name given to Theodoric the Great in the ancient heroic poems of Germany, in many of which he is a central and principal figure. Berne signifies Verona, his capital. *Alphart's Tod; Dietrich's Ahnen;* and *Dietrich's Flucht*, are the titles of some of the poems. He figures in the *Niebelungenlied.*

DIETRICHSON, LORENTZ HENRIK SEGELCKE, a

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Norwegian poet and critic; born at Bergen, Jan. 1, 1834; passed a portion of his youth in traveling; settled in Sweden in 1859; became docent at the University of Upsala in 1861; amanuensis at the National Museum in 1866; art teacher at Stockholm in 1868; and teacher in the Manual Training School in 1870. In 1875 he was made professor of the history of the fine arts at Christiania. His works, chiefly on art-history, are written some in the Swedish language, some in the Norwegian, the best known being *Outlines of the History of Norsk Poetry* (1866).

DIEULAFOY, Auguste Marcel, a French archæologist; born Aug. 3, 1844; noted for his important discoveries in Persia in 1881 and 1885, and for his splendid works *L'Art Antique de la Perse* (1884–89); and *L'Acropole de Suse* (1890–93). His wife, Jeanne, who accompanied him in his travels, published *La Perse, la Chaldée et la Susiane* (1886), and *A Suse* (1888). G.A.S.

DIFFERENCE-ENGINE. See Calculating-machines, Vol. IV, pp. 580, 581.

DIFFERENTIAL. See Infinitesimal Calculus, Vol. XIII, p. 14.

DIFFERENTIAL THERMOMETER, a thermometer consisting of two air-bulbs connected by a bent tube, partly filled with a colored liquid, the position of the column of liquid indicating the difference of temperature between the two bulbs. When exposing one bulb to heat, the expansion of the air forces the liquid down, causing it to rise in the other tube. W.R.B.

DIFFERENTIATION, of molecules. See Atoms, Vol. III, pp. 40, 41. In biology. See Biology, Vol. III, pp. 590, 591.

DIFFRACTION. See Wave Theory, Vol. XXIV, p. 479.

DIFFUSION. See Chemistry, in these Supplements.

DIGAMMA, an obsolete letter of the Greek alphabet, resembling the English F, and equivalent in sound to the English *w*.

DIGBY, a seaport town, county seat of Digby County, western Nova Scotia, situated on an inlet of the Bay of Fundy. Ship-building is carried on, and large quantities of herring and mackerel are exported. Population, 1901, 1,150.

DIGBY, George, Second Earl of Bristol; was born in October, 1612. He was a brilliant student and wrote many controversial letters to Sir Kenelm Digby on religion. In 1640 he entered Parliament, and in 1641 succeeded his father in the House of Lords. His course was shifty and he was impeached of high treason in 1642, but never tried. In the civil war he fought for the king, and afterward entered the French army and that of Spain. Upon the Stuart restoration he returned to England, had a stormy career, and died on March 20, 1677. W.F.J.

DIGBY, Kenelm Henry, an English author; born in 1800, was the youngest son of the dean of Clonfert. Having entered Trinity College, Cambridge, he took his B.A. in 1819, and three years later published the *Broad Stone of Honor*, "that noble manual for gentlemen," as Julius Hare called it; "that volume which, had I a son, I would place in his hands, charging him, though such admonition would be needless, to love it next to his Bible." It was much altered and enlarged in the 1828 and subsequent editions (the latest 1877), its author having in the meantime turned Catholic. He died in London, where most of his long life was spent, March 22, 1880. Of 14 other works (32 vols., 1831–74) the last eight were poetry.

DIGEST. See Justinian, Vol. XIII, pp. 802–804.

DIGESTER, Papin's Steam. See Papin, Vol. XVIII, p. 232.

DIGGES, Leonard, mathematician and meteorologist, was a gentleman of Kent, England; born about the year 1500, and educated at Oxford. He devoted his attention to mathematics and the practical application of the science, and was the author of *Tectonicum*, a treatise on superficial and solid measurements. He also paid much attention to astronomy and meteorology, and wrote a curious work on the prognostication of the weather by observation of the sun, moon and stars. Most of his life was spent in retirement and study at his home in Kent, where he died in 1574. W.F.J.

DIGGES, Thomas, son of Leonard Digges, (q. v., supra); was born about 1530; was educated at Oxford, and had a military career. He excelled as a mathematician, and wrote a treatise on the application of that science to military operations. He also wrote a book on the science of numbers so far as it was necessary to be understood by a soldier. He died in 1595. W.F.J.

DIGGES, Edward, son of Sir Dudley; born in England, 1620; died in Virginia, March 15, 1675; a resident of Virginia; employed Armenians to introduce the culture of the silk-worm in the valley of the James River, and was governor of Virginia during a portion of the year 1655. He then went to England to adjust a controversy between that colony and Lord Baltimore.

DIGGES, Dudley, another son of Sir Dudley, born 1612; died 1643; was the author of a treatise on the *Illegality of Subjects Taking Arms against Their Sovereign*.

DIGGES, Sir Dudley, eldest son of Thomas; born 1583; died 1639; educated at Oxford; an accomplished politician and elegant writer; is chiefly remembered for *The Compleat Ambassador*, a collection of letters between the ministers of Queen Elizabeth respecting her projected marriage with the Duc d'Anjou, published in 1655, after his death. In 1610 he appears as a friend of the navigator, Hendrik Hudson, contributing money to equip his fleet. In 1618 he was ambassador at Rome; 1621, member of Parliament; 1630, Master of the Rolls, and in 1631, one of a committee appointed to consider Virginian affairs.

DIGHTON ROCK, a mass of granite weighing nearly ten tons, with dimensions about six by eleven feet, and rising four feet above the ground, lying just above the water on the east bank of Taunton River, in the town of Berkeley, Bristol County, Massachusetts. Its front is deeply cut with mysterious characters, which have apparently undergone no change

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since first observed from the deck of a passing vessel by the early colonists. The rock is mentioned, with drawings of the inscription, in a letter from Cambridge to Sir Hans Sloane, dated Dec. 18, 1730, which is now in the British Museum; and it is also described by Edward A. Kendall in his *Travels Through the Northern Parts of the United States in 1807–08*. Many antiquarians believe that it is a runic inscription left by the Norsemen under Thorfinn, to record their visit to America, A.D. 1008. It was purchased, with the surrounding land, in 1857, for Ole Bull, the Norwegian violionist, and after his death was presented to the Royal Society of Antiquaries of Copenhagen, by whom it was, in 1890, ceded to the Old Colony Historical Society of Taunton, Massachusetts. J. J. Worsae, the eminent antiquarian of Stockholm, denies that the inscriptions are Runic or Norsk, and seems to favor the Indian tradition that it commemorates the massacre of some white men who arrived in a ship many years ago, and who, after seizing some of the natives as hostages, incautiously went ashore to a spring for water, and were overpowered.

DIGITIGRADA. See MAMMALIA, Vol. XV, pp. 362, 440.

DIHONG OR SANPO, Tibet, the principal feeder of the Brahmaputra River flowing from Lake Manasarowar on the northern slope of the Himalayan Mountains and after an easterly course of about 1,000 miles bending southwestward through a mountain-pass to Sadiya, Assam, whence it becomes the Brahmaputra. C.L.S.

DIJON MUSTARD. The celebrated Dijon mustard is worthy of note as a manufacture. Its peculiar quality is a certain piquancy not found in any other mustard. The seed is always sown on cleared charcoal-beds in forests, and the soil gives one peculiar flavor to the mustard; another flavor is differently accounted for. The mustard, when in powder, is mixed with the juice of new wine, lending that pleasant acidity with which we are familiar. But to obtain precisely the degree of acidity, it is necessary that the grape be always in precisely the same state of unripeness, a degree more or less making all the difference.

DIKE, SAMUEL WARREN, an American sociologist; born in Thompson, Connecticut, February 13, 1839. He was graduated from Williams College in 1863 and from Andover Theological Seminary in 1866. He was ordained as a Congregational minister in 1867 and held pastorates for 15 years. He was the founder of the Divorce Reform League later known as the National League for the Protection of the Family and has been its corresponding secretary from its organization. He has written numerous papers on marriage and divorce and prepared a statistical report upon these subjects for the Bureau of Statistics. W.M.C.

DIKE OR DYKE, in engineering. See HOLLAND, Vol. XII, p. 62. In geology, see GEOLOGY, Vol. X, p. 276.

DILATOMETER, an instrument for determining the expansion of liquids. The ordinary form consists of a globe bearing a graduated tube. If petroleum is to be tested, several dilatometers may be filled and immersed at once in an oil bath, the oil being heated and maintained at a certain temperature for at least fifteen minutes. At the end of this time the lid of the bath is raised and the increase in the volume of the oil in the tube is read like the mercury in a thermometer. The tube of the dilatometer is quite small, and in order to fill it, an air-pump has to be used to exhaust the oil, a very fine flexible tube being inserted for that purpose. All bubbles have to be carefully removed, and the tube must be cleaned by careful wiping. After use, the dilatometer may be emptied by a reverse process, air being blown in, followed by ether, to completely cleanse the apparatus.

C. H. COCHRANE.

DILETTANTE, an Italian expression for a lover of the arts and sciences, who devotes his leisure to them as a means of amusement and gratification. In 1734 a number of gentlemen formed in London a "Dilettanti Society," which published a splendid work on *Ionian Antiquities* (1769–1840); and *Specimens of Ancient Sculpture, Egyptian, Etruscan, Greek and Roman* (1809–35), *The Temples of Ægina and Bassæ* (1860); etc.

DILKE, SIR CHARLES WENTWORTH, an English politician and author, was born at Chelsea, London, Sept. 4, 1843; a grandson of Charles Wentworth Dilke, proprietor and editor of *The Athenæum*, whose *Papers of a Critic* Sir Charles edited in 1875, and son of Sir C. W. Dilke, one of the active originators of the great exhibition of 1851, and British commissioner to the New York Industrial Exhibition of 1853. Sir Charles was educated at Cambridge, where he graduated as "senior legalist" in 1866, and in the same year was called to the bar. During 1866–67 he made a tour of English-speaking and English-governing countries, including the United States, Canada, Australia, New Zealand and India, the results of which appeared in a cleverly written record of travel, under the title of *Greater Britain*. This work, which met with instant and signal success, treated the new subject of the influence of race on government, and of climatic conditions upon race, and won praise for its author as an acute and highly intelligent observer on imperial and colonial questions. In 1868 he entered Parliament as member for Chelsea. A doctrinaire Radical in politics, in 1871 he was attacked for holding republican opinions when he avowed his preference for a republican form of government to a constitutional monarchy. Despite this fact, he held office under the crown, being Under-Secretary of State for Foreign Affairs, and president of the Local Government Board, with a seat in Mr. Gladstone's Cabinet.

SIR CHARLES DILKE.

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In 1881–82 he was chairman of the royal commission for the negotiation of a commercial treaty with France. In 1885 he carried the Diseases Prevention Act through Parliament. He was also concerned with legislation creating the metropolitan school boards, directly elected by the rate-payers, and for conferring the municipal franchise on women. In 1885, in consequence of the disgraceful exposure of the Crawford divorce case, in which he was named as a co-respondent, he was defeated in a contest for a Parliamentary seat in Chelsea, and began to devote himself more to literary work and travel, and to the study of questions bearing upon the European and colonial policy of Britain, her military strength, the imperial defenses, etc. His chief publications, besides *Greater Britain*, already noted, are an anonymously published satire, entitled *The Fall of Prince Florestan of Monaco* (1874); *Two Recess Speeches* (1876); *The Eastern Question* (1878); *Parliamentary Reform* (1879); *The Present Position of European Politics* (1878); *The British Army* (1888); *The Problems of Greater Britain* (1890); and, conjointly with Spencer Wilkinson, a volume entitled, *Imperial Defence* (1891). In 1892 he was returned to the House of Commons as member for the Forest of Dean, Gloucestershire. In 1885 he married Mrs. Mark Pattison, widow of the late rector of Lincoln College, Oxford, herself a writer and author of several clever stories.

DILKE, EMILIA F., an English authoress; born at Oxford in 1840; married the Rev. Mark Pattison, rector of Lincoln College there, in 1862, and after his death 1884, married, in 1885, Sir Charles W. Dilke. During many years she wrote the art criticisms in the *Athenæum*, and the articles on Italy and France in the *Annual Register*. She also wrote on trades unions for women, in the *Fortnightly Review* and in the *New Review*. Her *Life and Works of Claude Lorraine* (1879) shows a judicious and appreciative critical talent; and in *The Renaissance of Art in France* (1879) she treats with thoroughness a most difficult period of French art. Among her other works are *The Shrine of Death* (1866); and *Art in the Modern State* (1888). Died October 24, 1904.

DILLMANN, CHRISTIAN FRIEDRICH AUGUST, a German theologian and Orientalist; born at Illingen, Würtemberg, April 25, 1823; died July 4, 1894; educated at Stuttgart, Schönthal and Tübingen; became a parish vicar at Tersheim in 1845; made researches among the libraries of Paris, London and Oxford in 1846–48; filled various posts of honor at the universities of Tübingen, Giessen and Kiel; edited a number of catalogues of Oriental and Ethiopic manuscripts; translated and explained the *Book of Enoch* (1853); published a *Grammar of the Ethiopic Language* (1857), and a lexicon of the same (1865); and undertook an edition of the Old Testament in that language. In 1869 he resigned his chair at Giessen to become the successor of Hengstenberg, at Berlin. The author of numerous works on Ethiopic themes, he was unquestionably the first authority in Europe on those languages. He possessed a magnificent Oriental library of 5,000 volumes, which has been acquired by the Johns Hopkins University, at Baltimore.

DILLON, a city and the capital of Beaver Head County, southwestern Montana, 100 miles S.S.W. of Helena, on the Beaverhead River, and on the Union Pacific railroad. It is a shipping-point for the country for 15 miles about, exporting ore, wool, cattle, sheep and farm products. Population 1900, 1,530.

DILLON, JOHN, an Irish politician, son of John Blake Dillon; born in Blackrock, County Dublin, in 1851; educated at the Catholic University of Dublin; entered Parliament for Tipperary, 1880; became an active supporter of Mr. Parnell, and was the first on the list when, Feb. 2, 1881, the entire Parnell party was suspended. He resigned in 1883; was elected for East Mayo in 1885, and again in 1886. He was twice imprisoned under the Coercion Act of 1881, and in 1886, while executing the "plan of campaign," was arrested at Loughrea and bound over to keep the peace. In 1888 he was sentenced to six months' imprisonment in Tullamore jail. He afterward traveled in Australia; returned in 1890, and was arrested on a political charge, forfeited his bail, escaped with William O'Brien to Cherbourg and thence went to the United States, where he was received by the friends of Mr. Parnell. He surrendered in 1891, and, after a brief imprisonment, declared in favor of Parnell's retirement from the leadership of the Irish party. Later he reëntered Parliament, and on the resignation of Justin McCarthy, in Jan., 1896, he was elected leader of the Anti-Parnellites, and was reëlected in 1897, 1898, and 1899.

JOHN DILLON.

DILLON, JOHN FORREST, jurist, was born at Northampton, N. Y., on December 25, 1831, removed to Iowa, and became a lawyer. He was made prosecuting attorney in 1852, district judge in 1858, and judge of the supreme court of the State in 1863, being re-elected in 1869. He became professor of real estate and equity jurisprudence in Columbia University in 1879, resigning in 1882. He is a member of the Institute de Droit International, and is the author of numerous works on law. W.F.J.

DILUVIUM, distinguished from alluvium. See ALLUVIUM, Vol. I, p. 518.

DIMINUTIVES, in grammar, words having a special affix expressive of littleness, or of the ideas of tenderness, affection, contempt, etc., commonly associated therewith. In English, the terminations *-kin*, *-ling*, and *-et*, as in napkin, gosling, and pocket, are examples of common diminutives.

DIMITY, a heavy, fine, white cotton fabric with a crimped or ridged surface; plain, striped, or cross-barred. The term is derived from the Greek *dimitos* (made with a double thread). The Greek cloth is believed to have been a kind of twilled goods. Modern dimity is used for women's dresses and in fancy draperies.

DIMORPHISM, in botany, is a term expressing

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the fact that a plant produces two forms of flowers related to each other in the work of pollination, frequently called *heterostylism*, as it involves reciprocal lengths of styles and stamens. In one form of flower the style is short and the stamens are long; in the other, the style is long and the stamens are short; but the long styles correspond in position to the long stamens, and the short styles to the short stamens. An insect visiting one of these flowers will receive pollen upon that portion of its body which will brush against the stigma of its own length in the reciprocal flower. It is found that if pollen from a short stamen be placed upon the stigma of a long style, or *vice versâ*, it will be completely ineffective, or, in any event, not nearly so effective as the pollen upon a stigma of its own length. In this way, close-pollination is practically prevented, and cross-pollination necessitated. As examples of dimorphic or heterostylic flowers, species of *Houstonia*, *Primula*, *Linum*, and *Polygonum* may be cited. This relationship is still more complex in *trimorphic* flowers, such as species of *Oxalis*, *Lythrum*, *Salicaria*, etc., in which there are reciprocal stamens and styles of three lengths, and hence three forms of flowers.

The term *dimorphism* has also a wider application, and is sometimes made to include a condition in which two forms of flowers are produced, but which do not involve heterostylism. For example, in the cases of *cleistogamous* flowers, these apparently abortive but really very productive flowers are formed in addition to the ordinary more showy flowers of the plant, which thus has flowers of two forms, and may be said to be dimorphic as to its flowers. A still wider application of the term makes it include all those plants in which the phenomenon of alternation of generations appears. Such plants—and they include all plants but the lower Thallophytes—have two alternating forms of plant body, the *gametophyte* and the *sporophyte*, and hence may well be called dimorphic. See SEX, Vol. XXI, p. 757. J. M. COULTER.

DIMORPHITE, a mineral. See MINERALOGY, Vol. XVI, p. 410.

DIMSDALE, THOMAS, physician; was born in England in 1712, and was one of the foremost practitioners of inoculation for the prevention of smallpox. He made two journeys to Russia, in 1768 and 1784, for the purpose of inoculating the Empress Catherine and other great personages, and was the author of several books explaining and advocating that practice. He was a member of the House of Commons, for Hertfordshire, in two Parliaments. He died in England in 1800. W.F.J.

DINARIC ALPS, a mountain range of Austria, connecting Mount Kleck at the southeast extremity of the Julian Alps with the western extremity of the Balkan range. It runs from northwest to southeast, through Croatia, forming the eastern frontier of Dalmatia, while a western branch covers much of that country. One of its highest peaks, Mount Dinara (6,010 feet), so called from the Celtic *Din*, or *Dinas*, a fortified height, gives name to the range. See also ALPS, Vol. I, p. 547.

DINDINGS. See STRAITS SETTLEMENTS, Vol. XXII, pp. 615, 616.

DINDORF, WILHELM, a German philologist, whose scholarship combined elegant taste with profound learning; born Jan. 2, 1802, at Leipsic, where his father was professor of Oriental languages; entered the university at 15, and by his acquirements soon gained the friendship of many distinguished scholars. He was appointed custodian of the Royal Library at Berlin in 1827, and professor of literary history at Leipsic in 1828, but resigned in 1833 to devote himself wholly to literary work. With L. and M. Hase he reëdited the *Thesaurus* of Stephen; and afterward edited *Demosthenes*, *Æschylus*, and other Greek authors for the University of Oxford, and many volumes in Didot's Paris *Library of the Greek Classics*. He died at Leipsic, Aug. 1, 1883.

DINGELSTEDT, FRANZ VON, a German poet; born June 30, 1814, at Halsdorf, became librarian at Stuttgart in 1843, director of theatre at Weimar in 1857, director of the Vienna Imperial Theatre in 1867, and of the Vienna Hofburg Theatre in 1871. He died at Vienna, May 15, 1881. G.A.S.

DINGLEY, NELSON, JR., statesman; was born at Durham, Maine, on February 15, 1832, and was graduated from Dartmouth College in 1855. The next year he purchased the weekly *Journal* of Lewiston, Maine, and became its editor. In 1865 he added a daily edition, and made it one of the leading Republican papers of the state. He was a member of the state legislature in 1862–65, 1868, and 1873, being speaker of the House in 1863–64, and in 1874–76 he was governor of Maine. He was elected to Congress in 1881 at a special election to fill a vacancy, and was re-elected successively for the remainder of his life. He paid particular attention to national legislation affecting shipping, currency, and the tariff, and was the author of the so-called Dingley tariff law of 1898. He died on January 13, 1899, universally esteemed. W.F.J.

DINGO, a wild dog of Australia. See DOG, VII.

DINGRAS, a town in the province of Ilocos Norte, Luzon, Philippines. Pop., 1903, 15,792.

DINICHTHYS HERZERI. See OHIO, XVII.

DINKA, an African race. See AFRICA, XXV, 67.

DINOMYIDÆ. See MAMMALIA, Vol. XV, p. 426.

DINOSAURIA. See REPTILES, Vol. XX, p. 455.

DINSMOOR, ROBERT, poet, was born at Windnam, N. H., on October 7, 1757, and was self-educated. He became a farmer, and a rustic poet. He died on March 16, 1836. W.F.J.

DINWIDDIE, ROBERT, a British colonial governor; born in Scotland in 1690. In 1752 he was appointed lieutenant-governor of Virginia, after having served some years as collector of customs for the British government in the West Indies, where he detected and exposed enormous frauds. As a reward for his disclosures he was given the Virginia appointment. During his official career from 1752 to 1758 he recommended the annexation of the Ohio valley and the erection of forts to secure the Western frontier against the French. He was one of the most earnest supporters of the French and Indian War, which

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began about 1753 and continued for 10 years. While he was governor he was charged with applying to his own use $100,000 sent to defray the expenses of Virginia for the public service. It was during his administration that Braddock proceeded on his expedition against the Indians. He died in Clifton, England, August 1, 1770. W.M.C.

DIOCLETIAN ERA. See CHRONOLOGY, Vol. V, p. 621.

DIODATI, CHARLES, nephew of Giovanni Diodati (q. v.), was born in 1608, was educated at Oxford, practiced medicine, was a close friend of Milton, and died in 1638. W.F.J.

DIODATI, GIOVANNI, was born at Geneva, Switzerland, on June 6, 1576, became a follower of Calvin, and was professor of Hebrew in the Geneva University, professor of theology in succession to Beza, and pastor of a Reformed church. He died at Geneva on October 3, 1649. W.F.J.

DIODON. See GLOBE-FISH, Vol. X, p. 611.

DIOMEDE ISLANDS. See BEHRING'S STRAIT, Vol. III, p. 440.

DIONÆA. See INSECTIVOROUS PLANTS, Vol. XIII, p. 142.

DIONYSIUS, SAINT. See DENIS, Vol. VII, p. 70.

DIONYSIUS THRAX, a classic author, a native of Thrace, who taught rhetoric at Rome about 75 B.C. See GRAMMAR, Vol. XI, pp. 34, 39.

DIOPHANTUS. See ALGEBRA, Vol. I, p. 451.

DIOPTRIC SYSTEM. See LIGHTHOUSE, Vol. XIV, pp. 624–628, 636.

DIORAMA, an exhibition invented by Daguerre in 1822, and given in London and Paris, in which a combination of both transmitted and reflected light was used to show large colored pictures to an assembly of spectators. See DAGUERRE, Vol. VI.

DIORITE ROCK. See GEOLOGY, Vol. X, 209.

DIPLACANTHUS, a genus of fossil ganoid fishes peculiar to the Old Red Sandstone, in which six species have been found. The body was covered with very small scales, and the tail was heterocercal. There were two dorsal fins, which, with each of the other fins, were furnished with a strong spine in front, the base of which was simply imbedded in the flesh, as in the dogfish, and not articulated, as in the siluroids. The head was large and the mouth wide and opening obliquely.

DIPLOGRAPTUS, a genus of fossil hydroids (*Cœlenterates*) belonging to the Graptolites. The colong consisted of a stalk with a double row of hydranths. It resembled the well-known sertularians. The fossils are from the Silurian shales.

DIPLOMATIC AGENTS, functionaries commissioned to represent one state at the capital of another, or to negotiate with that other state concerning national affairs. Ancient Greece, Rome, Persia, etc., used political agents to discuss their national affairs; but, as the civilized world was then often confined within the limits of a single empire, the science of diplomacy, as known in modern times, did not exist; and the diplomatic agent of the present day is the product of a policy of statecraft which was initiated in the sixteenth century.

Ambassadors were the original diplomatic agents of modern civilized nations, but as they were supposed to represent the person of their sovereign, the execution of their business was often retarded by ceremonious formalities. To avoid this disadvantage, agents were appointed under the name of *resident ministers;* and it was these "envoys of the second degree" who were first intrusted with permanent missions at foreign courts. In the sixteenth century their duties involved deceit, trickery, and espionage into the secrets of the nation to which they were accredited, in order to serve the personal schemes of their sovereign. But by the eighteenth century three classes of diplomatic agents had been developed: ministers plenipotentiary, resident ministers, and *chargés d'affaires.* (See AMBASSADOR, Vol. I, pp. 577–579, and Vol. XXV, p. 155.

To these classes was added in 1818, by the protocol of Aix-la-Chapelle, that of "ministers resident," who rank between envoys and *chargés d'affaires.* These are accredited from one sovereign to another; but the *chargés d'affaires* receive credentials from the minister of foreign affairs of their own country, addressed to a similar officer of the government to which they are accredited. The foregoing classification omits certain diplomatic agents of irregular status, such as semi-official agents sent by non-recognized governments. Such agents are not members of the diplomatic corps. It also omits commissioners to fix boundaries or adjust claims; also great personages, charged with important missions, who desire to avoid useless ceremonies without sacrificing their rank and position.

Diplomatic agents are exempt from arrest, and, generally speaking, from the jurisdiction of the courts of the country to which they are accredited; and straightforward honesty in their intercourse with the government of that country, and non-intervention in its internal affairs, are necessarily required of them.

Consuls, who are government agents sent abroad to facilitate commercial intercourse between their own country and the city or port to which they are sent, are sometimes intrusted with certain duties which carry the title of diplomatic agent, or *chargé d'affaires,* and in such cases they are furnished with a letter of credence to secure recognition of their diplomatic authority, in addition to their commission as consul. The constitution grants to the supreme court of the United States original jurisdiction in all cases affecting diplomatic agents and consuls.

DIPLOPHANTINE ANALYSIS, that section of the theory of unlimited or indeterminate problems which attempts to find rational and commensurable values answering to certain equations between squares and cubes.

DIPNOI. See ICHTHYOLOGY, Vol. XII, p. 725.

DIPPER. See OUSEL, Vol. XVIII, pp. 78, 79.

DIPPING-NEEDLE, a magnetic needle so suspended as to have a free vertical motion. If the vertical plane in which the needle moves is the magnetic meridian, the angle between the needle and a horizontal line is called the dip or inclination of the needle. In theory, there can be no dip at the magnetic equator, but a dip of 90° should be found

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at the magnetic pole. From observations with a carefully adjusted dipping-needle Sir J. C. Ross, in 1831, fixed the magnetic pole in Boothia Felix, near lat. 70° N. and long. 96° W., where he found the dip to be 89° 59′, or nearly perpendicular.

DIPSAS, a genus of harmless tree-serpents living in the tropical regions of both hemispheres. The name, signifying thirst, arose from an ancient mith that the animal was driven by an insatiable thirst to inhabit springs, where it awaited an opportunity to bite a victim, and impart a thirst which only death could quench.

DIPTEROCARPUS, a genus of mostly large trees of tropical Asia, which receives its name from the large wings attached to the fruit, and which gives its name to the family (*Dipterocarpaceæ*). These peculiar wings are largely developed sepals. The trees are mostly very large and handsome, with hard wood, and yield an abundant resin. Some of the species are known as "gurjun trees."

DIPTERUS, a genus of fossil ganoid fishes, found in Devonian formations. They approach the lung-fishes (*Dipnoi*) in many points of structure.

DIRECTORY, in French history. See FRANCE, Vol. IX, p. 536.

DIRK-HARTOG ISLAND, an island off the western coast of Australia, lat. 26° S. long. 113° E. With two smaller islands it forms the breast-work of Shark's Bay, one of the most commodious inlets on that coast.

DISABILITY, in law, is the state of being incompetent to perform a legal act, or to hold a certain office. It may be partial or complete, or temporary or permanent; and may be caused by the subject's own volition or act, or be involuntarily imposed upon him by natural conditions or by accident. W.F.J.

DISAPPOINTMENT, CAPE, also called CAPE HANCOCK, is at the southwestern corner of the state of Washington, a part of Pacific County, jutting into the Pacific Ocean at the north side of the mouth of the Columbia River. Fort Canby and the town of Ilwaco are at its base, and a lighthouse stands at its point. The same name is given to the southern extremity of the island of South Georgia, in the South Atlantic Ocean, east of Cape Horn. W.F.J.

DISBARMENT, a term denoting the withdrawal of the status and privileges granted practitioners of the legal profession on their admission to the bar. One invested with the privileges of an attorney, solicitor, counselor-at-law or barrister may be deprived of his rights as such and the exercise of his functions in that capacity by the courts, and they may take this action on their own motion when conduct justifying such action comes under their observation, or the indictment may be presented by other parties, accompanied with evidence to sustain the charges. Gross professional dishonor, persistent contempt of court, taking unwarranted advantage of clients, dishonesty, extortion, or evidences of a weakness or viciousness of character rendering one unfit to be trusted with legal business, singly or collectively, may be taken as sufficient reason for disbarment. The accused must be given an opportunity to be heard in his own defence, either before a selected tribunal or in open court, and has the privilege of producing evidence in his own behalf, examining witnesses and cross-examining as is done under indictments for criminal offenses. The penalty which deprives a barrister of his means of livelihood is a severe one and it is only inflicted for grave offenses and when the evidence of guilt is beyond question. The court, in its discretion, may restore the disbarred attorney on satisfactory proofs, indications and promises of proper conduct in the future. A.R.R.

DISCHARGE IN HIGH VACUA AND AT HIGH POTENTIAL. See ELECTRICITY, §§ 94, 95, in these Supplements.

DISCIPLES OF CHRIST. The religious communion known by this title had its origin in the United States and is the youngest of the great Protestant churches, having had its beginning in the early part of the last century. In 1809 Thomas Campbell published what is known as "The Declaration and Address," setting forth certain principles which have since been held and emphasized by the Disciples of Christ. This is generally conceded to be the beginning of this movement, although there were a number of influences at work even earlier that were potent factors. Numerous Christians of different denominations, in different localities and entirely independent of each other, were taking the position that denominationalism was a sin and that Christian people should unite upon the Bible, and the Bible alone, as a basis of faith and conduct, and that all human names should be discarded and the name Christian alone be used by the people of God. North, south, east and west these advocates of Christian union appeared. Thomas Campbell and his son Alexander, the pioneers of the Disciples, were of this number. They began their labors in western Pennsylvania. At this time they were members of the Presbyterian Church. After deciding to take the Bible and the Bible alone as their guide, they changed their views upon the subject of baptism and united with the Baptists. With them they continued to labor until 1827, at which time the Baptists expelled Alexander Campbell from their fellowship, and soon after this they began the organization of independent churches, bearing the name of Churches of Christ, and whose members were known simpy as Christians, or Disciples of Christ. Associated with the Campbells in the early day of the Disciples were Barton W. Stone and Walter Scott. Western Pennsylvania, Virginia, Ohio, Indiana and Kentucky were the states in which these men principally labored. These states, together with Illinois, Missouri, Tennessee, Iowa, Kansas and Texas, contained the numerical strength of the Disciples in 1904.

In the early days, the Disciples of Christ were assailed on every hand and were compelled to contest every inch of ground they gained. As a result they developed a talent for and a love of controversy that did much to aid them in plant-

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ing their faith. Among them were found many great debators. Mr. Campbell, in addition to his other numerous duties as teacher, preacher, author and organizer took part in innumerable public discussions. He thus met advocates of almost every phase of thought differing from his own, from the ordinary Evangelical to the Roman Catholic represented by Bishop Purcell, and infidelity as advocated by Robert Owen, of Scotland. This spirit of controversy has largely passed away and in its stead the Disciples of Christ are marked by an intense love for what they regard as "their plea" and marked by an evangelistic spirit. As a result their growth has been quite remarkable and still continues to be so. In 1866 when Mr. Campbell died the Disciples numbered about 240,000. Since then they have made a net gain of about 1,000,000.

In faith, the Disciples hold the great essential truths of Christianity that are common to the Evangelical Churches: such as the inspiration of the Holy Scriptures of both the Old and New Testaments; the divinity of Jesus Christ; the sufficiency of his atonement for sin; the work of the Holy Spirit in convicting the world of sin, of righteousness, and of judgment and His indwelling in the hearts of Christians as comforter and sanctifier; the doctrine of rewards and punishment, including immortality for the faithful and everlasting punishment for the wicked.

The distinctive purpose with which they began their work and which characterizes them to-day is to restore to the church of the living God the unity for which Christ prayed and which was largely realized during the Apostolic age. This they propose to do by returning to the Apostolic faith and practice as set forth in the New Testament. They hold—First. That the word of God is a perfect rule of faith and conduct and that it is a sufficient guide for the people of God without the aid of human creeds. They do not ask for a return to the life of that age, for that was imperfect, but to the teachings of the apostles. Second. That in order to unite the people of God no names should be used for the church, save those that all agree upon. The names used in the Scriptures are satisfactory to all. So they call their churches, Churches of Christ or Christian Churches and themselves Disciples of Christ or Christians. In doing this, they disclaim any desire to monopolize these names, but state their wish to be to share them with all the Christian world. Third. Their creed, if they may be said to have a creed, is that which was demanded by the apostles, viz., Belief in Jesus as the Christ, the Son of God and a personal Savior. This creed they claim is broad enough to include all that the authority of Jesus rests upon and narrow enough to exclude all else and yet it leaves men free to hold whatever private opinion they prefer as to the many dogmas that have vexed the church and divided it. Fourth. The condition of membership among them is (1) faith in the above mentioned creed; (2) repentance, a turning away from sin to God; (3) a public confession of faith; (4) baptism for the remission of sin and as an act of obedience to the divine will. They practice immersion not only because they believe it to be the baptism of the Apostolic age but because it is the only form concerning which there is no controversy and upon which, for that reason, without offence to conscience the churches could unite. Intolerance has nothing to do with this position but a desire to reach a universally acceptable practice, if possible; (5) a consistent moral life directed by the Spirit of God. Fifth. They observe the Lord's Supper every Lord's Day to which they neither invite nor debar Christians of other communions, but all who love and obey the one Master, Jesus, are gladly welcomed if they desire to unite in the commemoration of the sufferings of the Lord.

They are Congregational in government. Each church has complete control of its affairs. As nearly as possible they organize their congregations after the New Testament pattern. Each congregation is governed by a board of deacons and elders. Trustees are added to these in order to comply with the civil law. They have no ecclesiastical authority. All, from the lowliest member to the most distinguished minister, are amenable only to the local congregation in which they hold membership and to the weight of public opinion. They have no heresy trials because they have no tribunal before which such trials may be had. Their missionary interests and other general interests are cared for in conventions to which congregations voluntarily send or withhold delegates. The actions of these conventions are not binding upon any persons, having only advisory power. These conventions are numerous, each state and many smaller districts holding them annually, besides a great national gathering to which many thousands go. These national gatherings elect the boards that control the great missionary interest of the body.

The Disciples early realized the necessity of having an educated ministry. Their first ministers were educated in the colleges of the denominations; but to-day, though less than a century has passed, they have many colleges and universities, numbering twenty-five in all. The first of these was Bethany College in West Virginia, established by Alexander Campbell, he being its president until his death. It was soon followed by many others, the chief of which are Drake University at Des Moines, Iowa; Kentucky University at Lexington, Kentucky; Hiram College, Hiram, O., and Christian College, Waco, Texas. They have Negro schools in Mississippi and Kentucky. The one at Edwards, Miss., being modeled after the Tuskegee Institute. Their colleges are not largely endowed, the total amount being only about $1,690,000. Their college property is valued at $2,123,500. In 1903, there were 831 ministerial students in these colleges. The same year they expended about $250,000 upon education.

The Disciples are but beginning to put forth a literature. The most valuable historical documents being *The Christian Baptist* and *The*

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Millennial Harbenger, which were edited by Alexander Campbell from 1823 to time of his death. His debates in book form and class room lectures, together with other volumes from his pen, are considered valuable. *Memoirs of A. Campbell*, by Richardson, is a valuable work. More recent authors of note are Isaac Errett, J. W. McGarvey, J. H. Garrison, Robert Milligan and Herbert L. Willett. The leading papers of to-day are *The Christian Evangelist*, of St. Louis, Mo.; *The Christian Standard*, of Cincinnati, O.; *The Christian Century*, of Chicago, Ill.; and *The Christian Guide*, of Louisville, Ky. *The Missionary Tidings* of Indianapolis, Ind., *The Missionary Intelligencer*, *The American Home Missionary*, and *Business in Christianity* are the missionary papers of worth. Sunday school supplies are published by the Standard Publishing Company of Cincinnati and the Christian Publishing Company of St. Louis, and at Nashville, Tenn.

The missionary work of the Disciples is done by numerous boards, the amount spent in 1903 aggregrating $681,065. The most important of these missionary agencies are The Foreign Christian Missionary Society, of Cincinnati, O., whose income in 1903 was $210,000; the Christian Woman's Board of Missions, of Indianapolis, Ind., income $145,000: and the American Missionary Society of Cincinnati, O., with an income of something over $100,000. They have also a Church Extension Society with headquarters at Kansas City, Mo., which has a trust fund for building churches amounting to about $450,000. The State Societies, of which there are many, also have in trust considerable sums for missionary purposes. The total number of missionaries on the foreign field is about 425. They labor in India, China, Japan, Hawaiian Islands, Philippine Islands, Jamaica, Cuba, Africa and Tibet. The Disciples have colleges in Japan, China and India. The growth of the missionary spirit has been quite marked among the Disciples, the income of the Foreign Society having increased 300 per cent. during the last ten years. They have also a National Benevolent Association with headquarters at St. Louis. They conduct homes for the aged and the orphans. These are located in St. Louis, Mo., Jacksonville, Ill., Cleveland, O., and Aurora, N. Y. They also have a Ministerial Relief Fund that is growing encouragingly.

The growth of the Disciples of Christ has been remarkable. Their first organizations were effected in 1827, and in 1904 they had 10,983 churches and 1,220,841 members, and ranked fourth among the Protestant churches of America. They had 8,855 Bible schools and 850,000 scholars. They had 6,507 ministers.

Many have been the theories offered in striving to account for the rapid and continued progress of the Disciples of Christ. The most natural explanation is that what they hold that is distinctive has proven a popular theory with the American people. As stated above the distinctive purpose is to unite the people of God upon the Bible as an all sufficient guide; thus dispensing with the innumerable divisions in the body of Christ, the Church. That this is a popular plea is proven not only by the fact of the rapid progress of the Disciples, but by the further fact that all denominations to-day are to a greater or less extent influenced by a desire to realize a closer fellowship among God's people of every name and creed, while at the time of the Campbells a more unpopular doctrine could not have been preached.

July, 1904. JOHN G. SLAYTER.

DISCIPLINE, CHURCH. See EXCOMMUNICATION, Vol. VIII, p. 699.

DISCIPLINE, FIRST AND SECOND BOOKS OF. See PRESBYTERIANISM, Vol. XIX, pp. 699, 700.

DISCLAIMER, in law, is a renunciation by which a party renounces or disclaims some right or interest in property. Thus a patentee may renounce a part of his title to a patent, or a party may refuse to accept an estate which has been conveyed to him by deed or in a will. The widow frequently disclaims the interest conveyed to her by her deceased husband's will, for the reason that she prefers to take her dower interest in the property; and trustees may disclaim an estate conveyed to them in trust, when, for any reason, they do not care to execute the trust. In pleading, the term means a renunciation, by a defendant, of all interest in the subject-matter of the dispute or claim.

DISCOBOLI. See LUMP-SUCKER, Vol. XV, p. 66.

DISCO ISLAND. See BAFFIN'S BAY, Vol. III, p. 190.

DISCOVERY, in law, means the disclosure of facts in the knowledge of a defendant, or the production of documents for the use of the party making the demand therefor. Discovery may be had, in chancery proceedings, of matters of use to the complainant in sustaining his claim, and which he is not otherwise able to procure. Frequently, suits solely for discovery are instituted in courts of chancery, as a collateral proceeding to another suit then pending in that or some other court. In courts of chancery, however, relief and discovery may both be obtained in the same suit, thus rendering a supplemental proceeding to a suit in a chancery court for the purpose of discovery usually unnecessary.

DISCOVERY OF TERRITORY, a phrase to express the claim of right by which civilized nations have sought to possess themselves of newly discovered countries. There are many familiar examples of such claims in the history of America, Africa and Polynesia; and England, France, Spain, Portugal and Holland have often vied together in a headlong race to see which nation should first appropriate the inheritance of unsuspecting savages. In the time of Columbus, the pope of Rome gave unhesitating assent to such claims, and undertook to divide among certain favored nations, in advance, the right of acquiring territory by discovery in the unknown portions of the globe. In the present century the Oregon question, between the United States and Great Britain, was a controversy involving the right

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of prior discovery, and the occupation of each newly discovered guano island in the Pacific Ocean affords an instance of its practical operation.

DISFRANCHISEMENT, in the ordinary use of the term, means the act of depriving a citizen of the right to vote. This cannot be done by public authorities. Frequently, criminals, or those who have been convicted of crime, are disfranchised by law, but the disability is generally only for a limited time, or is capable of being removed. Disfranchisement, as a legal term, means the act of depriving a member of a corporation of his right of membership by expelling him from the corporation. Corporations which are not for pecuniary profit have the right to expel their members as an incident to their corporate existence, but corporations which are maintained for profit have not this right, except when it is expressly granted by the charter. In any event, however, the right must be exercised only upon just cause, and after ample notice to the member, and opportunity to be heard. The power of disfranchisement can only be exercised by the corporation or society at large, unless the by-laws otherwise expressly provide. The remedy for wrongful expulsion is a writ of *mandamus* against the corporation to effect a restoration of the expelled member to his corporate rights.

DISHONOR, commercially, is the defaulting upon or failure to pay a bill, note or draft when it is due. In such case the endorsers of the note, if there be any, become liable for it, but in order to ensure their legal liability a notice of the default, called Notice of Dishonor, must be served upon them. Such notice may, generally speaking, be given by word of mouth or in writing, in any intelligible form, though in some states certain details of form and in most places limitations of time are prescribed. W.F.J.

DISK, a term of wide application in botany, but generally applied to an outgrowth of the receptacle of a flower, which often appears as a ring between the stamens and pistil, or as a cup more or less investing the pistil. Sometimes it carries up a set of organs, as the stamens, or both petals and stamens, or all the organs except the pistil, resulting in what is known as an *epigynous* flower, or one with an "inferior ovary." When the disk occurs it often functions as a *nectary*, secreting the characteristic nectar of insect-pollinated flowers.

DISPART, in gunnery, is a sight or projection cast upon the muzzle of a gun, and equal in height to half the difference between the diameters of the breech and of the muzzle; its object being to enable the gunner to obtain a line of sight from a cleft in the breech across the top of the dispart which shall be exactly parallel with the axis of the bore.

DISPENSARY, primarily, a room or place where medicines are compounded or dispensed, used to signify the places where medical treatment and medicines are supplied gratuitously, or nearly so, to the poor. In the latter case they serve not only as an outlet for philanthropic impulses, but to diminish the danger of pauperism, by restoring to health and the ability to labor the afflicted poor, and they act as a sanitary restraint for the community in checking incipient epidemics and relieving conditions that would otherwise tend to breed disease. The first recorded distinct dispensary was established in London in 1770, for "the relief of the sick poor, without regard to place of abode." It was an adjunct to St. Bartholomew's Hospital, and received governmental support. Its success led to the formation of similar institutions in other cities of England and the Continent. In England they became subject to Parliamentary regulation in 1805. The first dispensary in America was organized in Philadelphia in 1786, and was supported chiefly by the Society of Friends. In New York City the first dispensary was started by the New York Medical Society in 1791. In Boston their beginning was in 1796, under the auspices of the Chamber of Commerce. Baltimore followed in 1801. Since then they have spread to all the larger cities and towns.

In Germany, France and Austria any one can receive free treatment upon application. In England tickets are issued, after examining the worthiness of the applicant. There are, in England, also, many provident dispensaries (fifty in London in 1891) that are co-operative and self-supporting. Members pay a small sum monthly, for which they are entitled to medical treatment in case of sickness. In 1878, at a conference of delegates of the dispensaries in New York, it was decided to demand a nominal fee (ten cents) for each prescription, provided the applicant could pay. The fee was paid by about 85 per cent of the applicants, who, in 1891, numbered 452,429. In London the various dispensaries relieved (1891) 1,158,026 patients, or 274 to each 1,000 of the population. In most of the larger cities dispensaries are largely supported by the medical colleges.

DISRAELI, BENJAMIN. See BEACONSFIELD, EARL OF, in these Supplements.

DISSEN, LUDOLF, a German philologist, born at Grossen-Schneen, near Göttingen, Dec. 17, 1784; studied philology at Göttingen, became in 1812 professor of philology at Marburg, and in 1817 at Göttingen. He died Sept. 21, 1837. He published editions of *Pindar* (1830); *Tibullus* (1850), and of *Demosthenes' De Coronna* (1855). His treatises which are of great hermeneutical value appeared at Göttingen (1839). G.A.S.

DISSENTERS, in Great Britain, the appellation for those Protestants who separate themselves on grounds of faith, or practice, from the established church. The term is of English origin, although its near equivalent may be said to have existed in Poland in the name of *Dissidents*, which first appears in the acts of the Warsaw Confederation of 1573, and there denotes the Polish Protestants, in contradistinction to the members of the established Catholic religion. After 1632 the term *Dissidents* was applied, in Poland, to all who were not Roman Catholics, as Lutherans, Calvinists, Greeks, Armenians, etc. In England, the term *Dissenters* appears to have come into use in the seventeenth century, as synonymous with *Nonconformists;* and from England its use was transferred to Scotland in the eighteenth century, after the secession church had been

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founded in that country. The principle that none but persons professing the established religion were eligible for public office found expression in stringent legislation during the reigns of Elizabeth and Charles II, and dissenters remained under certain legal disabilities, which were only removed by acts of Parliament passed between 1828 and 1871; for an account of which, see TEST ACTS, Vol. XXIII, p. 216. For a list of 122 Dissenting religious denominations in England and Wales, see ENGLAND, Vol. VIII, pp. 223, 224.

DISSEPIMENT, in botany, a partition consisting of the coherent sides of adjacent carpels, separating the cells of a syncarpous ovary or fruit, such as the carpel of the lotus. Partitions otherwise formed are called spurious, or false dissepiments. It also refers to the middle part of a lamella of the pileus in hymenomycetous fungi. Sometimes dissepiments are partial, appearing as mere projections from the outer walls of the ovary. In zoölogy, one of the horizontal plates connecting the vertical septa in corals. Also one of the divisions or body-segments of an annelid. W.R.B.

DISSOCIATION. See CHEMISTRY, Vol. V, p. 412; and ELECTROLYSIS, in these Supplements.

DISTANCE. The limit of view in a picture, or "point of distance," as it is called in perspective, is that portion of the picture where the visual rays meet, the "middle distance" being the central portion between the extreme distance and the foreground. The art of producing on the eye the effect of real distance, in so far as it is not accomplished by mere mechanical rules, is one of the most subtle branches of landscape-painting, and cannot be acquired otherwise than by long experience and a careful study of the effects of light and shade.

DISTEMPER, in painting. See TEMPERA, Vol. XXIII, pp. 173, 174.

DISTICH (Gr., *distikon*, couplet), a couple of lines of verse (couplet) usually making complete sense and (in modern poetry) rhyming. The Greeks and Romans were fond of the distich as a vehicle of expression, preferring a hexameter and pentameter. Here is Schiller's couplet:

In Hexameter steigt des springquells flüssige Säule,
In Pentameter drauf fällt sie melodisch herab,

that is:

In the hexameter rises the fountain's silvery column;
In the pentameter aye falling in melody back.

W.R.B.

DISTILLED WATER, water in its purest state, produced by condensation from steam. Impure and salt water may be passed through a "still" as steam, and by distillation be made drinkable, and this method of obtaining a water-supply is in use by navigators of the present day. Distilled water is especially necessary in chemical operations, where the presence of the foreign matters which ordinary water contains would be injurious.—DISTILLED WATERS is a term used to indicate such products as rose-water and lavender-water, which are obtained by distilling water and certain essential oils together.

DISTRIBUTING MACHINES. See TYPE-SETTING MACHINERY, in these Supplements.

DISTRICT ATTORNEYS. These officials represent the general government, in circuit and district courts, civil and criminal, and in the prosecution of crimes and misdemeanors. They resemble the public prosecutor in England and the *procureur de la république* in France. State attorneys occupy similar positions in regard to criminal prosecutions in each county of a separate state. District attorneys are appointed by the President. State attorneys are elected by popular vote.

DISTRICT OF COLUMBIA. (See COLUMBIA, DISTRICT OF, Vol. VI, p. 150.) Population 1890 230,392; 1900, 278,718. In 1900, the old limits of the city of Washington contained 218,196 inhabitants; now it is co-extensive with the district. Prior to the year 1871 the affairs of the district were administered by Congress, but in that year the district was placed upon a territorial basis, Henry D. Cooke being governor from 1871 to 1873, and Alexander Shepherd from 1873 to 1874. Since 1874 the government has been in the hands of a local corporation, with an executive consisting of three commissioners, two of whom are appointed from civil life by the President of the United States, while the third must be an officer of the engineer-corps, detailed for that purpose. Judicial officers, recorders and justices of the peace are also appointed by the President, while all subordinate municipal officers are appointed by the Commissioners.

DITTANY, a genus of plants of the natural order *Rutaceæ*, of which *Dictamnus albus* is a native of the rocks and dry mountain forests of the south of Europe, especially in calcareous soils, which is generally cultivated as a garden flower. The flowers are of a fine rose color with darker veins, more rarely white. The plant diffuses a powerful fragrance from its numerous oil-glands when in flower and during dry, hot weather exhales such a quantity of volatile oil that its sudden combustion makes a slight flash when a candle is brought near it. The root is thick, white, and very bitter. *D. origanum* of Crete is probably the dittany of the ancients. W.R.B.

DIVIDEND is a part of the principal or profit distributed among the owners or other persons entitled thereto. The profits of a stock company are distributed to the stockholders in proportion to the respective amounts of their stock by means of dividends. Administrators and executors, trustees, assignees, receivers and other similar trust officers, upon whom the duty may devolve to administer insolvent estates, divide the proceeds derived from the sale or investment of assets by means of dividends.

DIVIDING-ENGINE. See GRADUATION, Vol. XI, pp. 27, 28.

DIVISIBILITY, that property of quantity, matter or extension through which it is either actually or potentially separable into parts. Whether matter is or is not indefinitely divisible is a question which has occupied the minds of philosophers since very early times. There is no doubt that, abstractly speaking, it is indefinitely divisible. We cannot conceive any body or space so small but that we can subdivide it in imagination, and thus figure to ourselves bodies and spaces still smaller; and practically we know that the subdivision of matter is carried in

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nature far beyond appreciation either by our senses or by calculation. The diffusion of odors through the air, for long periods, from odoriferous bodies, without their suffering any sensible change of weight, and the tingeing of great quantities of fluid by very minute portions of coloring matter, are cases commonly appealed to in proof of the extreme fineness of certain material particles; while, by experiment, it is shown that there is no particular limit to the divisibility of even the most solid substances. Thus an ounce weight of silver, gilt over with eight grains of gold, has been drawn out into a wire 13,000 feet long, which was all its length covered with gold. Divisibility resolves molecules into atoms; but these are, relatively, as various in size as the occupants of the stellar universe. The most patent form of matter, in a state of attenuated divisibility, is ether, "composed of aboriginal atoms, the diameters of which measure the seven hundred thousand millionth of the wave length of violet light." The evolutionary energy of the universe, in fact, depends upon the microcosmic potentialities of matter in its infinitesimal divisibility.

Revised by R.C.A.

DIVORCE, a subject exhaustively treated, in relation to Europe, under the appropriate heading in this ENCYCLOPÆDIA, Vol. VII, pp. 260–265, is of especial interest to Americans, not only by reason of the many and varying laws dealing with this most important social question, but also on account of the more reasonable principles upon which American courts in general have proceeded to dissolve ties which, through misconduct, have become productive of evil to an innocent plaintiff, and thus constituted an evil in the body politic.

The Catholic theory of indissolubility of marriage bonds finds no place in American statute laws, unless it be (and for a far different reason) in South Carolina, which, while legislating as to how large a proportion of his property a married man may leave to his concubine, has steadfastly declined to grant divorces, even for adultery aggravated by the greatest of indignities.

The history of American divorce legislation is interesting, and the tendencies of the various enactments run on well-defined lines. In colonial days, divorces were mainly, if not quite exclusively, granted by acts of the colonial legislatures, and by analogy with the English practice of divorce by act of Parliament. Instances are numerous in early colonial records of the granting of such relief, and until the present day the constitutions of the six New England states, with New York and Delaware, contain no express prohibition of this practice. The causes for which divorce was granted were much the same as in English law; and to the present day, in Georgia, limited divorces are granted "on any ground which was held sufficient in the English courts prior to May 4, 1784."

With the birth of the republic came a change in method. Each separate and sovereign state possessed the power of legislating for itself and its citizens, while the Federal Congress had (and to-day has) legislative jurisdiction over divorces only in the District of Columbia and "in any territory or other place where the United States has exclusive jurisdiction." Thus, and for these reasons, within the boundaries of the United States, may be found nearly half a hundred codes of law, each regulating the granting of divorce within the borders of a state or territory, and occasionally evolving riddles in matrimonial law.

Legislative divorce soon fell into disfavor in the young republic, as savoring of class legislation, and benefiting only the rich. Tennessee was the first to prohibit this method, in a constitution adopted in 1834. Pennsylvania and New Hampshire have ingrafted similar prohibitions upon the state constitutions. Elsewhere the practice is obsolete, or has never been sanctioned by precedent.

As regards the causes for which divorce may be granted, the American colonial legislatures began early to enact statutes more equitable and remedial than obtained in the motherland. The earliest colonists who laid the foundations of New England had brought with them views on divorce common to their reformed brethren in Scotland and Holland. Marriage was no sacrament, and desertion was a sufficient cause for a decree of dissolution. In those days desertion was a very different matter from that which is so called now. Voyages to remote colonies, to the more distant West Indies, or to the far-off motherland, implied long severance of family ties, and to a vagabondic spirit added an extreme probability of adultery. To meet such a case is found a law of the Massachusetts colony, as early as 5 William and Mary (1694), whereby "three years' absence for one gone to sea, the ship not being heard of for three years, when a voyage is usually made in three months," is declared to be sufficient ground for divorce.

The newer states of the Northwest have followed the policy of the first settlers. Causes for divorce have multiplied freely, and have been designed to meet most of the cases of hardship possible. Naturally, in a period of transition from prairie to sovereign state, some abuses have crept in. That parasite of the law—the pettifogger—at times has waxed fat by the exercise of his abilities in obtaining fraudulent divorces and occasionally has conducted a "mail-order business." But settled procedure, bar associations, publicity, and due and proper provisions for the personal service of process, are rapidly rendering "divorce colonies" few and far between.

Decisions of sterling value have gone so far as to hold fraudulent and invalid divorces obtained by concealment and fraud, especially where a plaintiff has proceeded from his own state to one with more lax laws, and for the express purpose of obtaining a divorce, and that without personal service on the defendant, and without the defendant's appearance, in order to give *bona fide* jurisdiction.

In Delaware, Maine and Massachusetts it has been provided by statute that when an inhabitant of the state shall go into any other jurisdiction to obtain a divorce for any cause occurring within the state, or for a cause which would not authorize a divorce by the laws of the state, a divorce so obtained shall be of no force or effect in the state. In all other cases a divorce decreed in any other state or country

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according to the laws thereof, by a court having jurisdiction of the case and of the parties, is valid in these states.

In Indiana it is declared, without qualification, that "a divorce decreed in any other state, by a court having jurisdiction thereof, shall have full effect in this state."

The foregoing are the only statutory provisions found on this subject.

Still, the complex and varying nature of the divorce codes of the separate states has produced a well-defined demand for uniformity of laws on this subject. Under the present system it is possible for too many men to have

"One wife at Natchez-under-the-hill,
And another at home in Pike."

The sentiment crystallized into action in 1891, when the legislatures of six states appointed commissions of able jurists to confer as to rendering uniform many important laws, including divorce. By 1895 the number of commissions at work was increased to 28. Valuable service has been rendered by these bodies, and their labors are gradually bearing fruit. Their recommendations, in the main, are in the direction of each state adopting a divorce law based upon that of the District of Columbia, and thus to abolish a multiplicity of complex, and at times conflicting, statutes. The alternative of a change in the constitution, giving to Congress the power of passing one uniform divorce law, was considered, but rejected as impracticable.

In many instances intricate questions of law arise on the wording of statutes, and, as a general rule, the subject is one for any interested person to avail himself of the advice of an attorney of standing in the particular state where relief is sought.

The following table, with its appended notes, presents the salient features of the divorce laws of every state and territory, a statement of the causes for which the law's aid may be invoked following immediately after the table:

States and Territories.	Court in which Proceedings Had.	Requirement of Previous Residence.	Specific and Valid Defenses. (See notes below)	Limitation for Bringing Suit.	Right to Re-marry after Divorce.
Alabama	Chancery.	1 to 3 years.	a. b. c. d.	None.	Unless decree
Alaska	----------	1 year.	b. c. d.	1 year.	6 months.
Arizona	District.	6 months.	a. b. c. d.	4 years.	Yes.
Arkansas	Equity circuit.	1 year.	a. b. d.	5 years.	Yes.
California	Superior.	1 year.	a. b. c. d.	2 years.	Yes.
Colorado	District chancery.	1 year.	a. d.	None.	Yes.
Connecticut	Superior.	3 years.	----------	None.	Yes.
Delaware	Superior.	No law.	a. b. c. d.	None.	Not adulterers.
District of Columbia	Supreme.	2 years.	----------	None.	No law.
Florida	Circuit.	2 years.	a. d.	4 years.	Plaintiff.
Georgia	Superior.	1 year.	a. b. c. d.	None.	Jury permit'g.
Idaho	District.	6 months.	a. c. d.	1 to 2 years.	Yes.
Illinois	Circuit.	1 year.	a. b. d.	5 years.	Yes.
Indiana	Sup'r and circuit.	2 years.	b. c. d.	2 years.	2 years.
Indian Territory	Only tribal laws.	----------	----------	----------	----------
Iowa	District or circuit.	1 year.	----------	None.	Yes.
Kansas	District.	1 year.	d.	5 years.	6 months.
Kentucky	Equity.	1 year.	c.	5 years.	Yes.
Louisiana	District.	No law.	c.	None.	10 months.
Maine	Supreme.	1 year.	a. d.	None.	2 yrs., or leave.
Maryland	Equity.	2 years.	----------	None.	Unless decree.
Massachusetts	Superior.	3 to 5 years.	----------	None.	Def't, 2 yrs.
Michigan	Circuit.	1 to 2 years.	a. b. c. d.	5 years.	Def't, 2 yrs.
Minnesota	District.	1 year.	b. c. d.	3 years.	Yes.
Mississippi	Chancery.	1 to 2 years.	a. c. d.	6 years.	Unless decree.
Missouri	Circuit.	1 year.	a. b. d.	None.	Yes.
Montana	District.	1 year.	a. c. d.	3 years.	Yes.
Nebraska	District.	6 months.	a. b. c. d.	4 years.	6 months.
Nevada	District.	6 months.	c.	4 years.	Yes.
New Hampshire	Supreme.	1 year.	----------	6 years.	Yes.
New Jersey	Chancery.	3 years.	a. b. d.	2 years.	Yes.
New Mexico	District.	6 months.	----------	None.	No law.
New York	Sup'me and sup'r.	1 year.	b. c. d.	5 years.	Not defendant.
North Carolina	Superior.	2 years.	a.	10 years.	Yes.
North Dakota	Circuit.	90 days.	a. b. c. d.	Unreasonable time.	No law.
Ohio	Common pleas.	1 year.	----------	10 years.	No law.
Oklahoma Territory	District.	90 days.	a. b. c. d.	4 years.	6 months.
Oregon	Circuit.	1 year.	b. c. d.	1 year.	6 months.
Pennsylvania	Common pleas.	1 year.	b. c. d.	None.	Adulter'r bar'd
Rhode Island	Supreme.	1 year.	a.	None.	Yes.
South Carolina	No divorce laws.	----------	----------	----------	----------
South Dakota	Circuit.	6 mos. to 1 yr.	a. b. c. d.	Unreasonable time.	No law.
Tennessee	Circuit.	2 years.	b. c. d.	None.	Adulter'r bar'd
Texas	District.	6 months.	a. b. c. d.	4 years.	Yes.
Utah	Circuit.	1 year.	----------	4 years.	No law.
Vermont	County.	1 to 2 years.	----------	None.	3 years.
Virginia	Circuit.	1 year.	b. c.	5 years.	Unless decree.
Washington	Circuit.	1 year.	----------	1 year.	6 months.
West Virginia	Circuit.	1 year.	b. c.	5 years.	Yes.
Wisconsin	Circuit.	1 year.	b. c.	3 years.	Yes.
Wyoming	Circuit.	6 months.	a. b. c. d.	3 years.	Yes.

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SPECIFIC AND VALID DEFENSES OR BARS TO RELIEF. The statutes of a majority of the states provide for the disallowance of applications for divorce where there has been collusion, connivance, condonation, or in case of recrimination.

a. *Collusion* is an agreement between the parties for one of them to commit, or appear to have committed, some act constituting a cause for divorce, in order to enable the other to obtain a divorce.

b. *Connivance* is the corrupt consent of a party to the act of the other constituting a cause for divorce, which is afterward sought to be taken advantage of in an action for divorce.

c. *Condonation* is the conditional forgiveness, either express or implied, by one party, of a breach of matrimonial duty in the other.

d. *Recrimination* arises when the party seeking the divorce is also guilty of the act of which he or she complains in the other, or, in some states, of any other act constituting a ground for divorce.

By reference to the fourth column of the foregoing table, the application of these specific defenses or bars, in each state, can be ascertained.

CAUSES FOR WHICH DIVORCE IS GRANTED. *Adultery*, the violation of the marriage vow, is sufficient cause for absolute divorce in all the states and territories, except South Carolina, which, as has been stated, is without any divorce laws.

Physical incapacity is a cause in all the states except California, Connecticut, Idaho, Iowa, Louisiana, New Mexico, New York, South Carolina, Texas and Vermont. In most of these states it renders marriage voidable.

Willful desertion, six months in Arizona; one year in Arkansas, California, Colorado, Florida, Idaho, Kansas, Kentucky, Missouri, Montana, Nevada, North Dakota, Oklahoma, Oregon, Utah, South Dakota, Wisconsin, Washington and Wyoming; two years in Alabama, District of Columbia, Illinois, Indiana, Iowa, Michigan, Mississippi, Nebraska, New Jersey, Pennsylvania and Tennessee; three years in Connecticut, Delaware, Georgia, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, Ohio, Texas, Vermont and West Virginia; five years in Louisiana, Virginia and Rhode Island, though the court may, in the latter state, decree a divorce for a shorter period. Both parties living apart without cohabitation, five years in Kentucky; ten years, Rhode Island.

Habitual drunkenness, in all the states and territories, except Illinois, Maryland, New Jersey, New York, Pennsylvania, South Carolina, South Dakota, Texas, Vermont and Virginia.

Imprisonment for felony or *conviction of felony*, in all the states and territories (with limitations), except Florida, Maryland, New Jersey, New Mexico, New York and South Carolina.

Cruel and abusive treatment, *intolerable cruelty*, *extreme cruelty*, *repeated cruelty* or *inhuman treatment*, in all the states, except Maryland, Michigan, New York, South Carolina, Tennessee, Virginia and West Virginia.

Failure by the husband to provide, six months in Arizona; one year in California, Colorado, Idaho, Nevada and Wyoming; two years in Indiana; three years in Delaware; no time specified in Arizona, Maine, Massachusetts, Michigan, Nebraska, New Mexico, Rhode Island, Utah, Vermont, Washington and Wisconsin.

Fraud and fraudulent contract, in Connecticut, Delaware, Georgia, Kansas, Kentucky, Ohio, Pennsylvania, Vermont and Washington.

Absence without being heard from, three years in New Hampshire and Ohio; seven years in Connecticut and Vermont; *voluntary separation*, five years in Wisconsin; *when reasonably presumed dead by the court*, in Rhode Island.

Ungovernable temper, in Kentucky; *habitual indulgence in violent and ungovernable temper*, in Florida; *cruel treatment, outrages or excesses as to render their living together insupportable*, in Arkansas, Kentucky, Louisiana, Missouri, Tennessee and Texas; *indignities as render life burdensome*, in Missouri, Oregon, Pennsylvania, Tennessee, Washington and Wyoming. *Attempt to murder the other party*, in Illinois, Louisiana and Tennessee.

Insanity or idiocy at time of marriage, in Arkansas, Colorado, District of Columbia, Georgia, Iowa and Mississippi. *insanity lasting ten years*, in Washington.

Other causes in different states are as follows: *Husband notoriously immoral before marriage, unknown to wife*, in West Virginia; *fugitive from justice*, in Virginia; *gross misbehavior or wickedness*, in Rhode Island; *any gross neglect of duty*, in Kansas and Ohio; *refusal of wife to remove into the state*, in Tennessee; *mental incapacity at time of marriage*, in Georgia; *three years with any religious society that believes the marriage relation unlawful*, in Massachusetts; *joining any religious sect that believes marriage unlawful, and refusing to cohabit six months*, in New Hampshire; *parties cannot live in peace and union*, in Utah; *vagrancy of the husband*, in Missouri and Wyoming; *refusal of wife to cohabit for twelve months*, in North Carolina; *excesses*, in Texas; *where wife, by cruel and barbarous treatment, renders condition of husband intolerable*, in Pennsylvania.

In Georgia, an absolute divorce is granted only after the concurrent verdict of two juries, at different terms of the court. In New York, absolute divorce is granted for but one cause, adultery. In South Carolina there are no divorce laws.

In many states a limited divorce may be granted for any of the causes for which an absolute decree may be given. This decree may be limited as to time, and in operation resembles the judicial separation granted by the English courts. The decree does not enable either party to marry any other person, as the original marriage remains undissolved.

The literature on the question of divorce is more than voluminous. Bishop's learned *Commentaries on the Law of Marriage and Divorce* (2 vols., 1891) and Nelson's *Divorce and Separation* (2 vols., 1895) must be placed in the front rank of American legal textbooks. The masterly report of the Commissioner of Labor, Carroll D. Wright, is interesting as a popular and accurate compilation of laws, and a most valuable collection of statistics. Among other works may be mentioned *Divorce and Divorce Legislation*, by Theodore D. Woolsey (1882); *A Digest of Divorce and Alimony*, by W. H. Browne (1872); *A Treatise on the Law of Divorce*, by A. P. Lloyd (1887); and *The Law of Marriage and the Family Relations*, by Neville Geary (1892). Polemically, the question has been treated by a host of social scientists, and from every possible point of view. Much valuable information can be gleaned from the annual reports of the National Divorce Reform League, the corresponding secretary of which organization, the Rev. Samuel W. Dike, LL.D., has labored long, and with marked literary as well as executive ability, in the interests of wholesome and uniform legislation on this greatest of social questions.

DIX, DOROTHEA LYNDE, philanthropist, was born in Worcester, Mass., probably in 1805, the daughter of Dr. Dix, a physician. Left an orphan, she became a school teacher, until, on inheriting a fortune, she was enabled to devote herself to charitable works, especially to the reform of prisons and the founding of asylums for the unfortunate classes. During the Civil War she did a great work in the army hospitals, and was appointed by the Secretary of War to be superintendent of female nurses. At the end of the war she resumed her work for asylums, especially for insane patients. She wrote several books and many pamphlets on various topics. She died on July 19, 1887. W. F. J.

DIX, JOHN ADAMS, an American soldier and statesman; born in Boscawen, New Hampshire,

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July 24, 1798. He received his education at Salisbury, Philips Exeter Academy, the College of Montreal, and Saint Mary's College. In 1812 he was appointed a cadet in the United States army and was made an ensign in 1813. He participated in the operations on the Canadian frontier during the War of 1812 and became aide-de-camp to General Brown. He afterward studied law and was admitted to the bar in Washington. In 1826 he was sent as a special messenger to the court of Denmark. In 1828 he resigned from the army and commenced the practice of law at Cooperstown, New York. In 1833 he was appointed secretary of state and adjutant-general of New York, and was prominently identified with the Democratic party. In 1841 he was elected to the state assembly and from 1845 to 1849 was a United States Senator. In 1861 he was appointed Secretary of the Treasury by President Buchanan. While in this office he ordered the captain of a revenue cutter to sail from New Orleans to New York. The captain refused to obey. Dix telegraphed to place him under arrest, adding the statement which made him famous—"If any one attempts to haul down the American flag, shoot him on the spot." At the outbreak of the Civil War he was appointed major-general of New York volunteers and subsequently held the same rank in the regular army, receiving also the command in Maryland, and afterwards the direction of the Seventh Army Corps. After the close of the war he was appointed minister to France where he remained two years. In 1872 he was elected Republican governor of New York, but in 1874 he was defeated by Samuel J. Tilden. He died in New York city, April 21, 1879. W.M.C.

DIX, MORGAN, an American clergyman and author; born in New York city, November 1, 1827. He is a son of John Adams Dix (q. v.). He was graduated from the Columbia College in 1848, and from the General Theological Seminary in 1852. He became a priest in the Episcopal Church and after serving as assistant in Trinity Church, New York, became the rector of Trinity Parish in 1862. His success in the New York parish has been such that he nominates his own assistants independently of the bishop of the diocese, and he presides directly over one-ninth of the entire diocese. He has written *Commentary on the Epistle to the Romans* (1864); *Exposition of the Epistles to the Galatians and Colossians* (1865); *Lectures on the Pantheistic Idea of an Impersonal Substance Deity* (1865); *Lectures on the Two Estates* (1872); *Memoirs of John A. Dix* (1883); *The Sacramental System* (1893); *History of Trinity Church* (1901). W.M.C.

REV. MORGAN DIX.

DIX ISLAND, Maine, a granite islet 10 miles southeast of Rockland, Knox County, off the entrance of Penobscot Bay. It has an area of about 50 acres, and is inhabited by quarrymen who work the fine quality granite for export. Dix Island granite was used for the New York post-office and other notable buildings. C.L.S.

DIXON, a village of Solano County, central western California, 20 miles S.W. of Sacramento on the Southern Pacific railroad. The town has granaries and flour-mills, and exports wheat, barley, hay, cattle, wool, wine and pork, the products of the neighborhood. Pop., 1890, 1,082; 1900, 783.

DIXON, a city and the county seat of Lee County, Illinois, in the northern part of that state. It lies on the Rock River, which provides an ample water supply and power for its numerous and varied manufacturing establishments. It is the seat of Rock River University, the Northern College of Illinois, a normal school, and other institutions of learning. It is 93 miles west of Chicago, and is reached by the Illinois Central and the Chicago and Northwestern railroads. Its population in 1900 was 7,917. W.F.J.

DIXON, JAMES, an American politician; born in Enfield, Conn., Aug. 5, 1814. He graduated from Williams College in 1834; studied law, and was admitted to the bar. He was a member of the Connecticut House of Representatives, 1837–38, 1844, and 1854, and a Whig Representative in Congress, 1845–49. He was elected to the United States Senate as a Republican (to succeed Francis Gillette, the former representative of the Free-Soil party), and served from March 4, 1857, to March 3, 1869. He was defeated as a Democratic candidate for the United States Senate in 1868, and as a Democratic candidate for Representative in the Forty-first Congress. He died at Hartford, Conn., March 27, 1873. E.E.T.

DIXON, JAMES MAIN, a Scottish-American educator; born in Paisley, Scotland, April 20, 1856. He was graduated from the University of Saint Andrews and in 1879 was appointed professor of English in the Imperial College at Tokio, Japan. From 1886 to 1892 he was professor in the University of Japan, and from 1892 to 1901 was professor of English literature at the Washington University. He has written *A Dictionary of English Phrases* (1891) and a *History of Methodism* (1900). W.M.C.

DIXON, JOSEPH, inventor and manufacturer, was born on January 19, 1799, and in his boyhood was apprenticed to the shoemaker's trade. He invented a file-cutting machine, was a printer, a lithographer, and a medical student. He was the inventor of friction matches, of photo-lithographic processes, of the anti-friction "Babbitt metal," of crucible steel making, of the reflector in optics to prevent objects from appearing reversed, of the use of collodion in photography, and of the plumbago crucible. He founded in Jersey City, N. J., a large manufactory of plumbago crucibles, lead pencils, and other articles of black lead. He died on June 14, 1869. W.F.J.

DIXON, WILLIAM HEPWORTH, an English au-

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thor; born in Manchester, June 30, 1821. He entered journalism and in 1853 became chief editor of the *Athenæum*, a position which he retained till 1869. His works include *Memoir of John Howard; Life of William Penn; Life of Admiral Blake; Spiritual Wines; New America; Personal History of Lord Bacon; The Holy Land* and *Free Russia*. He died in London, England, December 27, 1879. W.M.C.

DIXON, WILLIAM W., an American lawyer and public man; born in Brooklyn, N. Y., June 3, 1838. He removed with his family to Quincy, Ill., in 1842, and to Keokuk, Ia., in 1849; received a common-school education, and entered the profession of law in Keokuk; went to Tennessee and Arkansas in 1860, and in 1862 crossed the plains to California; went to Nevada the same year, and to Montana in 1866. In 1879 he went to the Black Hills, remaining two years, and then settled in Butte City, Montana. In politics a Democrat, he was elected a member of the Montana legislature in 1871; was a member of the Montana constitutional conventions of 1884 and 1889, and in 1890 was elected to the Fifty-second Congress from Montana.

DIXON ENTRANCE, northwest America, the strait separating the Prince of Wales Archipelago in the Alaskan "panhandle" from Queen Charlotte Islands, British Columbia. It extends east to west about 100 miles with an average width of 40 miles. C.L.S.

DJEZZAR, or "Butcher," was the name given, because of his infamous cruelties, to Achmed Pasha, a Turkish commander, who was born in Bosnia in 1735. Originally a slave, he rose, largely through murder and treason, to be pasha of Acre. Upon the advice of Sir Sidney Smith he decided to hold the city of Acre against the French when Napoleon Bonaparte advanced against it in 1799. He defended it obstinately from March 20 to May 21, when the French retired in defeat. He died in 1804. W.F.J.

DOANE, GEORGE WASHINGTON, clergyman and author, was born at Trenton, N. J., on May 27, 1799, and was graduated from Union College in 1818. He became a clergyman of the Protestant Episcopal Church in 1821, was an assistant minister of Trinity Church, New York, and was the first professor of rhetoric in Trinity, then Washington, College. After serving churches in New York and Boston he was made bishop of the diocese of New Jersey in 1832, and settled at Burlington, N. J., where he founded St. Mary's Hall, a school for girls, and Burlington College, for boys. He went to England in 1841 and was the first American bishop to preach in that country. He published some volumes of addresses and sermons, and a volume of poems, among which was the favorite hymn, *Softly Now the Light of Day*. He died at Burlington on April 27, 1859. W.F.J.

DOANE, WILLIAM CROSWELL, clergyman and author, son of George Washington Doane (q. v.), was born in Boston on March 2, 1832, and was graduated from Burlington College, N. J., in 1850. He entered the ministry of the Protestant Episcopal Church in 1853, and was successively rector of churches at Burlington, N. J., Hartford, Conn., and Albany, N. Y. In 1869 he was made bishop of the diocese of Albany, N. Y., where he founded All Saints' Cathedral, St. Agnes's School, the Child's Hospital, and other institutions. In 1902 he was elected a regent of the University of the State of New York, and in 1903–04 was chancellor of the university. He has written a number of poems, and several volumes in prose, including a life of his father. W.F.J.

BISHOP DOANE.

DOBBS, ARTHUR, statesman and author, was colonial governor of North Carolina in 1754–65. He was the author of *Trade and Improvement of Ireland* (1729); *Captain Middleton's Defense* (1744); *Countries Adjoining Hudson's Bay* (1744); and other works. He died in 1765. W.F.J.

DOBBS FERRY, a beautiful and aristocratic residence village on the east bank of the Hudson River, twenty miles north of New York city. It has some industries, and several noted secondary schools. It had in 1900 a population of 2,888. W.F.J.

DÖBEREINER, JOHANN WOLFGANG, a German chemist; born in Hof, Bavaria, December 15, 1780. He was professor of pharmacy and chemistry at the University of Jena for 39 years, and discovered the combustibility of platinum, the apparatus for utilizing which is known as Döbereiner's lamp. He published *Zur Pneumatischen Chemie* and other works. He died in Jena, March 24, 1849. W.M.C.

DOBSON, HENRY AUSTIN, an English litterateur and writer of *vers de société* and lyrical *elegantiæ*; born in Plymouth, England, Jan. 18, 1840, the son of George C. Dobson, a civil engineer. After an education, received partly in England and in Germany, he was appointed, at the age of 16, to a civil service clerkship in the London Board of Trade. His temperament and tastes early disposed him to the manufacture of the graceful and light forms of drawing-room verse, including adaptations of the French rondeau, ballade and villanelle. In this *rôle* he at once became the pioneer of a new movement in English poetry, associated with the names of Frederick Locker, C. S. Calverley and Mackworth Praed, to revive the dainty, debonair verse of Suckling, Prior and other early fashionable poets and courtly troubadours. In 1873 he collected his scattered lyrics into a volume entitled *Vignettes in Rhyme and Vers de Société*, which was followed, four years later, by *Proverbs in Porcelain*. These, in turn, were followed by *Old World Idyls* (1883) and *At the Sign of the Lyre* (1885). Prose composition now for a time occupied his pen. To Humphry Ward's *English Poets* he wrote the introductions on

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Prior, Gay, Praed, Hood; to Morley's English men of Letters he contributed a *Life of Fielding;* to the Great Writers Series, a *Life of Goldsmith;* to the English Worthies Series, a *Life of Steele;* to the *Biographies of Great Artists*, a *Life of Hogarth;* and to the Parchment Library an edited collection of *Eighteenth-Century Essays.* Besides these works, Mr. Dobson published, in 1884, *Thomas Bewick and His Pupils;* in 1890, a *Memoir of Horace Walpole;* in 1891 a further volume of essays, entitled *Four Frenchwomen;* and in 1892 and 1894, two series of, *Eighteenth-Century Vignettes.* He was also a contributor to the Temple Library, the Chiswick Press Reprints, the Ex-Libris Series, and edited a number of English and French classics for the Clarendon Press. For the Cranford Series he edited, in 1894, a collection of *Old English Songs*, with introduction and notes.

DOD, Albert Baldwin, an American educator; born in Virginia in 1805. He studied at the Princeton Theological Seminary and in 1829 was ordained minister in the Presbyterian Church. In 1830 he was appointed professor of mathematics in Princeton College, which position he retained until his death in 1845. A Dod memorial was erected at Princeton in 1890. W.M.C.

DODD, Anna Bowman (Blake), authoress, was born in Brooklyn, N. Y., in 1850, and in girlhood began to write for magazines. Her best known works are *Cathedral Days*, *The Republic of the Future*, *In and Out of Normandy Inns*, *On the Norfolk Broads*, *Struthers*, and *Glorinda.* She has also written much for *The London Art Journal* and other important periodicals. She was married to Edward Williams Dodd in 1883, and in recent years has lived in Paris. W.F.J.

DODD, Edward Mills, missionary, was born at Bloomfield, New Jersey, on June 22, 1824, and was educated for the ministry of the Presbyterian Church. In 1849 he proceeded to the Levant as a missionary, under the patronage of the American board of commissioners for foreign missions. He conducted a mission to Jews at Salonica, European Turkey; then one at Smyrna, Asia Minor, to the Turks; and finally settled in Armenia, where the remainder of his life was spent. He died at Marsovan on August 16, 1865. W.F.J.

DODDER-LAURELS, a common name given to species of *Cassytha*, a genus of *Lauraceæ*, or "laurels," although sometimes considered a separate family (*Cassythaceæ*). They are dodder-like, herbaceous, slightly green, almost leafless, twining parasites, natives of the tropics, but one Florida species belonging to the United States.

DODDS, Alfred Amédée, a French mulatto general, famous for long and successful service in Africa; born at St. Louis, Senegal, Feb. 6, 1842; entered the army in 1864; served in the Réunion campaign in 1869, in the campaigns of Sedan, the Loire and the East in 1870, and in Senegal from 1872 to 1892. In the latter year he led a victorious expedition against the king of Dahomey, and was promoted grand officer of the Legion of Honor.

DODECATHEON, an American genus of *Primulaceæ*, or "primroses," whose species occur from the western slopes of the Alleghanies to the Pacific. It is characterized by its cluster of smooth leaves at the base of the stem, which bears an umbel-like cluster of beautiful flowers, the calyx being reflexed, the long white to purple petals also sharply reflexed, and the linear anthers conniving into a long, slender projecting cone, giving the flower a Cyclamen-like look. The common species of the eastern Mississippi basin is *D. Meadia*, often called "shooting-star" or "American cowslip."

DODGE, Augustus Cæsar, an American soldier and statesman; born in Missouri, January 2, 1812. From 1838 to 1839 he was a registrar of the land office in Iowa. In 1840 he was a territorial delegate to Congress and from 1848 to 1855 was a United States Senator. In 1855 he was minister to Spain. He died in Burlington, Iowa, November 20, 1883. W.M.C.

DODGE, Grenville Mellen, soldier, was born at Danvers, Mass., on April 12, 1831, and was educated at Norwich University, Vermont (1851). Before the Civil War he was engaged as a railroad engineer in Illinois. In the war he served in Missouri, and under Sherman in Georgia, and won promotion to the rank of major-general of volunteers. After the war he was chief engineer of the Pacific railroad, and superintended the completion of it. He was a Republican representative in Congress from Iowa in 1867–69. He succeeded General Sherman as president of the Society of the Army of the Tennessee, and became president of the New York commandery of the Order of the Loyal Legion. He was also president of the commission appointed to inquire into the conduct of the Spanish War in 1898. He is now interested in western and southern railroads. W.F.J.

DODGE, Henry, an American statesman; born in Vincennes, Ind., Oct. 12, 1782. He emigrated to Missouri; served in the Black Hawk and other Indian wars; and left the army as colonel of the 1st United States Dragoons, in July, 1836. He was governor of Wisconsin from 1836 to 1841; served in Congress as a delegate from 1841 to 1845; was again appointed governor of Wisconsin, Feb. 6, 1846; and was elected United States senator from Wisconsin as a Democrat, and re-elected, serving from June 23, 1848, to March 3, 1857. He died in Burlington, Iowa, June 19, 1867. E.E.T.

MARY ABIGAIL DODGE.

DODGE, Mary Abigail, an American journalist and author; best known under the pseudonym of "Gail Hamilton"; born in Hamilton, Massachusetts, in April, 1830. She was educated in the public schools and in 1851 became an instructor in the high school at Hartford, Connecticut. In 1865 and 1866 she was

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one of the editors of *Our Young Folks*, and was meanwhile establishing a reputation as a newspaper correspondent and contributing to various journals and periodicals. She wrote a large number of books, including *Country Living and Country Thinking* (1862); *Gala-Days* (1863); *Woman's Wrongs* (1863); *A New Atmosphere* (1864); *Red-Letter Days* (1864); *Skirmishes and Sketches* (1865); *The Battle of the Books* (1870); *Woman's Worth and Worthlessness* (1871); *A Washington Bible Class* (1872); *Twelve Miles from a Lemon* (1873); *Our Common School System* (1880); *The Insuppressible Book* (1885), and *English Kings in a Nutshell* (1893). She also wrote a biography of James G. Blaine (q. v.). She was a relative and intimate friend of Mr. Blaine and upon his death was appointed his literary executor. She died at Hamilton, Massachusetts, August 17, 1896. W.M.C.

DODGE, MARY ELIZABETH MAPES, author and editor, was born (Mapes) in New York City, and was married to William Dodge, who died many years ago. She became one of the editors of the periodical *Hearth and Home*, and from 1873 was editor of the *St. Nicholas* magazine. She was also a prolific writer, chiefly of stories for children and young people, among her works being the *Irvington Stories*, *Hans Brinker*, *A Few Friends*, *Theophilus and Others*, *Donald and Dorothy*, and *The Land of Pluck*. She also wrote much in verse, including *Rhymes and Jingles*, *Along the Way*, and *When Life is Young;* and edited *Baby World* and *Baby Days*. Her best known work is *Hans Brinker*, which has been translated into many other languages. She died August 21, 1905. W.F.J.

MARY MAPES DODGE.

DODGE, WILLIAM EARLE, an American capitalist; born in Hartford, Connecticut, September 4, 1805. He was educated in the public schools and became a dry goods merchant. In 1833 he was a member of the firm of Phelps, Dodge & Company and in 1879 he retired with a large fortune. He was director of the Erie railroad, president of the New York Chamber of Commerce, trustee of Union Theological Seminary and the founder of the Union League of New York. He died in New York city, February 9, 1883. W.M.C.

DODGE CITY, the seat of Ford County, Kansas, in the southwestern part of that state. It is the seat of a college, is reached by the Atchison, Topeka and Santa Fé, the Chicago, Rock Island and Pacific, and other railroads, and had in 1900 a population of 1,942. W.F.J.

DODGEVILLE, a city and the county seat of Iowa County, Wisconsin, in the southwestern part of that state. It is forty miles west of Madison, and is reached by the Chicago and Northwestern and Illinois Central railroads. Its population in 1900 was 1,865. W.F.J.

DODGSON, CHARLES LUTWIDGE, an English author; born in 1832; graduated at Christ Church, Oxford, in 1854, with high honors in mathematics; was mathematical lecturer there in 1855–81; and was ordained to the ministry in 1861. He was the author of a large number of valuable works in mathematics; among them, *Euclid and His Modern Rivals* (1879); *Mathematica Curiosa* (1888–93), characterized as a valuable contribution to the science; also *Symbolic Logic* (1896). Under the pseudonym, "Lewis Carroll," he produced many quaint books, which, for children, are unrivaled, including *Alice's Adventures in Wonderland*, with illustrations by Sir John Tenniel (1865); *Phantasmagoria, and Other Poems* (1869); *Through the Looking-Glass, and What Alice Found There* (1871); *The Hunting of the Snark* (1876); *Doublets: A Word Puzzle* (1879); *Rhyme? and Reason?* (1883); *A Tangled Tale* (1885); *Alice's Adventures Underground: A Fac-Simile of the Original Manuscript*, with 37 illustrations by the author (1886). *Through the Looking-Glass*, which is a continuation of *Alice's Adventures*, is established as an English nursery classic, and has been translated into nearly every language in Europe. Died in Guilford, Jan. 14, 1898.

DOG-DAYS, anciently, the forty days between July 3d and August 11th, the term being derived from Sirius, the dog-star, which was supposed to cause the insufferable heat at this season. The dog-days of the Egyptians extended from the 4th of August to the 14th of September. The rising of Sirius, however, has been so accelerated by the precession of the equinoxes during the passage of more than two thousand years that the corresponding conditions for the ancient dog-days would not include them within the 3d of July and the 11th of August, so that our modern dog-days have no connection with the rising of Sirius or any other star.

DOG-DISTEMPER. See VETERINARY SCIENCE, Vol. XXIV, p 222.

DOG FOX, a small animal of the genus *Cynalopex*, family *Canidæ*, found in Asia.

DOGGER BANK, an extensive sand shoal in the North Sea (q. v., Vol. XVII, p. 577) which affords one of the most valuable cod fisheries in the world. It was the scene of a deplorable tragedy on October 22, 1904, when Russian warships en route for Japan fired upon a fleet of British fishing smacks, under the alleged misapprehension that they were Japanese torpedo boats, with deadly results. W.F.J.

DOGGETT, DAVID SETH, clergyman; was born in Virginia in 1810, and became a preacher of the Methodist Episcopal Church. He was also a professor in Randolph-Macon College. Upon the separation of the Methodist Episcopal Church between the North and South, he adhered to the Southern branch, and became a bishop of it in 1866. He died at Richmond, Va., on October 27, 1880. W.F.J.

DOG ISLAND, an island in Franklin County, southwestern Florida, four miles from shore. St. George's Sound is between it and the mainland. It

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is six miles long and quite narrow. A lighthouse stands on the island, a mile from its western end, at lat. 29° 46′ 51″ N., long., 84° 38′ 37″ W., with a revolving light.

DOGMA, originally an opinion or proposition put in the form of a positive assertion, its truth being supposed to have been previously shown. In theology it was understood to signify a doctrine founded on Scripture, and advanced, not for discussion, but for belief. But as this method of stating truth easily degenerates into the assertion of opinions without ground, and without regard to the aspect they may present to others, *dogma* and *dogmatism* have come, in English, to be almost synonymous with assertion without proof. In Continental theology, however, the word is still used without implying any censure, dogmas meaning simply doctrines; and this is the case in our own expressions, *dogmatic theology*, or *dogmatics*, which is that branch of theology that treats of the systematic arrangement of the doctrines of Christianity. See DOGMATIC, Vol. VII, p. 288.

DOGS. For a full, general discussion of this subject, see Vol. VII, pp. 281–287. The annual exhibitions which, during the last few years, have been held at New York, Chicago, Boston and other American cities, under the auspices of the Westminster Kennel Club, have fostered an increasing love for and knowledge of dogs, and have resulted in great improvement in the various breeds of this most companionable and affectionate type of all the brute creation. Competition in the champion and open classes has grown more and more spirited, and interest in these annual exhibitions has spread, until now, polite society having put the stamp of its approval upon it, the "dog show" has become admittedly one of the fashionable happenings of the season. At the annual exhibitions held under the auspices of the Westminster Kennel Club, in the cities named, dogs of every breed and clime are to be seen.

Corps of trained dogs are attached to the different European armies, which are to be used not only as guards for outpost work, but also to carry dispatches and ammunition.

By the statutory regulations of most of the states, a dog is personal property; the owner may be indemnified in case of willful injury to the dog, and theft of the animal is a crime. Some states require, however, that the dog shall be licensed, or registered and collared, and therefore subject to taxation, before any property rights can attach to the animal. Unless duly authorized by law to kill unlicensed dogs, no one has a legal right to kill a dog belonging to another, unless he, or some one under his protection, or his animal, is in immediate danger of injury from the dog, or the dog is rabid, or has been bitten by a rabid animal. In general, the owner is liable in damages for any injuries caused by his dog; and he cannot plead ignorance of the vicious habits of the animal in mitigation of the damages, every owner being bound to know the character of the dog he keeps. The owner of a vicious and dangerous dog may be indicted for keeping a nuisance, and be compelled to muzzle or kill the animal. Dog-racing is not illegal when for training purposes only, but if chance is the principal element, it becomes a crime within the statutes against gaming.

Boards of health, or other civic authorities generally throughout the United States, issue edicts requiring all dogs to be kept muzzled for a certain number of weeks during the summer season, and authorizing any person to kill any dog found running at large not so muzzled. In many cities the police make raids on ownerless dogs and destroy them. Some American cities have homes for lost dogs, modeled after that at Battersea, London.

DOGSBANE, the common name of a small genus (*Apocynum*) of the family *Apocynaceæ*, perennial herbs or under-shrubs. The dogsbane of North America (*A. androsæmifolium*), often called "fly-trap," from the throat appendages of its corolla closing upon the insects which enter it, is of medicinal repute; similarly, also, its congener, *A. cannabinum*, or Indian hemp.

DOG'S-TAIL GRASS, a common name applied to *Eleusine Indica*, an Oriental grass introduced into the United States for lawns, and used in the South as a pasture-grass. It is also known as "crab-grass," "yard-grass" and "wire-grass." The name is also applied, in England, to another lawn and pasture grass, *Cynosurus cristatus*.

DOHRN, ANTON, a German zoölogist; born at Stettin, Prussia, Dec. 29, 1840; studied at Königsberg, Bonn, Jena and Berlin. He lectured for a time at Jena on zoölogy, and, after studying the crustaceans of the British coast and the Mediterranean, he founded the famous zoölogical laboratory at Naples in 1870, which, by his assiduity, has drawn investigators from nearly every country where science is prosecuted. In embryology he is noted for his researches into the development of insects, and also on the origin of vertebrates. His views can be gathered by referring to the article on VERTEBRATA, Vol. XXIV, p. 198; and ZOÖLOGY, Vol. XXIV, p. 850, of this ENCYCLOPÆDIA. He has published *Der Ursprung der Wirbelthiere* (1875); and *Studien zur Urgeschichte des Wirbelthierkörpers* (1882).

DOILY OR DOILEY, a small napkin used at a table for putting glasses upon during dessert. Some are highly ornamented. The name is said to be derived from the original maker, but more probably it is a modification of the Dutch *dwaele*, a towel, and was introduced with the article from Holland.

DOIT, a small copper coin current in Scotland during the reigns of the Stuarts. It was a Dutch coin (*duit*), and in value the sixteenth part of a guilder.

DOKMEH, DAKHMA OR TOWER OF SILENCE, a receptacle for the dead used by the Parsees, consisting of a low stone tower, on top of which the bodies are exposed to the vultures till, being denuded of their flesh, their bones drop through the grating into a pit beneath. See PARSIS, Vol. XVIII, pp. 331, 332.

DOLABRA, a rude ancient hatchet. *Dolabræ* are represented on the columns of Trajan and Antoninus, and abound in all museums. When made of flint, which was their earliest and rudest form, they are usually called *celts*.

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DOLABRIFORM, having the shape of an ax or hatchet, as some leaves, and also certain organs of some shell-fish.

DOLBEAR, AMOS EMERSON, educator and inventor; was born at Norwich, Connecticut, on November 10, 1837, and was educated at the Ohio Wesleyan University and the University of Michigan. Since 1864 he has been professor of physics at Tufts College. While a student in college, in 1864, he invented a writing telegraph, and in 1876 he invented a telephone operated by magnetism. His other inventions have been a static telephone in 1879, an ammeter in 1889, an air-space telegraph cable in 1882, a system of wireless telegraphy in 1881, and a method of photographing with electric waves, in 1893. He is the author of a number of books and many magazine articles. He received for his inventions a bronze medal at the Philadelphia Exposition of 1876, a silver medal at Paris in 1881, and a gold medal at London in 1882. He was twice elected mayor of Bethany, West Virginia. W.F.J.

DOLE, SANFORD BALLARD, an American statesman; born in Honolulu, Hawaii, April 23, 1844. His parents were American missionaries. He received his early education in Honolulu, and completed his studies at Williams College. In 1874 he was elected to the legislature and in 1887 was appointed judge of the supreme court. He then resigned to accept the leadership of the revolution that overturned the monarchy in 1893, and established a provisional government. On July 4, 1893, a republic was formally proclaimed, of which he was elected President. After the annexation of Hawaii in 1898 he was appointed governor. W.M.C.

DOLES AT FUNERALS are of great antiquity. St. Chrysostom speaks of them as being given to procure rest to the soul of the deceased. On this ground, as well as on the score of general benevolence, the practice of making gifts to the poor at funerals was common until comparatively recent times, for it was continued, sometimes on a munificent scale, long after the custom of praying for the dead had been adandoned in some localities on the introduction of reformed doctrines. For a curious instance see TICHBORNE, in these Supplements.

DOLGORUKIJ, the family name of one of the oldest princely houses in Russia, deriving their name from Rurik. The most renowned members were: — JACOB FEDEROVITCH D., born in 1639. He was sent in 1687, ambassador to France and Spain; was taken prisoner by the Swedes in the battle of Narva, released in 1710, and appointed a Senator. Died July 5, 1720. — VASSILIJ VLADIMIROVITCH D., born in 1667; gained the confidence of Peter the Great, and signed in 1709 the alliance with Frederick IV of Denmark, was exiled by the intrigues of Menshikow in 1718, but recalled by Katharine I, and appointed field-marshal by Peter II. Exiled again by Empress Anna and recalled by Empress Elizabeth, he died Feb. 22, 1746. — VASSILIJ LUKITCH D., was Russian ambassador at the Danish court for 13 years, and at the French court from 1716–23. On account of his intrigues against Empress Anna he was banished to Siberia and beheaded at Novgorod, Nov. 6, 1739. — PETER VLADIMIROVITCH, born at Moscow in 1807, was banished by Emperor Nicolaus on the publication of his work *The Principal Families of Russia*, but pardoned later. He was again banished for life on having published *The Truth about Russia* (1860). He died at Bern, Aug. 17, 1868. He also wrote *France under the Bonapartist Régime* (1864); *The Question of Russian Serfdom* (1861). His *Memoirs*, published in Geneva from 1867–71, portray many of his contemporaries most effectively. G.A.S.

DOLGORUKIJ, KATHARINA MICHAILOVNA, PRINCESS JURJEVSKAJA. She became the second wife of Alexander II, czar of Russia, July 31, 1880. After the violent death of the emperor, Princess Dolgorukij left Russia for Switzerland, where she, under the pseudonym of Victor Laférté, published *Alexandre II: Détails Inédits sur sa Vie Intime et sa Mort* (1892). G.A.S.

DOLICHOCEPHALIC. See ANTHROPOLOGY, Vol. II, p. 99.

DOLICHOS (Gr., *dolichos*, long), a large genus of climbing leguminous greenhouse or hardy herbs, with long twining stems fond of climbing trees, belonging to the order *Leguminosæ*. They possess trifoliate leaves, the flowers, either solitary or in racimes, spring from the bases of the leaves and produce edible legumes and pulses. *D. sesquipedalis* is a native of tropical America, has pods a foot long containing 7 to 10 kidney-shaped seeds. W.R.B.

DOLIUM, a genus of gastropodous molluscs, family *Doliidæ* (tun-shells), inhabiting tropic seas. They are globose, somewhat compressed and spirally ribbed. *D. galea* has a shell 8 to 10 inches long. R.W.C.

DOLL, an image, usually representing a little girl, but sometimes a boy or man, and used as a toy. The word *doll* is of doubtful derivation; various etymologies have been suggested. The use of dolls dates from the most remote times, and is common in all countries, barbarous as well as civilized. The love of dolls is a perfectly legitimate feeling, and its exercise helps to cultivate not only tender affections, but also taste as regards the making and management of children's dresses. Accordingly, the keeping of dolls becomes a part of the home education of girls, and is recognized to be so by the universality of the practice. Dolls at one time were imported chiefly from the Netherlands, and hence not an unusual name for a doll was "Flanders baby." These old Flemish or Dutch dolls were made of wood with neatly formed faces and flashy dresses, the cheaper kinds having slender wooden legs. Latterly, there have been great improvements in the making of dolls, and it has assumed the character of a manufacture; but there are still large importations from the countries on the Rhine, France and Switzerland. The discovery and perfection of the phonograph marks a new era in the manufacture of these toys, and talking dolls are now almost as common as the ordinary wax dolls were a few years ago.

DOLLAR-BIRD, a name given to the bird

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Eurystomus australis (family *Coraciidæ*, or rollers), from the fact that it exhibits a circular light wing-patch when flying. It inhabits tropical Africa, Australia and parts of Asia. R.W.C.

DOLLART ZEE, the indentation of the North Sea formed by tidal inundations of the 13th century, at the estuary of the Ems River between Hanover, Germany, and the Netherlands. It is about ten miles long and seven broad. C.L.S.

DÖLLINGER, JOHANN JOSEPH IGNAZ, a German theologian; son of the physiologist Döllinger; born in Bamberg, Bavaria, Feb. 28, 1799. He was appointed in 1822 chaplain at Oberscheinfeld in the diocese of Bamberg, in 1823 professor of church history and ecclesiastical law at the lyceum of Aschaffenburg, and in 1826 at the University of Munich, afterward provost of the collegiate church of St. Cajetan in Munich and archiepiscopal councilor, and also first librarian at the university library. In 1845 he was made representative of the university in the Bavarian diet. In 1857 he visited Rome and soon afterward it became evident that his religious views had undergone a change. Public announcement was made of this in a course of lectures which he delivered at Munich, in which he declared the temporal power of the Pope not an essential part of the Roman Catholic Church, and he vindicated this position in a treatise on *The Church and the Churches* (1861). In 1874 he presided over a conference of Old Catholics at Bonn, and here he declared that he did not hold himself bound by the decisions of the Council of Trent. His principal works are *Mohammed's Religion* (1838); *Die Reformation, ihre innere Entwickelung und ihre Wirkungen im Umfange des Lutherischen Bekenntnisses* (1846); *Hippolytus und Kallitus* (1853); *Heidenthum und Judenthum* (1857); *Christenthum und Kirche, zur Zeit ihrer Grundelegung* (1860), and *Kirche und Kirchen* (1861); *Lectures on the Reunion of the Churches* (1872); *The Sects of the Middle Ages* (1890). He died in Munich, January 10, 1890. W.M.C.

DOLLIVER, JONATHAN PRENTISS, United States Senator of Iowa. He was born near Kingwood, Va. (afterward W. Va.), February 26, 1858; graduated from the West Virginia University in 1875; was admitted to the bar in 1878, and was elected to Congress in 1889, and re-elected five successive terms when he was appointed Senator, 1900, to fill a vacancy, and was elected to succeed himself in 1902.

DOLLY VARDEN TROUT, a charr, differing from the true trout in the number and arrangement of its teeth. It is a variety of the common brook-trout. R.W.C.

DOLMENS. See RUDE STONE MONUMENTS, Vol. XXI, p. 57.

DOLOMITE. See GEOLOGY, Vol. X, p. 203.

DOLPH, JOHN HENRY, artist; was born at Fort Ann, N. Y., on April 18, 1835, and studied portrait painting at Cleveland in 1855–58, worked in New York in 1863–70, and studied in Antwerp in 1870–73, and in Paris in 1880–83. He became an associate of the National Academy in 1877, and a member in 1899. He was for many years a member of the Society of American Artists. He has painted many portraits of well known men, but in later years has devoted himself largely to cats, dogs, and other animals. Among his best known pictures are *A Knickerbocker Farmyard; A Country Blacksmith; The Rehearsal; Alexander and Diogenes*, and *The Antechambers.* W.F.J.

DOLPH, JOSEPH NORTON, senator; was born near Watkins, New York, on October 19, 1835, studied and taught in public schools, was admitted to the bar in 1861, and went across the plains to Oregon a year later. He established himself in legal practice at Portland, became city attorney in 1864, and United States District Attorney in 1865. He was prominently associated with the development of the railroad systems of the northern Pacific coast, and was a leader of the Republican party. He served in the Oregon legislature in 1866–72 and in 1874, and in 1883 became a United States Senator, serving by re-election until 1895, and filling a commanding place in that body. He died on March 10, 1897. W.F.J.

DOM OR DON, from Latin *Dominus*, Lord, a title originally assumed by ecclesiastical dignitaries, and still used in Benedictine and Carthusian communities. In Portugal and Brazil it is applied to the sovereign and to all men of high social or official standing. In Spain the form *don* is similarly used, often in combination with señor. In Germany *dom* is applied to church edifices. W.F.J.

DÖME, MRS. ZOLTAN F., best known by her stage name of NORDICA; was born at Farmington, Maine, on December 12, 1859, her maiden name being Lillian Norton. She was trained in singing at the New England Conservatory of Music in Boston, became an oratorio singer, went to England with P. S. Gilmore's concert band, studied for the opera stage in Milan, and made her *début* at Brescia in *La Traviata*. Since then she has made steady progress, until for some years she has ranked as one of the two or three greatest dramatic sopranos in the world — perhaps the very greatest. She has nearly 50 operas in her repertory, and sings equally well in English, French, Italian or German. She was married in 1883 to F. A. Gower, an electrical engineer, who lost his life in a balloon voyage in 1884. In 1896 she was married to Zoltan F. Döme, from whom she has since separated. W.F.J.

DOMESTIC ARCHITECTURE. The external forms and internal arrangements of the domestic abodes of a people are far more influenced by their manners, habits and occupations, and by the climate in which they live, than their ecclesiastical edifices and public buildings, and there is, consequently, no department of architecture which is so varied and national as domestic architecture. But not only are the circumstances of each country different in this respect, but the same is the case with every department in each country, with every town in each department, with every street in each town; and a domestic architecture which fulfills its object

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will only adapt itself to the necessities, but will also make the best, in point of artistic effects, of the specialties of every case with which it is called upon to deal. The circumstances of families, and even the tastes and fancies of individuals; are legitimate subjects of consideration in domestic architecture. See also ARCHITECTURE, Vol. II, pp. 334–419, and in these Supplements.

DOMETT, ALFRED, one of the favorite minor poets of English literature; was born in England on May 20, 1811, and was educated at Cambridge. He early manifested a roving disposition, and came to America for two years. Next he wandered over the continent of Europe. Returning to England, he practiced at the bar for a year, and then, in 1842, went to New Zealand among the pioneer settlers in that land. There he remained, became secretary of the colony, and finally, in 1862, its prime minister. He returned to England in 1871, and died on November 11, 1887. His *Christmas Hymn: Old Style*, beginning "It was the calm and silent night," has become well known the world around. He published half-a-dozen volumes, including one of prose. He was a close friend of Browning, who wrote his poem of *Waring*, on Domett's departure for New Zealand, "Waring" being his pen-name for Domett.

W.F.J.

DOMINO, the name formerly given to the garb worn in winter by priests while officiating in cold edifices. It is now used to signify a masquerade costume, consisting of an ample cloak or mantle with wide sleeves.

DOMINOES, the name of a game, usually played with twenty-eight oblong, flat pieces of ivory or bone, etc., each of which bears two numbers marked by points from naught to six. The attempt has been made to trace the game of dominoes back to the Greeks and Hebrews, and also to the Chinese. It is certain that it was introduced about the beginning of the eighteenth century from Italy into France, where it immediately became popular in the larger towns. It is a game requiring some skill, considerable powers of calculation being necessary to make the best combinations with the different numbers on the pieces.

DOMINUS, the Latin word which we commonly render "lord," but which more properly signifies master, as opposed to the slave (*servus*). Aurelianus is said to have been the first emperor who adopted *dominus* as a title of honor on his medals, though it had long been made use of in conversation and in correspondence in that sense. In legal phraseology, the *dominus litis* is the person really interested in the issue of an action, though not necessarily the pursuer.

DONALDSON, JAMES LOWRY, soldier, was born at Baltimore, Maryland, on March 17, 1814, and was educated at West Point (1836). In the Civil War he was chief quartermaster of the Middle Department, and furnished the supplies of Sherman's army in the whole campaign from Chattanooga to Savannah. He afterward established the system of national cemeteries. He died on November 4, 1885. W.F.J.

DONALDSONVILLE, Louisiana, the seat of Ascension Parish, and the former capital of the state, at the outlet of Bayou La Fourche into the Mississippi, 70 miles N.W. of New Orleans, and at the junction of a branch line with the Texas & Pacific railroad. It has sugar industries, and manufactures machine and foundry products, lumber and wood wares, bricks and ice. Pop., 1900, 4,105. C.L.S.

DONAX, a bivalve mollusk with triangular shell, found living and fossil in Europe and America.

DONDRA HEAD, Ceylon, the southernmost point of the island projecting into the Indian Ocean, 50 miles east of Point de Galle, in latitude 5° 55′ north, longitude 80° 38′ east. Near it is the small native village of Dondra Head with about 1,000 inhabitants engaged in sea fisheries and allied industries. C.L.S.

DONELSON, ANDREW JACKSON, diplomat, was born in Tennessee, and was graduated at West Point in 1820. He served as aide-de-camp to his uncle, Andrew Jackson, then governor of Florida, and afterward became a lawyer. In 1829 he was President Jackson's private secretary. In 1844 he was sent by President Tyler to negotiate the annexation of Texas, in 1846–49 he was United States minister to Prussia, in 1851 he became editor of the *Washington Union*, and in 1856 was the "American" party's candidate for the Vice-Presidency. Fort Donelson in Tennessee was named for him. W.F.J.

DONELSON, FORT, an important Confederate fortification on the Cumberland River, in northwest Tennessee. It was 12 miles from Fort Henry, on the opposite bank of the Tennessee River, both forts being in Stewart County. They were connected by road, and were about forty miles above the junction of the two rivers with the Ohio, and commanded the navigation of the rivers upon whose banks they were situated. They were of great strategic importance to the Confederates in their operations in the territory between Memphis and Bowling Green in the winter of 1861–62. The Federals decided upon a combined attack on these forts in January, 1862. A fleet of seven vessels, under the command of Commodore Andrew H. Foote, left Cairo, Illinois, February 2d, to be followed by an army consisting of 15,000 men, commanded by General Grant, who was delayed by bad roads. Foote, being impatient, opened fire on Fort Henry, February 6th, the fort being defended by 17 guns and 3,000 men under General Tilghman, who was forced to surrender in little more than an hour. General Tilghman and about seventy of his men were captured, the others of the garrison escaping to Fort Donelson. General Grant, after waiting to repair the damage done to the gunboats, pushed on Fort Donelson on February 12th, and arrived in front of the works the same day. Fort Donelson had been considerably reinforced by the arrival, on the 9th, of General Pillow, on the 12th, of General Buckner, and on the morning of the 13th, of General John B. Floyd. The latter assumed command of the entire force, now consisting of 16,000 men. The high ground to the rear of the fort had been well protected, and the whole aspect of affairs indicated

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the difficulty of the capture of the place by the Unionists. General Grant at once commenced operations by investing the lines of the enemy, upon whom he also opened a cannonade, begun on the morning of the 13th. In the afternoon of the same day General McClernand attempted an assault upon the fort, but was repulsed with considerable loss. The next day the arrival of 10,000 additional troops raised the total number of land forces under Grant to 27,000. A combined attack then was determined upon by the land forces and the fleet. The fleet, however, had to commence operations alone, as General Grant found it impossible to get his troops into position to aid the attack of the fleet, which was compelled to retire after an hour and a half, every gunboat being more or less disabled, and 54 men being killed or wounded. General Grant then made his investment of the Confederate lines more complete and sat down to await the arrival of his reinforcements. The Confederates were quite aware of the situation, and early in the morning of the 15th they made a sudden sortie, but were at once met by the fire of their opponents. The engagement lasted until well in the afternoon, when General Grant ordered a general advance all along the line, driving the Confederates back upon their works, a position on the left within the Confederate lines being gained by the Federals. The loss on each side, in killed and wounded, was 2,000. The next morning, while General Grant was arranging for a more determined attack, the Confederate generals held a hurried consultation, when it was agreed by them to surrender. Generals Floyd and Pillow, with about two thousand men, escaped, leaving General Buckner to his own resources. The latter dispatched a flag of truce to General Grant to secure an armistice until noon and to inquire the terms of surrender. General Grant then sent back the reply to the Confederate general, which at once made his name famous when it became known to the world: "No terms other than unconditional surrender can be accepted. I propose to move immediately upon your works." The Confederates, having no other resource, at once accepted the terms; 14,625 prisoners, 65 cannon, 17,000 small arms, besides quantities of stores and munitions, fell into the hands of the Federals. The total loss of the latter was 2,832 killed, wounded or missing.

DONGAN, THOMAS, statesman, was born in Ireland in 1634. In 1682 he was made governor of New York and New England. He drafted a charter for the colonies, which James II suppressed as too liberal. He settled boundary disputes, secured charters for the cities of New York and Albany, succeeded to the earldom of Limerick in 1698, and died in 1715. W.F.J.

DONNELLY, IGNATIUS, an American author; born in Philadelphia, Pennsylvania, November 3, 1831. He removed to Minnesota in 1857; was elected lieutenant-governor in 1859, and again in 1861, and was then elected to Congress. He wrote *Atlantis, the Antediluvian World* (1882); *Ragnarok* (1883); and *The Great Cryptogram* (1888). His best known novel is *Cæsar's Column* (1890). He died in Minneapolis, Minnesota, January 2, 1901. W.M.C.

DONNER LAKE, California, near Truckee, in Nevada County, 11 miles N.W. of Lake Tahoe, on the Lake Tahoe and the Southern Pacific railroads, is a mountain lake resort in the Sierra Nevada much frequented by summer-tourists. A party of emigrants snowbound here in 1846 died from starvation with the exception of a few who subsisted on the dead bodies. The lake is named after their leader. C.L.S.

DOO, GEORGE THOMAS, one of the best English historical engravers of the century; born in the parish of Christ Church, Surrey, Jan. 6, 1800. His admirable rendering of Eastlake's *Italian Pilgrims Coming in Sight of Rome;* his exquisitely finished heads of women and children, after Lawrence; his engravings, *The Infant Christ*, from Raphael; *Ecce Homo*, from Correggio; *Knox Preaching Before the Lords of the Covenant*, from Wilkie, etc., have succeeded in winning for him a high place in the estimation of the admirers of his laborious art. In 1836 he was appointed historical engraver to William IV, and in 1842 to Queen Victoria. In 1851 he was elected a fellow of the Royal Society, and in 1856 a royal academician. He died Nov. 13, 1886.

DOOLITTLE, JAMES ROOD, statesman, was born at Granville, N. Y., on January 3, 1815, was graduated from Hobart College in 1834, became a lawyer and judge in Wisconsin, and was a United States Senator from Wisconsin from 1857 to 1869. In 1866 he sided with President Johnson, voted against his impeachment, and withdrew from the Republican party. He died on July 27, 1897. W.F J.

DOOM, 1. To condemn to any punishment. 2. A judgment, or decision, formally pronounced, mostly of adverse character. 3. Personal or private judgment. 4. The faculty of judgment of discrimination or discomment. 5. Fate, lot, irrevocable destiny (usually of adverse fate). 6. Final fate, destruction, ruin, death. 7. The action or process of judging trial. 8. The last judgment at the end of the world. W.R.B.

DOOM (OR DOUM) PALM. See ARABIA, Vol. II, p. 207.

DOON, a Scotch river rising in the southeast of Ayrshire, in Loch Enoch; runs northwest through Loch Doon, past Dalmellington, Burns's Monument and Alloway Kirk, to the Firth of Clyde. It was immortalized by Robert Burns in his poem *Ye Banks and Braes o' Bonnie Doon*, which has been read and sung wherever the English language is known.

DOOR AND DOORWAY. In art the form of the door is determined by the architectural style of the building in which it is placed. In classical buildings it is generally rectangular in form, though both Greeks and Romans, following the Egyptians, among whom the practice was almost universal, occasionally diminished the opening toward the top, and the Romans, in later times, very frequently threw over it the circular arch, which was the characteristic feature of their style. Egyptian doors are known to us, for the most part, only by the examples which remain in monumental structures, and these, like the other mem-

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bers of the style thus exhibited, are of gigantic proportions. The door of the temple at Edfoo measures seventy-four feet to its summit. With the Egyptians the door was an architectural object of very great importance. On either side colossal statues or obelisks were placed, and often the approach to it was lined with rows of gigantic sphinxes. The Greek door was surrounded by moldings, and as the lintel or top stone which covered it projected on both sides beyond the jambs, the moldings which ran around both sides jutted out at the place of meeting, forming a sort of shoulder. This arrangement, however, was by no means uniform, the moldings of the jambs often being separated from those of the architrave, as is the beautiful door of the Erechtheum. The doors themselves, in private dwellings of antiquity, were usually of wood, and in structures devoted to religious or public purposes, of metal, and occasionally of marble. They generally were paneled, and turned on pivots working in sockets. With the exception of the forms of the windows and the tracery and foliage of the pillars, doors are the most characteristic features of all the styles of Gothic architecture.

DOORGA OR DURGA, a Hindu divinity, one of the names given to Paravati, the consort of Siva. She is the Amazonian champion and protectress of the gods, and has been compared to the Olympian Juno, and the Pallas or armed Minerva of the Greeks. She is represented with ten arms. In one hand she holds a spear, with which she is piercing the giant Muhisha; in another, a sword; in a third, the hair of the giant, and the tail of the serpent turned around him; and in others, the trident, discus, axe, club and shield.

DOORNBOOM, the Dutch name given to the *Acacia horrida*, or "thorn tree," a native of South Africa, having numerous sharp spines. W.R.B.

DORA D'ISTRIA, pseudonym. See KOLTZOFF-MASSALSKY, in these Supplements.

DORAMA, Arabia, an agricultural town and supply depot of Nejd on the central plateau, at the junction of several caravan routes, 450 miles northeast of Mecca. The ruins of Derayeh are 30 miles to the south. Pop., 8,000. C.L.S.

DORAN, JOHN, an English author, of Irish parentage; born in London, March 11, 1807. He was educated chiefly in France and Germany, and became tutor in four noble British families. He was early attached to literature, and in 1822 produced a melodrama, *The Wandering Jew*, which was acted at the Surrey Theatre, London. His *History of the Borough of Reading* secured for him the degree of Ph.D. from Marburg, Prussia. Among his many works are, *Table Traits; Knights and Their Ways; Queens of the House of Hanover; Monarchs Retired from Business; The Book of the Princes of Wales; Their Majesties Servants; The History of Court Fools*, etc. He wrote the articles *Beard* and *Dwarf* for the BRITANNICA; was elected an F.S.A.; and was editor of *Notes* and *Queries* at the time of his death, which occurred in London, Jan. 25, 1878. R.C.A.

DORCHESTER, Massachusetts, the southern corporate portion of Boston city on Dorchester Bay in Suffolk County. Prior to 1869 it was a manufacturing city of Norfolk County, four miles south of Boston, and was founded in 1630 by Puritan settlers from Dorchester, England. It was the parent colony of Windsor & Hartford, Connecticut, whose 100 founders went there through the wilderness in 1636. C.L.S.

DORCHESTER, New Brunswick, a town of Westmoreland County on an upper reach of Shepody Bay, 90 miles northeast of St. John's on the Intercolonial railroad. It is a port of entry with an active export trade in bituminous coal and quarried stone. Population, 2,000. C.L.S.

DORÉ, PAUL GUSTAVE, painter and illustrator; was born in Strasburg on January 6, 1832, and in 1845 settled in Paris, where, two years later, he began to exhibit pen and ink work at the Salon. He became a member of the staff of an illustrated paper, but won most fame as an illustrator of books. He illustrated the works of Rabelais (1854), of Eugene Sue (1855), and Balzac (1856). His greatest work was done in Dante's *Divina Commedia*, especially the *Inferno* (1863–68), and he also illustrated the *Tales* of Perrault; *Don Quixote;* Milton's *Paradise Lost;* the Bible; Tennyson's *Idyls of the King;* La Fontaine's *Fables*, and other works. Between 1850 and 1870, according to his own word, he earned $1,400,000 with his pencil. He also painted many pictures, chiefly historical and Biblical in theme, and produced some creditable statuary. He most excelled, however, in grotesque, weird and terrible portrayals, such as those of the *Inferno* and of *Don Quixote.* He began in 1882 a monument to the elder Dumas, but left it unfinished at his death, which occurred in Paris on January 23, 1883. W.F.J.

GUSTAVE DORÉ.

DOREMUS, ROBERT OGDEN, chemist, was born in New York city on January 11, 1824, and was educated at New York University, being graduated from its collegiate department in 1842 and from its College of Medicine in 1851. He studied chemistry and metallurgy in Paris in 1847, and in 1848 opened a laboratory of analytical chemistry in New York. He became professor of chemistry in the New York College of Pharmacy in 1849, and in 1851 after receiving his degree as doctor of medicine, took a similar professorship in the College of the City of New York. He was one of the founders of the New York Medical College, and of the Long Island College Hospital in Brooklyn. He became professor of chemistry and toxicology in the Bellevue Hospital Medical College in 1861, and in Paris in the two following years he perfected a system of manufacturing compressed granulated gunpowder, which was adopted by the

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French government. He also invented a chemical fire extinguisher which came into wide use. His method of disinfecting plague ships with chlorine-gas was adopted by the United States quarantine service. For some years he was president of the board for examining druggists and prescription clerks, in New York. He ranked as one of the foremost chemical experts, and his services were frequently called into requisition in the courts. He delivered many popular lectures, and wrote much for the periodical press. Died Mar. 22, 1906. W.F.J.

DOREMUS, SARAH PLATT, philanthropist, was born (Platt) in New York City on August 3, 1802, the child of rich and philanthropic parents. She married Thomas C. Doremus, a rich merchant, and had nine children, her only son being Robert Ogden Doremus (q. v.). She organized a mission for the relief of the Greeks in their war with the Turks in 1828, interested herself in Canadian missions in 1835, and in 1840 began services for the reformation of the prisoners in the New York City prison, in which last-named work she labored for thirty-seven years. She founded the Isaac T. Hopper Home, in 1842, for women released from prison, and was for many years the president of its board of managers. She became a manager of the New York City Mission and Tract Society in 1841, and of the City Bible Society in 1849, and in 1850 she founded the House and School of Industry. In 1854 she was one of the founders of the Nursery and Child's Hospital, and the next year, at the suggestion of Dr. J. Marion Sims, she secured the foundation of the Woman's Hospital. In 1860 she was the chief founder of the Woman's Union Missionary Society, during the Civil War she labored effectively for the welfare of the soldiers of the Union army in the hospitals, in 1866 she was one of the organizers of the Presbyterian Home for Aged Women, and in 1876 she was one of the committee for organizing the Gould Memorial. She was interested in the relief of the Irish famine in 1869, and gave much time, labor and money to many other good works, and after a career of memorable usefulness she died in New York on January 29, 1877. W.F.J.

DORLAND, WILLIAM ALEXANDER NEWMAN, physician, was born at Hilton Head, S. C., on December 26, 1864, and was educated in the medical college of the University of Pennsylvania. He has written several medical handbooks. W.F.J.

DORN, JOHANN ALBRECHT BERNHARD, a German Orientalist; born at Scheuerfeld, Saxe-Coburg, March 11, 1805. In 1829 he was appointed ordinary professor of Oriental languages at the Russian University of Charkow, and in 1845 became professor of history and Asiatic geography at the Oriental Institute at St. Petersburg. In 1843 he was made keeper of the Imperial Library and director of the Asiatic Museum. He published many translations of Oriental works on history and geography, and also a valuable book as the result of a scientific journey to the Caucasus, entitled *Caspian Invasion of the Ancient Russians in Taberistan*. He died in St. Petersburg, May 31, 1881.

DORNICK, DORNIC OR DORNOCK, a species of figured linen, deriving its name from Dornich, or Tournay, in the Netherlands, where it was formerly made in considerable quantity.

DORR, JULIA CAROLINE RIPLEY, author, was born at Charleston, South Carolina, on February 13, 1825, the daughter of W. Y. Ripley, and was educated in Vermont, whither she was taken in infancy. She was married in 1847 to Seneca M. Dorr, who died in 1884. Mrs. Dorr has long been a popular writer, in both poetry and prose, for both juvenile and adult readers. She has published many volumes, and has contributed much to various periodicals. Among her best-known works are *Farmingdale*, *Lanmere*, *Friar Anselmo*, *The Flower of England's Face*, *A Cathedral Pilgrimage*, *In Kings' Houses* and *Afternoon Poems*. W.F.J.

DORR, THOMAS WILSON, an American politician; born in Providence, R. I., Nov. 5, 1805. He was educated at Phillips Academy, Exeter, N. H., and was graduated at Harvard in 1823. He studied law under Chancellor Kent; was admitted to the bar in 1827; and commenced practice in Providence. Originally a Federalist, he became a Democrat in 1837. The government of Rhode Island at that time was based on a charter granted by Charles II in 1663, and the apportionment of representation in the legislature was greatly at variance with the distribution of population. The elective franchise was limited to the holders of a certain amount of real estate and to their eldest sons. About one-third only of the citizens were voters. Mr. Dorr was a member of the Assembly, 1833–37, and exerted himself to procure the substitution of a liberal constitution in place of the old charter, but his movement for reform was defeated by 70 votes to 7. He then organized a suffrage party, which in 1841 called a State convention to frame a new constitution, which was submitted for ratification to the popular vote. It received 14,000 votes, a clear majority of the citizens of the State. The charter party contended that the proceeding was seditious, and that a large proportion of the votes were fraudulent. The suffrage party proceeded to hold an election for State officers, in which Mr. Dorr was chosen governor, and a legislature, composed exclusively of his supporters, was elected. The charter party also held a legal election for State officers, polling 5,700 votes, while the suffrage party claimed to have polled 7,300. On May 3, 1842, Mr. Dorr's government attempted to organize at Providence and to seize the reins of power. They were resisted by the legal State government, which organized at Newport on the same day. Both sides appealed to arms. Gov. King proclaimed the State under martial law, called out the militia, and asked for and obtained Federal aid to suppress the insurrection. On May 18 a portion of the suffrage party assembled at Providence under arms, and attempted to seize the arsenal, but dispersed on the approach of a military force. Another assembly at Chepachet, ten miles from Providence, dispersed without resistance on May 25, and the

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affair was over on the 28th. Mr. Dorr fled, but soon returned and was convicted of high treason, and sentenced to life imprisonment. He was pardoned in 1847, and in 1853 the legislature restored his civil rights, and ordered the record of his sentence to be expunged. He died in Providence, Dec. 27, 1854. E.E.T.

DORSEY, JAMES OWEN, ethnologist, was born in Baltimore, Md., on October 31, 1848, and was educated for the ministry at the Theological Seminary of Virginia, in 1871. He became a clergyman of the Protestant Episcopal Church in 1873, and for five years was engaged in pastoral work in Maryland. He then turned his attention to scientific investigations, and became connected with the United States Geological and Geographical Survey, as ethnologist. In that capacity he worked in the Rocky Mountain region, and spent much time at the Omaha Indian reservation in Nebraska. Later he was employed in the United States Bureau of Ethnology at Washington, where he was recognized as a leading authority upon the ethnology of the North American Indians. In 1885 he was made secretary of the Anthropological Society, of Washington, D.C. In addition to numerous official reports he wrote *Comparative Phonology of the Four Sioux Languages*, *Sioux Folklore and Mythological Notes*, *Kansas Mourning and War Customs*, and *Indian Personal Names*. These works are instinct with a thorough and sympathetic knowledge of the subjects treated, and are esteemed as standard authorities. Mr. Dorsey died at Washington, D. C., on February 4, 1895. W.F.J.

DORSHEIMER, WILLIAM, an American lawyer and journalist; born in Lyons, New York, February 5, 1832. He was admitted to the New York bar in 1861 and in 1867 was appointed United States district attorney for northern New York. In 1875 he was elected Democratic lieutenant-governor and in 1883 was elected to Congress. In 1885 he was appointed United States district attorney. In 1884 he wrote *The Life of Grover Cleveland*, and for two years was editor of the New York *Star*. He died in Savannah, Georgia, March 26, 1888. W.M.C

DORSIVENTRAL, in botany, a term applied to a plant body or organ which has two surfaces, dorsal and ventral, which differ from each other in structure or in the organs they bear. A thallus, such as that of liverworts, is an example of a dorsiventral body; many foliage leaves are examples of dorsiventral organs.

DORTURE (old Eng., *dorter;* Fr., *dortoir*), a long room in a convent, divided into a succession of small chambers, or cells, where the inmates sleep It usually has immediate access to the church or chapel, for the convenience of attendance on services during the night.

DORY (nautical), a small boat of simple construction, flat-bottomed, and much used in seafisheries as a go-between from the larger boat and the shore, in loading and unloading. It is also used to go in from the larger vessel in catching fish.

DOSTOJÉVSKIJ, FEODOR MICHAILOVITCH, a Russian novelist; born at Moscow, Nov. 11, 1822. His first story *Poor People* (1846), portraying the truthful condition of Petersburg officialdom, was followed by other novels, treating on life of the small gentry, among them *The Double* and *A Weak Heart*. Involved in the plot of Petrashevskij, in 1849, he was condemned to death, but sentence was commuted to ten years of exile in Siberia. Pardoned in 1856, he returned to St. Petersburg, where he published *The Humiliated and Wronged* (1861); *Memoirs from a Dead House* (1861–62); *Crime and Punishment* (1867); *Guilt and Atonement* and *The Idiot* (1868); *Demons* (1872). He died Feb. 9, 1881. G.A.S.

DOTEREL (*Charadrius morinellus*), a species of plover inhabiting northern Europe and Asia in summer, breeding chiefly in the highest latitudes. On the approach of winter, it migrates to the countries around the Mediterranean, and to others of similar climate. See KILLDEER, Vol. XIV, p. 78.

DOUAY BIBLE, THE, the name given to the translation of the Holy Scriptures current among English-speaking Roman Catholics. The college of Douay, France, was founded in 1568, by Catholic exiles from Great Britain. Here Dr. William (afterwards Cardinal) Allen, Dr. Gregory Martin, Dr. Richard Burton and John Reynolds, all educated at the University of Oxford, conceived the idea of writing an English version of the Bible to be made from the Vulgate with comparison of the Hebrew and Greek texts. Owing to political troubles they found it necessary to transfer the college to Rheims. Here the New Testament was published in 1584. The Old Testament, translated by Martin, with notes by Dr. Worthington, was published in 1610 at Douay, and hence the version as a whole is commonly known as the Douay Bible. This version has never received Papal approbation. W.R.B.

DOUBLE CONSCIOUSNESS, a term applied by some to an abnormal condition having various forms, and arising probably out of latent modifications of the mind. The patient may have alternate periods in which he has no recollection in one of what occurred in the other, or he may imagine himself successively to be different persons, or he may seem to himself to be confronted by another personality within him, as in the case of demoniacal possessions in the New Testament.

DOUBLEDAY, ABNER, soldier, was born at Ballston Springs, N. Y., on June 26, 1819, and was educated at West Point, where he was graduated in 1842. He served in Mexico and in the last Seminole War, and was in garrison at Fort Sumter at the outbreak of the Civil War, being second in command. It fell to his lot to aim and fire the first gun fired on the Union side in the war, in defense of Fort Sumter. Later he was engaged in the defense of Washington, and fought at the second battle of Bull Run, at Fredericksburg, Chancellorsville, and Gettysburg. He was one of the defenders of Washington against General Early's

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raid in 1864, and in 1865 was made a major-general by brevet in the regular army. He retired from active service in 1873 and thereafter lived at Mendham, New Jersey, where he died on January 26, 1893. General Doubleday was a soldier of marked ability, of modest and unpretentious demeanor, and of attractive personality. He wrote *Reminiscences of Forts Sumter and Moultrie, Chancellorsville and Gettysburg*, and *Gettysburg Made Plain*. W.F.J.

DOUBLE STARS. See ASTRONOMY, Vol. II, p. 716.

DOUBLE-SHOTTING, an augmentation of the destructive power of ordnance, by doubling the shot fired off at one time from a gun. Sometimes three shots are fired at once, in which case the piece is said to be "treble-shotted."

DOUBLING GAP SPRINGS, a health-resort of Cumberland County, Pennsylvania, central southern Pennsylvania, 30 miles W. of Harrisburg. Many chronic diseases are cured by the use of water from these springs. Some of the springs are saline-sulphuric, and others are carbonated saline chalybeate.

DOUBLING THE CUBE, a celebrated geometrical problem among the ancients. The object was to find the side of a cube whose contents should be twice that of another given cube; and various accounts are given of how the problem was suggested.

DOUBLOON, a Spanish coin, originally equal in value to a double pistole, from which fact it took its name. From 1730 to 1772 the value of the double pistole was equivalent to $8.24; from 1772 to 1786, $8.08; and from 1786 to 1848 to $7.87. The current Spanish doubloon of Isabella II, of 1848, is of the value of 100 reals and is worth a little more than $5.02, which value it retained until 1868. The coinage of doubloons has ceased in Spain.

DOUCET, CHARLES CANILLE, a French dramatic author; born in Paris, May 16, 1812; studied law and practiced as a notary. He soon began to devote himself to dramatic composition, and produced, in collaboration with Antoine Bayard, in 1838, the vaudeville *Léonce*. He wrote a number of plays, which were published in 1858, under the title *Comédies en Vers*, and which were produced at the Théâtre Français. They included *Un Jeune Homme; L'Avocat de sa Cause; Ennemis de la Maison;* and *Le Fruit Défendu*. He produced, also, many other works, both of a poetical and dramatic nature, such as *La Considération*, a drama in four acts (1860); *Le Chant du Cygne* and *Le Juin, 1606*, both in verse. In 1853 he became divisional chief of theaters, and had in this capacity the supreme charge of the Paris theaters as well as those in the departments. In 1865 he was elected a member of the Academy and, 11 years later, became its permanent secretary. He was elected several times as member of the council-general of the Yonne for the district of Ville-Neuve l'Archevêque, and in 1891 was promoted to be grand officer of the Legion of Honor. He died in Paris, April 1, 1895.

DOUCET, HENRY LUCIEN, a French artist: born in Paris, August 23, 1856; entered the School of Fine Arts in 1874; and was a pupil of Lefebvre and of Boulanger. He obtained the *Grand Prix de Rome* in 1880, and made his *début* at the Salon in 1877 with *Adam and Eve;* afterward producing a great number of works and portrait designs. His *Mme. Galli-Marié* of the Opera Comique, was a remarkably striking portrait. Among his other works are *Atala* (1878); *Après le Bal* (1888); and *Figure Nue* (1890); *Portraits de Mes Parents* (1891). He obtained a gold medal at the exposition of 1889; and received the decoration of the Legion of Honor in 1891.

DOUGHERTY, DANIEL, an American orator; born in Philadelphia, Pennsylvania, October 15, 1826. He studied law and was admitted to the bar in 1849. He was originally a Democrat, but during the Civil War became a Republican and made numerous speeches in the Lincoln campaign. In 1876 he again joined the Democratic and as a delegate to the National Democratic conventions of 1880 and 1888 made nominating speeches for Hancock and Cleveland He became widely known as a popular orator and met with considerable success upon the lecture platform. He was popularly called "The Silver-tongued Orator." He wrote three books, *American Politics; Orators and Oratory*, and *The Stage*. He died in Philadelphia, September 5, 1892. W.M.C.

DOUGLAS, ARCHIBALD, EARL OF ANGUS. See SCOTLAND, Vol. XXI, pp. 517 et seq.

DOUGLAS, SIR HOWARD, Baronet; was born at Gosport, England, the son of Admiral Sir C. Douglas, in 1776, and entered the British army. He served in Canada in 1795, and in the Peninsular War, being present at Corunna. He was governor of New Brunswick, Canada, and founder and chancellor of the University of Fredericton; Lord High Commissioner of the Ionian Islands, and a member of Parliament. He was the author of a number of treatises on military and naval affairs, including *An Essay on Military Bridges; Naval Gunnery; Observations on Carnot's Fortification*, and *Naval Evolutions*. His treatise on bridges is said to have suggested the invention of suspension bridges, while his treatise on naval gunnery was widely reproduced in other countries. He died on November 9, 1861. W.F.J.

DOUGLAS, SIR ROBERT KENNAWAY, Chinese scholar and Orientalist; was born in Devonshire, England, on August 23, 1838. He served in China as a consul from 1858 to 1865, and in the latter year was appointed assistant in charge of the Chinese department of the British Museum. He has long been professor of Chinese in King's College, London, and since 1892 has been keeper of Oriental books and MSS. at the British Museum. He was knighted in 1903, and is the author of a *Life of Li Hung Chang;* a *History of China;* a *Chinese Grammar*, and various other works on China. W.F.J.

DOUGLASS, DAVID BATES, an American engineer; born in Pompton, N. J., March 21,

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1790. He graduated at Yale in 1813, and entered the army. He took part in the battle of Niagara and in the defense of Fort Erie. In 1815 he was appointed assistant professor of natural and experimental philosophy at West Point. He was a member of the boundary commission in 1819–20, and in the latter year was promoted to the professorship of mathematics at West Point. In 1823 he was transferred to the chair of civil and military engineering. In 1831 he resigned this position and became chief engineer of the Morris Canal. In 1832 he was appointed professor of civil architecture in the University of the City of New York and prepared the designs for its building. In 1833 he planned the Croton aqueduct to supply the city of New York with water, and was appointed chief engineer to the commission, but had accomplished only the preliminary work when he was superseded. In 1840 he was elected president of Kenyon College, but resigned the office in 1844. In 1848 he was elected professor of mathematics and natural philosophy at Geneva College, and entered on his duties in October of that year. He planned several cemeteries, including Greenwood, at Brooklyn, N. Y., one at Albany, N. Y., and one at Quebec. He died in Geneva, Oct. 19, 1849. E.E.T.

DOUGLASS, Frederick, an American journalist, diplomat and orator; born in Tuckahoe, Maryland, in February, 1817. His father was a white man; his mother a mulatto slave. He learned to read and write and early developed natural talents as an orator. Though his father was white, he was, according to the law, reared as a slave. In 1832 he was purchased by a Baltimore ship-builder, but made his escape in 1838 and settled in New Bedford, Massachusetts. Here he came into prominence as a public speaker and his speeches attracting the attention of the abolitionists, he was persuaded, in 1841, to devote his time and talents to the colored race. He was therefore employed by various anti-slavery societies. In 1844 he wrote his autobiography and the next year went abroad and lectured on slavery in England, Ireland and Scotland. In December, 1847, he commenced the publication of the *North Star*, a weekly newspaper at Rochester, New York. It was afterwards called *Frederick Douglass's Paper* and was published successfully for sixteen years. In 1859 he was accused of complicity in the raid made by John Brown on Harper's Ferry, and sought refuge in England. During the Civil War he raised two regiments of negro troops in Massachusetts, and in 1870 began the publication of the *New National Era*, in Washington. In 1871 he was appointed by President Grant a member of the commission sent to Santo Domingo and in 1872 was a Republican presidential elector in New York state. In 1877 he was appointed by President Hayes United States marshal for the District of Columbia and in 1881 President Garfield appointed him recorder of deeds for the District of Columbia. In 1889 he was appointed by President Harrison United States minister to Hayti, which office he resigned in 1891. During his public life he was president of three National conventions of negro citizens. In 1881 he published a revised edition of *My Bondage and My Freedom*. In 1892 the government of Hayti appointed him a commissioner to the Columbian Exposition. He died in Washington, February 20, 1895. W.M.C.

FREDERICK DOUGLASS.

DOUGLASS, Sir James Nicholas, an English engineer; born in London, Oct. 16, 1826. He studied civil and mechanical engineering, and, after a regular training for the profession, became, in 1847, assistant engineer to his father, who was the superintending engineer to the Trinity House, the English governmental department having charge of lighthouses, buoys, channels and coast navigation, which at that time was engaged in building a lighthouse on the Bishop Rock, the westernmost of the dangerous rocks of the Scilly Isles. After this work was completed, he was appointed resident engineer in sole charge of the erection of a lighthouse on the chief rock of the dangerous group of the Smalls, off Milford Haven. This work he completed with a saving, in cost, to the government, of $75,000 on the amount of the lowest estimate. In 1862, on the death of the engineer-in-chief to the Trinity House, he was appointed to that office, in the execution of which he carried out many important engineering works; amongst others, the erection of the Wolf, Longships, Great and Little Bass, new Eddystone, and Muricoy lighthouses. He effected many improvements in the construction of lanterns and in the mechanism of optical, electrical, oil, and gas illuminating apparatus. He was knighted on the completion of Eddystone lighthouse, in the erection of which he saved $120,000. He was elected a member of the institutions of civil engineers, mechanical engineers, and electrical engineers, and in 1887 a fellow of the Royal Society.

DOUKHOBORS. See Duchobortzi, p. 460, this volume.

DOURO RIVER. See Spain, Vol. XXII, 309.

DOUROUCOULI or DURUKULI, the name of a small South American monkey of the genus *Nyctipithecus*. It is nocturnal in its habits.

DOVE. In Christian art the dove is employed as an emblem of the Holy Ghost, no doubt from the fact of this being the form in which the Spirit descended upon Jesus at his baptism. From the dove being used to symbolize purity, it generally is represented white, with its beak and claws red, as they occur in nature. In the older pictures a golden nimbus surrounds its head, the nimbus frequently being divided by a cross, either red or black. In stained-glass windows we see the dove with seven rays proceeding from it, terminating in seven stars, significative of the seven gifts of the Holy Spirit. Holding an olive branch, the dove

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is an emblem of peace. When seen issuing from the lips of dying saints and martyrs, it represents the human soul.

DOVE, HEINRICH WILHELM, a German physicist; born at Liegnitz, Oct. 6, 1803. In 1828 he became assistant professor of natural philosophy at Königsberg, and in 1829 at Berlin. He was made full professor in the latter university in 1845; and elected a member of the Royal Academy of Sciences. He applied the stereoscope to the detection of forged bank-notes. Among his many works, the two best known, outside of Germany, are his *Distribution of Heat on the Surface of the Globe*, published by the British Association in 1853; and *The Law of Storms* (1874). He died April 4, 1879. See ACOUSTICS, Vol. I, p. 102.

DOVE, RICHARD WILHELM, professor of canonic law, son of the preceding; born in Berlin, Feb. 27, 1833; professor at Tübingen in 1863; at Kiel, in 1865; and at Göttingen, in 1868; elected to Parliament in 1871, and called to the Upper House in 1875. He published most of his works in *Zeitschrift für Kirchenrecht*, of which he was a founder, and also revised *Lehrbuch des Kirchenrechts* by Richter. G.A.S.

DOVEKIE OR SEA-DOVE. See GUILLEMOT, Vol. XI, p. 233.

DOVER, Delaware, the seat of Kent County and the capital of the state, on Jones Creek, 10 miles W. of its entrance in Delaware Bay, and 75 miles S. of Philadelphia on the Delaware division of the Pennsylvania railroad. The state house is the principal building and among educational establishments is the Wilmington (Methodist Episcopal) Conference Academy. The industrial interests are connected with farming, fruit, berry and vegetable growing, distilleries, and various manufactures. Pop., 1900, 3,329. C.L.S.

DOVER, a city of southeastern New Hampshire and capital of Strafford County. Dover is the oldest town in the state, having been settled in 1623. It is abundantly supplied with water-power from the Cocheco River, which has here a direct fall of 32 feet. The site of the city is hilly or uneven, and many of the streets cross each other obliquely. Population, 1890, 12,790; 1900, 13,207. See DOVER, Vol. VII, p. 330.

DOVER, a town and the capital of Piscataquis County, north-central Maine, on the Piscataquis River, and the Bangor and Aroostook railroad, 65 miles N.N.E. of Augusta, in a farming district. It manufactures woolens, pianos and organs, furniture and spools. Population, 1900, 1,889.

DOVER, New Jersey, a town of Morris County, 38 miles N.W. of New York city, on the Rockaway River and Morris canal, and on the Delaware, Lackawanna & Western and the Central of New Jersey railroads. It has foundry, machine, and railway repair shops, silk mills and other factories, and is a busy center for a farming and summer-resort region. Pop., 1900, 5,938. C.L.S.

DOVER, Tennessee, the seat of Stewart County, on the Cumberland River, and on a branch line of the Tennessee Central railroad to Bear Spring, two miles S.E. Steamers facilitate the export of its iron mining, smelting, and agricultural products. Pop., 1900, 400. C.L.S.

DOVER'S POWDER, a preparation of powder of ipecacuanha, one dram; opium, in powder, one dram; and sulphate of potash, one ounce. The whole is thoroughly mixed, and the ordinary dose is from five to ten grains. Occasionally, saltpeter is added, as well as camphor. It acts as a sudorific, increasing the proportion of sweat, or sensible perspiration.

DOW, NEAL, reformer; was born at Portland, Maine, on March 20, 1804, and was educated in a Friends' School in Massachusetts. Early in life he became an earnest advocate of total abstinence from alcholic liquors, and was the author and chief advocate of the famous "Maine law," which was adopted by the legislature in 1851, prohibiting the manufacture and sale of liquor within that state. He was for the rest of his life one of the foremost leaders of the prohibition movement in America, aiding also in its promotion in other countries, and in 1880 was the Prohibitionist candidate for President of the U. S. He was elected mayor of Portland in 1851 and in 1854, and was a member of the Maine legislature in 1858–59. He served in the Civil War, under Butler at New Orleans, in command of the forts at the mouth of the Mississippi, and in the famous assault upon Port Hudson. In the last-named engagement he was wounded and captured and spent eight months in a Southern military prison. He rose to be a brigadier-general of volunteers. Died on Oct. 2, 1897. W.F.J.

DOWAGIAC, Michigan, a manufacturing city and summer-resort of Cass County, 35 miles S.W. of Kalamazoo on the Michigan Central railroad, and on the Dowagiac affluent of the St. Joseph River, which affords power for grain mills and other industries; agricultural implements and stoves are manufactured. Pop., 1900, 4,151. C.L.S.

DOWDEN, EDWARD, Shakespearean student and critic; was born in Cork, Ireland, in 1843, and was educated at Queen's College, Cork, and Trinity College, Dublin, ranking as one of the most brilliant students of his day. In 1867 he won, through competition, the professorship of oratory at Dublin University, but soon changed it for that of English literature, which he has filled with great distinction. He has written much for magazines and reviews, largely on Shakespearean topics, and is the author of *Shakespeare: A Study of His Mind and Art* (1875); a *Shakespeare Primer* (1877); *Studies in Literature: 1789–1877* (1878); *Southey* (1879); *Transcripts and Studies*, and a *Life of Shelley* (1888). He published a volume of poems in 1876. W.F.J.

DOWER, in the ordinary use of the term, is the estate which a widow takes in the lands or tenements of her husband for the support of herself and children. By the common law the widow was entitled to a life estate in one-third of all the real property of which her husband was seised at any time during coverture, and which any issue she might have had could inherit. Dower is said to be inchoate when the conditions of marriage and the seisin of the husband exist, and consum-

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mate upon the death of the husband. It is not necessary that the husband remain seised of real estate for any particular length of time, as the right of dower attaches instantly upon the seisin of the husband for his own use and benefit, and in order that he may give complete title in a conveyance of the property, it will be necessary that the wife join in the deed. The right of dower in the United States is largely regulated by statute in the various states, and the right is always determined by the laws of the state where the property is situated. In many states the right is now extended to personal property, and in some states the wife, upon the death of her husband, takes an absolute estate in fee-simple in her husband's realty. In many states where the estate which the husband took in his wife's property under the common law, called estate by the curtesy, has been abolished, the right of dower has been extended to the husband in his wife's estate in the same manner as her dower right exists in his estate. The manner in which the right of dower may be defeated or released is generally governed by statute. See also HUSBAND AND WIFE, Vol. XII, p. 417.

DOWLAIS, a town of Glamorganshire, southeastern Wales, on the Taff, and on the Brecon and Merthyr Tydfil and London and Northwestern railways. It is a suburb of Merthyr Tydfil, and is important for its extensive iron-works. Population, 16,807. See BELLOWS, Vol. III, p. 475.

DOWLAS, a kind of coarse, strong linen, used by working-people for shirts, and manufactured largely at Knaresborough, Yorkshire, England, at Dundee, and at Newburgh and other places in Fifeshire, Scotland.

DOWNIE, DAVID, an American missionary; born in Glasgow, Scotland, July 29, 1838. He removed to America at the age of 15 and was graduated from Phillips Andover Academy in 1865. He also studied at Brown University and in 1872 graduated from the Rochester Theological Seminary. In 1873 he was sent by the American Baptist Missionary Union to Madras, India, where he was eminently successful in establishing missionary agencies and schools. His *History of the Teluga Mission* was published in 1893. The Telugas were among the original natives belonging to the Dravidian family. W.M.C.

DOWNIEVILLE, California, the seat of the northeastern Sierra County, 25 miles N.E. of Nevada City, where it connects with the Nevada County Narrow Gauge railroad by a daily stage. Downieville is on the Yuba River in a mountainous region where Downieville Butte rises 8,700 feet above sea-level. It is famous for its gold placer and quartz mines, and is the receiving and distributing center of the district. Population, 1900, 500. C.L.S.

DOWNING, ANDREW JACKSON, an American horticulturist, landscape-gardener and author; born in Newburg, New York, October 31, 1815. His father was a nursery man and landscape-gardener, and he succeeded him in the conduct of an extensive business. In 1838 he had become so well known that he was regarded as an authority on landscape-gardening and visited Europe where he wrote numerous magazine articles descriptive of the country homes of the titled aristocracy. In 1851 he was employed by the government to design the public parks in Washington. For several years he was editor of *The Horticulturist* published in Albany, New York. He wrote a *Treatise on the Theory and Practice of Landscape Gardening* (1841); *Cottage Residences* (1842); *Fruits and Fruit Trees of America* (1845); *Rural Essays* (1854), and contributed many articles on horticulture to encyclopedia and periodical literature. He was accidentally drowned in the Hudson River near New York city, July 28, 1852. W.M.C.

DOWNINGTON, Pennsylvania, a town of Chester County, 33 miles W. of Philadelphia on the east branch of Brandywine Creek, and a junction of the Youngstown and Lancaster line with a branch of the Philadelphia and Reading railroad. It has good educational institutions, and its industries comprise the manufacture of machinery, paper, wooden wares, brick and limestone. Pop., 1890, 1,920; 1900, 2,133. C.L.S.

DOWNS, THE. See SUSSEX, Vol. XXII, p. 760.

DOYLE, SIR ARTHUR CONAN, grandson of John ("H.B.") Doyle (*post*, p. 445), won fame in a kindred art as a popular novelist. Born in Edinburgh, May 22, 1859, he studied at Stonyhurst College and in Germany, returning to Edinburgh for a course of medical instruction. In his youth, short stories of his found their way into *Chambers's Journal*. A trip to the Arctic regions in a whaler preceded his medical graduation, when he spent four miserable months as surgeon on a passenger steamer plying between England and the west coast of Africa. Then for eight years he practiced medicine at Southsea, varying its monotony with his literary work. In his *Study in Scarlet*, written for *Beeton's Annual*, he created his best character, Sherlock Holmes. *The Firm of Girdlestone* (very much on the lines of Charles Reade's *Hard Cash*) and *Micah Clarke* (a novel of the western rising under Monmouth) followed, and fell in with popular favor. *The White Company*, a semi-historical novel similar to *Micah Clarke*, is esteemed by many as Dr. Doyle's best work. Then he wavered for a while between an oculist's career and the attractions of literature. Books prevailed, and Sherlock Holmes stalked through his "Adventures" and "Memoirs," sardonic, but a master of the science of deductive logic. Every boy in England and America dwelt lovingly on these detective stories, and admired Doyle's mingling of science with detective skill. He drew the bow too far, however, and many of the elders sighed with relief when he killed his much-exploited modern Vidocq. *Round the Red*

A. CONAN DOYLE.

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Lamp, a collection of medical stories, and *The Stark-Munro Letters* still showed his bent for medicine and his skill in interweaving its details with his stories. Then he turned to the Napoleonic period and delighted many readers with the exploits of that *vieux soldat*, Brigadier Gerard. *Rodney Stone* (1896), a story of the Regency, once more approached the field of his former success in historical plots. His latest works are *Uncle Bernac* (1897); *The Tragedy of the Korosko* (1898); *Songs of Action* (poems, 1898); *Round the Fire* (1899). Dr. Doyle has written much on the Boer War. Knighted 1902.

DOYLE, Sir Francis Hastings Charles, an English poet; born at Nunappleton, near Tadcaster, Aug. 22, 1810. He was educated at Eton and Oxford, and took a first class in classics in 1831; and was elected a Fellow of All Souls, in 1832. He was called to the bar at the Inner Temple in 1837, but his devotion to poetry and his love of horses and horse-racing precluded his success as a barrister. He succeeded his father as a second baronet in 1839, and in 1867–77 filled the chair of poetry at Oxford. In 1868 he published his *Lectures on Poetry*, a second series appearing in 1877; and in 1886 his *Reminiscences and Opinions*, which revealed its author's genial humor, broad sympathies, and liberal culture. Died June 8, 1888.

DOYLE, Henry Edward, son of John Doyle, mentioned below; born in 1827, and educated for an artist. He soon became interested in art exhibitions. He represented Pope Pius IX in his contributions to the London Exhibition of 1862, and was rewarded with the order of knighthood of the Holy Roman Empire. In 1869 he was appointed director of the National Gallery of Ireland, and labored long and with much success to improve the collections of art in that country. He died in County Wicklow, Feb. 19, 1892.

DOYLE, John, a famous British caricaturist; born in Dublin in 1797. He learned his art in the schools of that city, went to London and essayed portrait-painting, exhibiting at the Royal Academy. He found lithography a more lucrative field, and soon won popularity and fame with his series of representations of prominent people. These were signed as the work of "H. B.," and the originals, now deposited in the British Museum, are well known as the "H. B." caricatures. He died Jan. 2, 1868.

DOYLE, Richard, an English artist; son of John Doyle (q.v.); born in London in 1826. He was a pupil in the Royal Academy, and became one of the founder-illustrators of *Punch*. In 1850 his association with this paper came to a somewhat abrupt end, on account of the frequency with which it then ridiculed the Roman Catholics, and especially Cardinal Wiseman. He contributed innumerable illustrations to books, including *The Newcomes; Jar of Honey from Mount Hybla*, and *King of the Golden River*. Next came out *Fairy Tales from all Nations; Jack the Giant-Killer*, and *The Continental Tour of Messrs. Brown, Jones and Robinson*. In 1885 appeared as a posthumous publication, a series of sketches of the *Manners and Customs of Ye English*, in *Punch*, and *Bird's Eye Views of Society*, in *Cornhill* which illustrate the life and manners of London men and women of his time with extraordinary felicity and fidelity. He died in London, December 11, 1883. W.M.C.

DOYLESTOWN, a borough and the capital of Bucks County, southeastern Pennsylvania, 25 miles N. of Philadelphia, on the Philadelphia and Reading railroad. It has two private academies, a public library, gas-works, water-works, and is a pleasant resort for summer visitors. It manufactures spokes and agricultural implements. Population 1890, 2,519; 1900, 3,034.

DOZY, Reinhart, a learned German Orientalist; born in 1820, at Leyden. He studied at the university of his native city, and devoted himself especially to Oriental subjects. In 1844 he entered the Manuscripts Library, and in 1850 was appointed professor of history at Leyden. His fame rests chiefly on his valuable works on the history of Spain under the Moorish domination. His *Historie des Mussulmans d'Espagne* is a brilliant model of what a history should be, in style, arrangement and matter. He died April 29, 1883.

DRAA WADI, River. See Africa, Vol. I, p. 227.

DRACÆNA DRACO or DRAGON TREE. See Horticulture, Vol. XII, p. 275.

DRACHENFELS, a mountain in Rhenish Prussia, on the right bank of the river Rhine, about 8 miles S.E. of Bonn. Its name (Dragon's Rock) is from a legendary dragon which was supposed to inhabit a cave here, and this cave is pointed out now to the traveler. The mountain is of volcanic origin, consisting of lava, trachyte and basalt. It is covered with brushwood nearly to the top, which is crowned with a ruined castle, and whence the view is beautiful. It is celebrated in Byron's *Childe Harold's Pilgrimage:*

> "The castled crag of Drachenfels
> Frowns o'er the wide and winding Rhine."

DRACHM. See Apothecaries' Weight, in these Supplements; and for its symbol see Abbreviatory Signs, also in these Supplements.

DRACHMA. See Greece, Vol. XI, p. 80.

DRACHMANN, Holger, was born in Copenhagen, Denmark, on October 9, 1846, and was educated at the Copenhagen University and Academy of Fine Arts. He studied marine painting, and traveled much, but has devoted himself chiefly to literature, in both poetry and prose. His bibliography comprises *Poems* (1872); *Muffled Melodies* (1875); *Young Blood* (1876); *Songs of the Sea* (1877); *Over the Frontier* (1877); *Tendrils and Roses* (1879); *On the Faith and Honor of a Sailor* (1879); *Paul and Virginia* (1879); *Lars Kruse* (1879); *East of the Sun and Moon* (1880); *Chrysalis and Butterfly* (1882); *Once Upon a Time* (1885); *Volund Smed* (1899); *Brave Karl* (1889); *Gurre* (1889); *Dædalus* (1900); *Halfred Vandraadeskjald* (1900). His works are highly imaginative, but deal largely with the stern and somber phases of human experience, and in spite of their imaginative character profess to present realistic views of life. He ranks high among modern Danish men of letters. W.F.J.

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DRACO, a constellation in the northern hemisphere. The star Draconis is celebrated as the one used in determining the co-efficient of aberration of the fixed stars.

DRACONTIUM (Gr., *drakon*, a dragon), an apetalous evergreen creeper native of India and Ceylon, having the stems spotted like the skin of a snake. *D. polyphyllum*, of the natural order *Araceæ*, has a powerful effect on the nervous system, as it possesses antispasmodic virtues, and is a valuable remedy in asthma. It has the reputation of curing the bite of a snake, a doubtful quality suggested by its mottled stem. The flower, when it first expands, emits an intolerable stench. W.R.B.

DRAFT, a tentative copy of a legal document or other formal writing, made for the purpose of adjusting the matter afterward to be admitted into the fair copy, or engrossed, as it is called. Manuscripts and proof-sheets are the drafts of printed works. A bill of exchange is called a draft. See Vol. III, p. 582.

DRAFT RIOTS, the outbreak which occurred in the summer of 1863 in the city of New York, upon the attempt to make the first draft under the Enrollment Act of March 3d of that year, which declared that all able-bodied male citizens of the United States, and all persons of foreign birth who had declared on oath their intention to become citizens, between the ages of eighteen and forty-five, should be liable to perform military duty, with some exceptions. In New York City, Provost-Marshal Jenkins and his deputies, who had received from the President requisitions calling for specified numbers of men, were instructed to commence operations, July 11th. There had been rumors of dissatisfaction, and as trouble was anticipated, the police were held in readiness. The day, Saturday, arrived, and, unexpectedly, the day's proceedings passed off pleasantly. Next morning the names of the conscripts appeared in the papers. In the neighborhood in which the initial working of the law was undertaken there resided a rather unruly element. Among them were many very poor men, heads of families, whose sole support they were, and who were, by the mere turn of a wheel, forced to leave home and family to the care of Providence. Such men began to reflect upon this phase of the conscription. Another cause for disapproval was the clause allowing the purchase, for three hundred dollars, of substitutes, which sum was far above what such poor men could raise. On the Monday following, committees of discontents went around the various places where laboring-men were engaged, enjoining them to fall into line with the various processions which were on their way to the place of conscription. Proceedings had barely commenced there, when a huge boulder crashed into the room, discomposing the serenity of the presiding officers. Immediately the mob was aroused, and the place was attacked and set on fire, which extended to the whole block, the fire brigade being prevented, by the force of the mob, from its attempts to reduce the flames. The city was in the power of the rioters, there being no troops at hand. The incendiaries, now increased tenfold, commenced plundering and fire-raising. Citizens were maltreated, and many were cruelly tortured to death. Private residences were looted and destroyed. A detachment of marines, about fifty in number, was sent on the street-cars to quell the mob, but could get no farther than Forty-third Street, the mob at Forty-sixth Street having torn up the rails at that point. The marines formed in line, and after an ineffectual appeal to the mob to disperse, they were fired upon by the marines, with blank cartridges. The mob was roused to fury, and before the marines could take any more effective means of dispersing the rioters, they were attacked and desperately maltreated. The police were also dealt with in the same way. The colored people in particular, and their sympathizers, were marked out for especially brutal treatment. The Colored Orphan Asylum was burned. Trade was paralyzed. A quorum of aldermen could not be collected to consider the situation. On Tuesday, Governor Seymour arrived and issued a proclamation, but it produced little effect, and the second day was even worse than the first. Not a store was opened. The murder of Colonel O'Brien, who had heroically attempted, single-handed, to pacify the mobs, was treacherous, inhuman and implacable. The arrival of the militia, that had been on duty in Pennsylvania, however, had the desired effect, and on Wednesday Mayor Opdyke was able to announce the quelling of the riot and the establishment of quietude. The mortality statistics for the week showed an increase of 450 over the figures for the corresponding week of the previous year, 90 deaths were reported as having been caused by gunshot-wounds, and about $1,300,000 were paid to claimants for damages.

In the following month the draft was resumed and completed without further trouble, President Lincoln, considering the draft urgent, refusing at that time to consider the petition of Governor Seymour to have the provisions of the act relaxed, or suspended, until its constitutionality could be determined.

DRAG–BAR, a bar or link for attaching carriages together, or to the motive power, as on railways.

DRAGOMAN. See GREECE, Vol. XI, p. 111.

DRAGON. See LIZARD, Vol. XIV, p. 742.

DRAGON, GREEN (*Dracunculus vulgaris*), a plant of the family *Araceæ*, which receives its name from the spotted stem. It is a native of southern Europe. Its flowers are black, remarkably fœtid, and give out exhalations which cause headache, giddiness and vomiting. The root is emetic, and, probably for no better reason than the peculiar appearance of the stem, has been supposed useful for curing serpent-bites. The name is also sometimes applied to *Arisæma Dracontium* of the United States.

DRAGONET, a small fish of the spiny-finned group, genus *Callionymus*, and classified by some

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as belonging to the family *Gobiidæ*. Members of this group are brilliantly colored and are characterized by the head and anterior portion of the body being flattened, while the remainder is cylindrical. The foremost of the two dorsal fins has three or four flexible spines and the pelvic fins are five rayed. They are further characterized by having the gill-openings reduced to a small hole on each side. Most of the species inhabit the coast regions of the temperate zone of the Old World. R.W.C.

DRAGONNADE. See CAMISARDS, Vol. IV, p. 656.

DRAGON-ROOT (*Arisæma Dracontium*), a plant of the family *Araceæ*, a native of North America, whose tuber is a powerful local irritant, and is used as a stimulant of the secretions in chronic bronchitis, asthma, rheumatism, etc. The powder, made into a paste with honey, is beneficially applied to the mouths and throats of children in aphthæ; and milk in which the root has been boiled is a useful ointment in cases of scald-head, ringworm, etc. The tuber is probably used interchangeably with that of the nearly allied and more common *A. triphyllum*, the common "Indian turnip."

DRAGON'S MOUTH (Span. *Boca del Drago*), the name of two straits or passages in the New World. One of them is in South America, separating Trinidad from the mainland, and connecting the Gulf of Paria with the southeast extremity of the Caribbean Sea. The other is in Central America, being on the northeast coast of Veragua, the most northwest portion of Colombia, between the Carribean Sea and Lake Chiriqui.

DRAGOON-BIRD, a South American bird having the feathers on the head arranged in a helmet-like crest. It is also known as black fruit-crow, and umbrella-bird.

DRAINAGE. See SEWAGE, Vol. XXI, p. 747; and AGRICULTURE, Vol. I, pp. 292, 293.

DRAKE, CHARLES DANIEL, an American jurist and author; born in Cincinnati, Ohio, April 11, 1811. He served several years in the navy and was admitted to the bar in 1833. In the following year he took up the practice of law in St. Louis, where he became prominent in politics. In 1864 he was a member of the convention to revise the constitution of Missouri. From 1867 to 1871 he was United States Senator and from 1871 to 1885 he was chief justice of the court of claims. He wrote *Law of Suits by Attachment* (1854); *Life of Daniel Drake* (1871); *Union and Anti-Slavery Speeches* (1864). He died in Washington, D. C., April 1, 1892. W.M.C.

DRAKE, FRANCIS MARION, an American statesman and soldier; born in Rushville, Illinois, December 30, 1820. At the outbreak of the Civil War he enlisted as a private in a volunteer regiment and won rapid promotion for bravery in action. He was twice wounded. In 1865 he was brevetted brigadier-general. After the war he became identified with various Western railroad enterprises and was the first president of the Missouri, Iowa and Nebraska railway. In 1899 he was president of the Indiana, Illinois and Iowa railroad. In 1895 he was elected governor of Iowa. He made liberal gifts and endowments to Drake University at Des Moines, Iowa. He died in Centerville, Ia., Nov. 20, 1903. W.M.C.

DRAKE, FRANCIS SAMUEL, an American author and editor; born in Northwood, New Hampshire, February 22, 1828. He was a son of Samuel Gardner Drake (q. v.) with whom he was associated in the conduct of an antiquarian bookstore in Boston. In 1872 he published his *Dictionary of American Biography* and in 1873 appeared his *Life of General Henry Knox*. He also wrote *Tea Leaves* (1884) and *Indian History for Young Folks* (1885). Before his death he had gathered material for a new edition of his *Dictionary* which was afterwards incorporated in *Appleton's Cyclopedia of American Biography*. He died in Washington, District of Columbia, February 22, 1885. W.M.C.

DRAKE, JOSEPH RODMAN, an American physician and poet; born in New York city, August 7, 1795. He studied medicine and graduated in 1815, becoming meanwhile an intimate friend of Fitz-Greene Halleck, with whom he collaborated in writing *The American Flag* (1819). His best known poem *The Culprit Fay* appeared in the same year. He wrote also some shorter pieces, notably the poem *Abelard to Héloïse*. He died in New York city, September 21, 1820. W.M.C.

DRAKE, SAMUEL GARDNER, author, was born at Pittsfield, N. H., on October 11, 1798, and was educated and became a teacher in the common schools. In 1828 he established in Boston one of the first antiquarian bookstores in America. Thereafter he devoted himself largely to antiquarian research and to historical writing. He republished Church's *Entertaining History of King Philip's War* and other works of colonial times, and wrote and published *Indian Biography*, *Book of the Indians*, *Old Indian Chronicles*, *Indian Captivities*, *Tragedies of the Wilderness*, *History and Antiquities of Boston*, and *History of the French and Indian War*. He was one of the founders of the New England Historic Genealogical Society, and was its president in 1858. He lived for several years in London, and conducted important researches among archives there, in the interest of American history. He also edited for many years the *New England Historical and Genealogical Register*. Some of his works have gone through many editions and are esteemed as standard authorities. He died in Boston on June 14, 1875. W.F.J.

DRAKENBERG MOUNTAINS. See NATAL, Vol. XVII, p. 246.

DRAMA, THE AMERICAN. The first theatrical performances in North America were given in Quebec, in 1694, by amateur players, although there is little doubt that the Spaniards in Mexico had established the stage, which, in the times of the Spanish invasions, was in the height of its

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glory in the mother-country. The next positive date was 1745, when the first English performances were given in the island of Jamaica, and so successfully that the leader, Moody, famous as an actor of Irish characters, went to England, and in the following year brought out a regular company of actors, returning to Jamaica, where he remained for many months.

The first performance of an English play in what is now the United States was in Boston, in 1749, when Otway's *Orphan* was acted, but received by the Puritans with such horror that at the next general court a law was passed, fining actors, as well as spectators, £5 ($25) apiece, and the owner of a building £20 ($100), "for each and every day or time" a play was attempted or permitted. This law was enforced for nearly fifty years. In 1749 an attempt was also made to open a theater in Philadelphia, but the parties were arrested and bound over to their good behavior. They went to New York, and in February, 1750, rented a convenient room on Nassau Street, where they opened, on the 5th of March following, with a play announced as *The Historical Tragedy of King Richard III.* "Wrote originally by Shakespeare, and altered by Colley Cibber, Esq." The season lasted 16 months, with the exception of six weeks in the summer of 1750. The managers and chief actors were Murray and Kean. In July, 1750, the company disbanded, but the remains were gathered together by a Mr. Upton. The following season does not seem to have been very successful, as it was brought to a close in February, 1751.

Moody's success in Jamaica caused him to return to England in 1749, when he was at once engaged by David Garrick for Drury Lane. The rumors of his exploits had spread in London, and caused Mr. and Mrs. Lewis Hallam to organize a company, and with a stock of scenery and costumes from the Goodman Fields Theatre, they came to America, went to Williamsburg (then the capital of Virginia), altered an old storehouse over into a theater, and opened it, Sept. 5, 1752, with the *Merchant of Venice* and Garrick's farce, *Lethe*. The reception they received was very different from that accorded their friends in Boston and Philadelphia. Governor Dinwiddie gave them a certificate, drawn up and signed in council, testifying in high terms as to their ability as comedians, as well as to their conduct as men. They went to Annapolis, Maryland, and acted in the first regular theater erected in the colonies. In June, 1753, they went to New York, but met with unexpected opposition, through the abuse of a trust reposed in their advance agent. Mr. Hallam pleaded his case in the public press, and appealed to the authorities, with ultimate success. A prosperous season of six months followed, when they went to Philadelphia, where they met the most determined opposition. Petitions and counter-petitions were signed, and the city was divided in the dispute. Permission was at last obtained for the presentation of 24 plays, on the condition that the players "offered nothing indecent or immoral." The season was so satisfactory and successful that six more nights were added. Mr. Hallam then went to the West Indies, where he died. A Mr. Douglass led the actors back to New York, and built a theater on Cruger's wharf, the Nassau Street theater having been converted into a church.

In the spring of 1759 Mr. Douglass went to Philadelphia, where he built the first regular theater erected in that city. Shortly after, a theater was built in Newport, Rhode Island, where the first performance by professional actors was given in the New England states, on Sept. 7, 1761. In 1762 the company went to Providence, and in that year was formed the first theatrical circuit. It began at Williamsburg, Virginia, and included Annapolis, Philadelphia, New York, Newport, Providence, and a few smaller places, where a courthouse or proper building might serve the purpose of a theater. In New York a new theater was built in Chapel Street, and was, during one of the disturbances caused by the Stamp Act, the scene of the first theatrical riot. During the succeeding ten years several other theaters were built, but on Oct. 24, 1774, the Continental Congress recommended a suspension of all public amusements. Douglass, who had been fairly successful, was obliged to yield, and took his company to the West Indies, where he had been always welcome.

During the Revolutionary struggle there were no theatricals, except those given by British officers. A remarkable incident brought these to an end. Burgoyne, the British commander, wrote a play, *The Blockade of Boston*, and while it was being played a sergeant dashed in and announced, "The rebels have attacked the lines on the Neck" (the "Neck" was a strip of land connecting Boston with the mainland). The audience applauded his spirited delivery, and it was some minutes before the truth of his statement was realized. The play ended without completion; the British were driven from Boston and went to New York, where they took possession of the John Street Theater, which they called the Theater Royal. Major André was among the chief actors.

After the war the players came back. Up to 1794 there was in the United States but one stock company of recognized merit. After this date the growth of the drama was marked for its rapid development. Owing to prejudice, which had not yet subsided, various efforts to avoid the rigid laws were adopted. As late as 1792 a play-bill announced "A Moral Lecture in Five Parts, in Which the Dreadful Effects of Conspiracy will be Exemplified." It was but an underhand way of advertising Otway's *Venice Preserved*. *Hamlet* and *Romeo and Juliet* were also given as "moral lectures" or "moral dialogues." Such a violation of the law could not last long, and in December, 1792, the "exhibition rooms" were closed. Fortunately, in 1793, the legislature of Massachusetts repealed the law against theaters, and in February, 1794, the Federal Street Theater

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was opened with a prologue by Robert Treat Paine, Jr.

In New Orleans the first performances seem to have been given in 1791, by a company who had escaped from the insurrectionary troubles in Santo Domingo. The first theater in the Crescent City seems to have been built about 1808, and in 1822 the first American theater in New Orleans was built. A brick theater was built in Natchez, Mississippi, in 1828. From the beginning of the century the drama prospered, and kept pace with the growth of the country.

The first play written and acted in America seems to have been Burgoyne's *Blockade of Boston*, already referred to. The first professional dramatist in the United States was William Dunlap, one of the most fertile of playmakers. He was one of the founders of the National Academy of Design, and the author of several works. His *History of the American Theater* is an invaluable authority.

John D. Burke, killed in a duel in 1808, was the successful author of the plays *Bunker Hill; or, The Death of General Warren; Joan of Arc;* and several others. Other actors and authors followed; among them, John Howard Payne, the author of *Home, Sweet Home.* He is credited with some sixteen plays. Samuel Woodworth, the author of *The Old Oaken Bucket*, was also the writer of successful plays. George P. Morris, the author of *Woodman, Spare That Tree*, produced *Briercliff*, which held the stage for years.

The first actor to "star" was Cooper. He attached himself to no company, but went from one theatrical point to another, playing the chief part. The first great actor to follow him was George Frederick Cooke, who died in 1812. In 1820 Edmund Kean appeared as Richard III in New York. After filling his New York engagement he went to Boston; but one night, there being a sparse audience, he refused to act, and left the country. Five years later he returned and appeared in New York, but the memory of his slight to the Boston audience was not dim, and one of the worst riots known in theatrical history was the result. Kean apologized, and filled his engagement, but when he went to Boston, another riot occurred, which resulted in the destruction of the greater part of the theater.

In 1821 Junius Brutus Booth appeared as Richard III in Richmond, Virginia, then went to New York. He was immediately acknowledged as a master, and no actor exerted so much influence on acting in America as he. He died in 1852, four days after he had played in New Orleans, and while on his way to Cincinnati. Edwin Forrest was, if not the equal of Booth, at least a fit successor. He began playing in 1820, when but 14 years of age. At 19 he was the leading actor at the Albany Theater, and at the age of 20 made his appearance at the New York Park. In 1848, while in England, he became involved in a trouble with Macready, which culminated in the Astor Place riot, in New York, in 1849.

Macready, although 13 years older than Forrest, did not appear on the stage until 1826. Mrs. Duff made her first appearance in 1810 as Juliet, and while on the stage, a period of 28 years, was regarded as the foremost actress in America. In 1838 she left the theater and went into a self-imposed retirement, having taken upon herself a religious life. Fanny Kemble was another brilliant star. She was hailed as a beauty as well as a genius, and during her time she had none to dispute her place or sway. She left the stage in 1834 and married. Several plays came from her pen, the best known being *Francis the First.* Charlotte Cushman began as a singer, and was for a time prima donna at New Orleans, but, the climate affecting her voice, she gave up singing and became an actress. Her influence did much to elevate the stage and break down Puritanical prejudice.

Charles Mathews, whose eccentric comedy was as highly esteemed in England as Kemble's light comedy, first appeared in America in 1822. His trip was profitable and he returned to England. In a play written by himself, and acted in London, called *Mathews in America*, there were many caricatures which gave great offense to the sensitive Americans, and were not readily forgiven. His son, Charles James, usually known as Charles Mathews "the younger," appeared in 1834. He was a comedian of extraordinary lightness and ease, and his influence on the younger generation still survives.

The drama had grown to large proportions, and each succeeding year witnessed the advent of brilliant geniuses. In 1826 James H. Hackett, the first to make a specialty of Yankee parts, went on the stage. He journeyed to England, and introduced the stage Yankee to the English public with great success. Hackett was probably the earliest performer of *Rip Van Winkle.* He repeated his visit to England, when George Handel Hill became the favorite as a delineator of Yankee character. Hill followed to England, and even went to Paris, but the Parisians failed to appreciate his *Solomon Swop*, and but a few performances were given.

Dan Marble, as Sam Patch, appeared in 1838. F. S. Chanfrau, in *Mose, the New York Fireman*, and later, in *Kit, the Arkansas Traveler*, achieved a remarkable success. Joseph Jefferson, in *Our American Cousin*, and later in *Rip Van Winkle*, became noted for ease and simplicity of method, and for more than twenty years his *Rip Van Winkle* has held the stage. The play, as given by Hackett, was rewritten at the request of Jefferson, by Dion Boucicault, with suggestions and emendations by Jefferson, and has proved one of the most remarkable successes on the American stage.

With the increase in the number of stars, it began to be difficult to get a good stock company together. At first, stars acted only on special nights, but for personal profit eventually were willing to act every night. Then the star, seeing that the manager relied on him or her to get people into the house, demanded the lion's share of the profits.

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In the latter part of the history of the American drama the array of prominent names is very large. James W. Wallack, the handsome, dashing actor, gentlemanly and popular in the best and most refined society; William E. Burton, perhaps the best actor of broad, low-comedy parts; John Brougham, the genial Irish-American actor and author; John Lester Wallack, Augustin Daly; Edwin Booth, son of Junius Brutus Booth, and heir of much, if not all, of his histrionic genius; Dion Boucicault, and scores of others, have made the American stage one of the great social forces.

The number of theaters and opera-houses in the United States is about 3,100; of actors, actresses, and professional singers actively employed, 5,127; of professional itinerant theatrical, operatic, and musical "attractions," 347. See also DRAMA, Vol. VII, pp. 339–384.

DRAMMEN, a seaport town in Jarlsberg and Larvik province, Norway; has a college and various factories, and does a large trade in timber, iron, and pitch. Population, 1891, 20,687.

DRANESVILLE, a village of Fairfax Co., Va., 17 miles N.W. of Washington, the scene of a battle between the Union and the Confederate troops, Dec. 20, 1861, in which the Federals gained a slight advantage.

DRAPER, ANDREW SLOAN, an American educator; born in Westford, New York, June 21, 1848. He was graduated from the Albany Academy in 1866, and from the Albany Law School in 1871. He began his law practice in Albany, was elected to the board of education, and in 1881 was sent to the state legislature. In 1885 he was appointed by President Arthur one of the judges of the court of Alabama claims. He was state superintendent of public instruction in New York from 1886 to 1892 and superintendent of schools in Cleveland from 1892 to 1894. In 1894 he became president of the University of Illinois. He has published *American Schools and American Citizenship; American Universities and the National Life; The Rescue of Cuba; Origin of the New York Common School System; Powers and Obligations of Teaching; How to Improve the Country Schools*, and other works. W.M.C.

DRAPER, HENRY, an American chemist and astronomer; son of John William Draper (q.v.); born in Prince Edward County, Virginia, March 7, 1837. He was graduated from the University of New York in 1858, and in 1859 was appointed professor of physiology there. In 1873 he became professor of analytical chemistry, and in 1882 succeeded his father as professor of systematic chemistry. He became well known for his discoveries and work in celestial photography. He published *Changes of Blood Cells in the Spleen; A Text Book on Chemistry*, and a work on the *Construction of a Silvered-Glass Telescope*. In 1877 he discovered oxygen in the sun by photography and also a new theory of solar spectrum. He was photographer of the Transit of Venus Commission appointed by Congress, and for his work on this occasion the government of the United States caused a special medal to be struck in his honor. He organized the party for the observation of the eclipse of July 29, 1878, and at his private observatory at Hastings-on-the Hudson, and carried out many works which are usually defrayed out of the public purse. He was a member of the National Academy of Sciences, and in 1881 the University of New York and the University of Wisconsin simultaneously, but independently, conferred on him the degree of LL.D. He was one of the most valued contributors to the *American Journal of Science* and wrote for various other scientific journals. He died in New York city, November 20, 1882. W.M.C.

HENRY DRAPER.

DRAPER, JOHN CHRISTOPHER, physician; son of John W. Draper (q. v.); was born in Virginia on March 31, 1835, and was educated at New York University, being graduated from its Medical School in 1857. He had a distinguished career as a physician and surgeon, as an educator and as an author. He was professor of analytical chemistry in New York University from 1858 to 1871; professor of chemistry in the New York University Medical School from 1866 to 1885; professor of chemistry in Cooper Union from 1860 to 1870; and professor of natural sciences in the College of the City of New York from 1863 to 1885. He wrote several standard works on medicine, surgery, and chemistry. He died on December 20, 1885. W.F.J.

DRAPER, JOHN WILLIAM, an American chemist, physiologist and historian; born near Liverpool, England, May 5, 1811. He received his early education at a Wesleyan school in Liverpool. On the opening of the University of London, he proceeded to London and studied chemistry, natural philosophy and the higher mathematics. He removed to the United States in 1833, and continued his chemical and medical studies in the University of Pennsylvania, where he graduated in 1836. In 1837 he received an appointment as professor of chemistry and natural philosophy in Hampden-Sidney College, Virginia. In 1839 he was elected professor of chemistry in the University of New York and was subsequently one of the founders of its medical department, of the faculty of which he became president in 1851. Meanwhile he had acquired a wide reputation as a teacher and scientist and made many contributions to scientific literature, among which are *Treatise on the Forces Which Produce the Organization of Plants* (1844); *Human Physiology, Statistical and Dynamical, or the Conditions and Cause of Life in Men* (1856), and papers to the *Edinburgh Scientific Journal*. In these works the subject to which he chiefly devoted his

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attention was the chemical action of light, in connection with which he effected some discoveries. His doctrine of the causes of the circulation of the blood and physiological writings generally, have met with extensive acceptance among physicians. But his name is perhaps as widely known in the literature of philosophy and history. In 1863 he published *The History of the Intellectual Development of Europe* which has been translated into French, German, Italian, Polish, and Russian. This work won for Professor Draper warm words of commendation from Professor Tyndall in his well-known Belfast address. The *History* passed through many editions and was revised and reprinted in two volumes in 1876. In 1865 he brought out *Thoughts on the Future Civil Policy of America;* in 1870 *The History of the American Civil War* in three volumes, and in 1874 *History of the Conflict between Religion and Science*, which ran through many editions and was translated into nearly all the languages of Europe. He died at Hastings-on-the-Hudson, New York, January 4, 1882. W.M.C.

DRAPER, LYMAN COPELAND, antiquarian, was born at Evans, N. Y., on September 4, 1815, became an editor at Pontotoc, Mississippi, and after 1834 devoted his attention chiefly to the collection of biographical and historical matter pertaining to the Mississippi valley. He removed to Madison, Wisconsin, in 1852; became secretary of the State Historical Society; collected for it a library of 100,000 titles, and published many volumes of historical compilations. He was state superintendent of public instruction in 1858–60, and died at Madison on August 26, 1891. W.F.J.

DRAPER, WILLIAM HENRY, physician, was born at Brattleboro, Vermont, on October 14, 1830, and was educated at Columbia University, New York, and in London and Paris. He was professor of diseases of the eye and ear, and of clinical medicine, in the College of Physicians and Surgeons, and president of the New York Academy of Medicine. He died on April 26, 1901. W.F.J.

DRAUGHT OR DRAUGHT OF WATER, in maritime affairs, a technical name for the depth to which a ship sinks in the water when fairly afloat. The draught is marked on the stem or stern-post, or both, from the keel upward. When a ship is in good trim, the draught does not differ much at the two ends. Ships with sharp bottoms draw more water, or have a greater draught, than those of flatter construction.

DRAUGHTSMAN. A draughtsman differs from a designer, inasmuch as he lays no claim, in that capacity at all events, to the character of an originator.

DRAVE, Austria, one of the principal tributaries of the Danube which it joins 14 miles east of Esseg, after an east by south course of 380 miles from its source in the Tyrol, 17 miles east of Brunecken. The upper part of its course is through Carinthia and Styria; in the lower portion it separates Croatia and Slavonia from Hungary. Its principal affluents are the Mur, Mohl, Gurk, Lavant and Gail. It is navigable throughout nearly three-fourths of its course, and a railway extends throughout almost the whole length of its valley. C.L.S.

DRAVIDIAN LANGUAGES AND LITERATURE. See INDIA, Vol. XII, pp. 817–818; PHILOLOGY, Vol. XVIII, p. 793; and TAMILS, Vol. XXIII, pp. 46–49.

DRAWBACK, a term in commerce, employed in connection with the remitting or paying back of excise duties on certain classes of articles exported. Excise duties, as a matter of course, enhance by so much the natural price of the commodity on which they are imposed. Were these duties not remitted, the commodity so taxed would not be ordered from those foreign countries where articles of the same kind could be purchased free of such duties. To afford facility for the exportation of these articles, the state resorts to the expedient of returning to the exporter a sum equal in amount to what he or the manufacturer had paid to the excise.

DRAW-BAR OR DRAW-HEAD, in railway mechanics, a buffer to which a coupling is attached.

DRAWING-BOARD, a board on which drawing-paper is strained for painting on in water-colors. The paper is wetted for the purpose of being strained, and when attached at the edges it is permitted to dry and contract. Formerly, the drawing-board was fitted into a frame, the edges of the wet paper being made fast by the pressure of the frame on the board. But the much simpler drawing-board which is now in use is made of a flat piece or pieces of wood, held together and prevented from warping by an edging of other pieces, the grain of which runs in the opposite direction. The wet paper is attached to the board with paste or thin glue, and when dry becomes perfectly firm and flat. When the work is finished, the paper is cut beyond the drawing with a knife.

DRAW-PLATE, a steel plate with a graduated series of holes, through which metals are drawn in making them into wires or bars. Also a name given to a plate of metal placed before a fire or before the lateral opening between the top of the fireplace and the throat of the chimney. Its use is to force the air to pass through the fire on its way into the chimney, instead of allowing it to pass over the fire.

DRAYTON, WILLIAM HENRY, an American statesman; born in Drayton Hall, S. C., in September, 1742. He was educated at Westminster School, London, and Balliol College, Oxford, studied law, and was admitted to the bar. Returning to America in 1764, he became an active worker in political affairs, and in 1769 published letters on the side of the government which brought him into controversy with Christopher Gadsden and other patriotic leaders. In 1771 he was appointed by George III privy councillor for South Carolina; but as the Revolutionary crisis approached he espoused the popular cause and protested against the proceedings of his colleagues.

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In 1774 he was appointed judge of the Province. Suspended from his offices under the Crown, he was made a member of the popular Committee of Safety, and was prominent in advising the seizure of the provincial arsenals and British mails. In 1775 he was president of the Provincial Congress, and in 1776 was elected chief justice of South Carolina. In 1778 he was elected to the Continental Congress, and sat therein until he died in Philadelphia in September, 1779. E.E.T.

DRAYTON-IN-HALES OR MARKET DRAYTON, a town in the northeast of Shropshire, western central England. It is an old town, on the banks of the Fern, 19 miles N.N.E. of Shrewsbury and 153 miles N.W. of London. It is supposed to be the *Caer-Draithon* of the Romans. Here, in 1459, the Yorkists defeated the Lancastrians with great loss. The parish church was built in the reign of King Stephen. Drayton has manufactures of paper and haircloth, markets during the week and several fairs during the year. Population, 4,039, chiefly agricultural.

DREDGING-MACHINE. See STEAM-SHOVELS AND DREDGES, in these Supplements.

DRED SCOTT CASE. See UNITED STATES, Vol. XXIII, p. 812,

DREIBUND, THE, is the league or compact formed between Germany, Austria and Italy for mutual defense in case of attack. In 1579 an alliance between Germany and Austria, known as the "dual alliance," was formed, and in 1882, on the addition of Italy to the agreement, the dual alliance became the dreibund. The alliance has been maintained since, Emperor William of Germany announcing, in 1891, that it had then been resumed for a period of six years. The relation of these powers makes this dreibund an important safeguard in the maintenance of a balance of power on the continent of Europe.

DREISSENA. See MOLLUSCA, Vol. XVI, p. 715.

DRESDEN, a town of Bothwell County, western Ontario. Population 1901, 1,613.

DRESDEN, capital of Saxony, Germany. Substantial improvements have marked the recent growth of the city in commerce, industry and art. Pop. 1900, 396,146. See DRESDEN, Vol. VII, 404–405.

DANIEL DREW.

DRESDEN, BATTLE OF. See NAPOLEON, Vol. XVII, p. 227.

DRESS. See COSTUME, Vol. VI, pp. 400–425.

DRESSINGS in architecture, a term loosely used to signify moldings and all the simpler kinds of sculptured decorations.

DREW, DANIEL, an American capitalist and philanthropist; born in Carmel, Putnam County, New York, July 29, 1788. Early in life he was a cattle-drover; embarked in the steamboat business, in which he assumed a position of great influence, and later became identified with railroad enterprises, especially the Erie railway. He was also for several years a leading stock speculator in Wall street. He gave liberal sums of money to the Wesleyan University and other institutions, founded the Drew Ladies' Seminary at Carmel, and in 1866 donated $250,000 toward the founding of the Drew Theological Seminary at Madison, New Jersey, which was opened, under the auspices of the Methodist Episcopal Church, November 2, 1867. His donations to this institution were increased to over $1,000,000. He also gave large sums of money to various Methodist colleges and schools throughout the United States. He died in New York city, Sept. 19, 1879. W.M.C.

DREW THEOLOGICAL SEMINARY, founded at Madison, N. J., 1866, for the education of M. E. ministers, opened Nov. 6, 1867, with Dr. John McClintock president. Has a three-years course and in 1904 had 168 students, 8 instructors, 82,263 volumes in library and productive funds of $500,000. President, Henry A. Buttz, D.D. LL.D. A.R.R.

DREW, JOHN, actor, was born at Dublin, Ireland, on September 3, 1825, came to America, and made his first stage appearance in New York, at the old Bowery Theatre, in 1845, in the part of Doctor O'Toole in *The Irish Tutor*. Later he became proprietor and manager of the Arch Street Theatre in Philadelphia, where he had a prosperous career for many years. He made successful tours through the United States, England and Australia, and was much esteemed as a comedian. He married Louisa Lane, an English actress of great ability, who as Mrs. John Drew became one of the most famous players of her day. Mr. Drew made his last appearance on May 9, 1862, at his own theatre in Philadelphia, and died twelve days later, on May 21. W.F.J.

DREW, JOHN, JR., actor, son of John and Louisa (Lane) Drew (q. v.), was born in Philadelphia on November 13, 1853, and made his first stage appearance at his mother's Arch Street Theatre in that city in 1872, in the part of Plumper in *Cool as a Cucumber*. Under the efficient guidance of his distinguished mother he made rapid progress, and for a time was a member of Edwin Booth's company. He joined Augustin Daly's famous company at the opening of Daly's Theatre in New York in 1880, and remained with it for twelve years, during the time when it was the foremost comedy organization in America. In 1892 he withdrew from Daly's and became a "star" actor, playing at the head of various companies of his own, in a great round of comedy and romantic parts, in which he has easily maintained his rank as one of the most popular and meritorious comedy actors of his time. W.F.J.

DREW, MRS. JOHN (Louisa Lane), actress, was born in London on January 10, 1818, the daughter of Mr. and Mrs. Lane, well-known actors of that day, and was carried upon the stage by them before she was a year old. In childhood she began to act, and she made her first appearance upon the American stage in 1827, playing the Duke of York to the elder Booth's Richard III.

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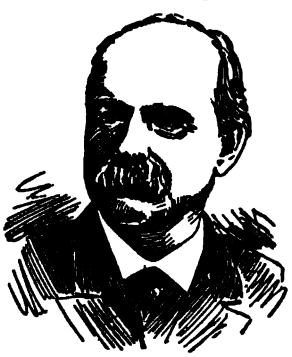
After a tour in the British West Indies she appeared as Julia in *The Hunchback*, in Boston, in 1832, being then only fourteen years of age, and thereafter made rapid progress. She became leading lady to Edwin Forrest in 1836, and played tragic parts with much success, but after her marriage to John Drew (q. v.) in 1850 she devoted herself chiefly to comedy parts, in which she greatly excelled. Shortly before the death of Mr. Drew, in 1862, she became manager of the Arch Street Theater in Philadelphia, and conducted it with much success for many years. In the later years of her life she played with various companies, with Joseph Jefferson, William Florence, and John Gilbert, and took part in some notable productions of old English comedies. In early life she was an admirable Peg Woffington, Lydia Languish, and Lady Teazle; in her later years she was the best Mrs. Malaprop ever seen upon the American stage. She died on Aug. 31, 1897. W.F.J.

DREXEL, ANTHONY JOSEPH, financier; was born in Philadelphia, Penn., in 1826, the son of Francis Martin Drexel, a native of Austria and a banker in Philadelphia. At the age of 13 years he entered his father's bank, while still a schoolboy, and worked in every department of it until he reached its head. In addition to the Philadelphia house of Drexel & Co., he established the New York house of Drexel, Morgan & Co., and the Paris house of Drexel, Harjes & Co., in 1850 and 1867, respectively. These houses for many years were among the foremost American banking establishments, and exerted a great control over financial affairs. In 1876 the Drexels united with the Rothschilds and other houses in refunding three hundred million dollars of the United States public debt at 4½ per cent, and on other occasions did signal service to public finances. They also took a leading part in the financing and reorganization of various railroads and other corporate enterprises. Mr. Drexel in addition to being one of the most successful bankers was one of the foremost philanthropists of his day. He founded the Drexel Institute, a great school of science, art and industry, in Philadelphia, at a cost of more than $1,500,000, and gave several millions more for a hospital, and art gallery and museum, and other similar purposes in that city. In co-operation with his close friend, George W. Childs, he established and endowed the Childs-Drexel Home for Aged Printers, at Colorado Springs, Colorado, which was formally dedicated and opened in May, 1872. Although a man of conservative habits, little given to speculation, he amassed a fortune, which was estimated at more than $25,000,000. He died at Carlsbad, Bohemia, on June 30, 1893.



ANTHONY J. DREXEL.

W.F.J.

DREXEL, GEORGE W. CHILDS, editor and publisher of the Philadelphia *Public Ledger*, is the son of the late Anthony Joseph Drexel (see foregoing), banker and philanthropist, and was born at Philadelphia.

DREYER, JOHN LOUIS EMIL, a Danish astronomer; born in 1852 at Copenhagen. M.A. and Ph.D. of Copenhagen University. He was astronomer at the Earl of Rosse's Observatory, Birr Castle, 1874; assistant astronomer at the Observatory of Trinity College, Dublin, 1878; director of Armagh Observatory, 1882; he is the author of *Second Armagh Catalogue of 3,300 Stars for 1885, from Observations Made in the Years 1869–83* (1886); *A New General Catalogue of Nebulæ and Clusters of Stars* (1888); *Tycho Brahe: A Picture of Scientific Life and work in the Sixteenth Century* (1890); and various papers on astronomical and other scientific subjects.

DREYFUS CASE, THE. During the years 1898–99, France was thrown into paroxysms of excitement over a military scandal, known as the Dreyfus case, the revelations of which disclosed an alarmingly partisan, if not corrupt, condition of affairs in some lines of French public life under the republic. The facts of the case are as follows: Alfred Dreyfus, an Alsatian Jew, was, up to the year 1894, a captain of engineers in the French army, and held high position on the general staff. About the middle of October, in the year named, he was arrested on a charge of treason, secretly tried by court-martial, convicted, and publicly degraded. He was then sent off to a lonely convict station (Ile du Diable), on the coast of French Guinea, closely guarded, and, it is said, in shackles. The ostensible charge against Dreyfus was that he had sold military information to a foreign government. The chief evidence in support of the grave accusation was a compromising document stated to have been found in the waste-basket of the German Embassy in Paris, which was alleged, though not conclusively proved, to be in the handwriting of the incriminated officer. The arrest, trial, conviction, degradation from his rank in the army, and deportation to a penal colony, it would seem, were wholly unwarranted, and, in fact, despotic acts. A grave judicial error appears to have been committed, for there was little upon which to base so serious a charge, save the mere supposition by experts in handwriting, who of course might be entirely astray in their judgment, that the document said to have been found in the German Embassy incriminated Dreyfus.

Nor is this all, for the German minister in Paris has stated that no such document, or *bordereau*, as it is called, could have been found at the Embassy. He, moreover, desired to testify, but was refused permission at the preliminary enquiry, that he knew nothing of Dreyfus and had had no communication whatever with or from him. Further circumstances have to be noted, which throw doubt upon the *bona fides* of the trial, and give occasion for the widespread suspicion among fair-minded Frenchmen that the officer in question was either the victim of jealousy, and possibly of hatred

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on account of his Jewish faith, or was cruelly made the scapegoat for someone else's perfidy. We refer to the fact that not only was the trial conducted with closed doors, and before those who seem to have been insanely prejudiced against Dreyfus, but that neither he nor his council saw or was informed of the evidence on which the unfortunate officer was convicted. Moreover, it is known that the victim of his anonymous accusers and of his irregularly governed judges had no ostensible motive for committing the crime, since he was well off, of good family, and though a Jew and an Alsatian, had a good record both as a gentleman and a soldier.

The trial was so manifestly unfair, and the doomed officer was so conscious of his innocence, that his family and friends took up the case and worked strenuously, though at first with little avail and against great and unreasoning prejudice, to get the affair reopened and the judgment reversed. A brother of the condemned officer, upon what evidence does not seem to have transpired, accused a Major Esterhazy of the crime for which Captain Dreyfus was punished, and his trial, which took place in Paris and appears to have been conducted also with closed doors, resulted in Esterhazy's acquittal. With the irregular methods of procedure at these military investigations, acquittal, morally, proves nothing, though in the highly prejudiced and inflammable condition of the public mind at the time in France the acquittal of Esterhazy was taken as an endorsement of the finding of the court upon Dreyfus.

At this juncture, M. Émile Zola, the novelist, appeared on the scene in the Dreyfus interest. In an open letter to the President of the Republic, M. Zola vehemently attacked the military administration for its conviction of Dreyfus and its acquittal of Esterhazy, and charged all and sundry with conspiring to ruin an innocent man and scandalously to screen the real culprit. So fierce and outspoken was his arraignment of all who had to do with the conspiracy against Dreyfus, from the Minister of War down to the Colonel who is supposed to have made a scapegoat of the convicted officer, that the Legislature, the Paris press, and almost the whole of France went into convulsions over the matter. So revolutionary was the tone of M. Zola's letter, and so heroically did he champion the cause of the cruelly treated Jewish officer, that the government was forced to prosecute him. The novelist was convicted, ordered to be imprisoned, heavily fined, and this in spite of the evidence of a Colonel Picquart, whose testimony, given with frank and fearless sincerity, was most damaging to his superior officers and to the prosecution of Dreyfus. The clamor to open the case against Dreyfus continued in France in spite of M. Zola's conviction. More insistent became the public voice when it was known that a Colonel Henry, one of the prisoner's accusers, had made confession that the evidence of guilt he had produced at the Dreyfus trial was a forgery. Henry was imprisoned in consequence of this confession, and while in confinement he committed suicide, which added to the excitement in Paris and precipitated a government crisis. While these events occurred, an effort was made to calm the tumult by M. Brisson, then President of the Council in France, who strove to reopen the Dreyfus case against all the sinister interests of the hour that sought to defeat his doing so, including the adverse interests of the War Office, the Legislative Chamber, and a hostile and mercenary press. Happily for Dreyfus, a new administration in France was courageous enough to assert its independence of the army and order a revision of the facts of the case before the Court of Cassation. Even when this was determined upon, satisfactory enquiry was burked in many ways, and long delays ensued. Finally, on June 3, 1899, the Court of Cassation quashed the verdict of the 1894 court-martial and ordered a retrial by a new court-martial at Rennes. The exile at Ile du Diable was notified of this and a French cruiser was despatched to bring him to France. He landed at Quiberon on July 1st, and while awaiting trial at Rennes the nation had largely recovered from its insane prejudice against Dreyfus and had turned round and espoused his cause. Before this had happened the Dupuy administration had given place to that of the Waldeck-Rousseau ministry, while M. Loubet had in the month of February (1899) succeeded M. Faure in the presidency of France. These were auspicious omens that justice would at last be done to Dreyfus, while there was hope also in the appointment of General De Gallifet, as Minister of War, since he had hitherto been unsmirched by anti-Dreyfusism, and was known to be a strong as well as a patriotic Frenchman. A further link in the chain of evidence that made for Dreyfus's vindication was wrought about this time in the confession of a Major Esterhazy, a weak tool hitherto of the army chiefs, that he was the author of the *bordereau* which had sent Dreyfus into exile. Esterhazy, if the real culprit, had, however, betaken himself out of the country, and his criminality could not, therefore, be legally brought home to him. It further transpired that the famous *bordereau* was *not* the work of an artillery officer or an officer of engineers, and this increased the suspicion that Major Esterhazy, who belonged to the infantry branch of the French army, was the culpable person.

The new court-martial began its sessions at Rennes on August 7, and so strong still was the animus in certain quarters against the accused that within a week of the opening of the court Maitre Labori, Dreyfus's leading counsel, was shot in the back on his way to court. The learned counsel, however, quickly recovered and went on with the case, ably assisted by M. Demange, who acted also for the defence. The taking of evidence and other proceedings in the case protracted the trial till Sept. 7, and two days later a verdict was reached. Dreyfus was again found guilty by a vote of 5 to 2; but a majority of the court, finding extenuating circumstances, signed a recommendation to mercy, which President Loubet met by a pardon. Throughout the new trial there was little of any incriminating value in the evidence pro-

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duced, the six weeks proceedings being strung out by tattle of the flimsiest character, with great obsequiousness, even on the part of the bench, shown to military figureheads, and the manifest purpose of the army chiefs to endorse the previous conviction, and so save their face and gratify anew their class and racial hatred. For manifest reasons, important depositions likely to be favorable to Dreyfus, were refused to be heard by the court, and this weakened the defence and made it the more difficult to secure justice and salve the wounded honor of, obviously, a greatly injured man. The President signed a decree pardoning Dreyfus on the 19th of Sept. and he was set at liberty on the following day. The ill-used officer at once issued the following declaration: "The Government of the Republic restores me my liberty: it is nothing to me without my honor. From this day forth I shall continue to seek the reparation of the judicial error of which I am still the victim. I wish that France as a whole should know by a final judgment that I am innocent. My heart will not be at rest until there is no longer a Frenchman who imputes to me the abominable crime which another has committed."

The verdict was widely denounced outside of France as well as largely within it, since it proved how antiquated and farcical were French modes of justice, and how capable of abuse was the privilege, largely taken advantage of, of withholding testimony for so-called state or military reasons. Under such a system, it was widely held, any real defence of the accused was impossible, while prosecution by the government became a species of inquisition. Sympathy with France in her desire to conserve the honor of her army no one, no soldier at least, can withhold; but throughout the Dreyfus affair it was difficult to feel this sympathy when frenzied efforts — so characteristic of the entire proceedings — were resorted to, not to secure justice, but in large measure to shield culprits, screen rottenness, and conceal a great crime. This attitude of foreign critics in regard to the case has been well understood and even justified by Frenchmen themselves, one of whom thus frankly writes: "Under such conditions, why should we be astonished that a cry of amazement and disgust should be raised against us everywhere at the news that the Rennes court-martial had condemned Dreyfus? They have seen in this verdict a deliberate act of injustice; they have devoted the court-martial itself to infamy, and, what is more serious and at the same time supremely unjust, they have identified all France with this court-martial and have covered it with obloquy. This is the terrible situation. . . . Affairs having come to this point, it was inevitable that the situation should be made use of by our enemies in order to poison the mind of the world against us and even threaten to boycott the Exposition. These efforts have not produced the result expected. . . . The fact remains that unfavorable opinion toward us has increased, so all our efforts must be put forth to avoid everything in future that can discredit us anew." G. MERCER ADAM.

DREYSE, NICHOLAUS VON, inventor of the needle-gun, was born at Sömmerda, near Erfurt, in 1787. He was the son of a locksmith and bred to his father's trade. At Sömmerda he established a large factory for a manufactory of firearms, and in 1864 was ennobled for his invention of the needle-gun. He died in 1867.

DRIFT, a name given to the boulder-clay a deposit of the Bleistocene epoch. More fully, it is called the Northern Drift, Glacial Drift or Diluvial Drift in allusion to its origin. Drift-wood is wood carried by tides and currents to a distance from its native locality. Specimens thus transported have been observed in the marine strata of the chalk, London clay and other formations. Sand-drift is sand driven and accumulated by the wind. See GEOLOGY, Vol. X, pp. 325–327.

DRIFT, in mechanics, a conical hand-tool of steel for enlarging or shaping a hole in metal, by being driven through or into it.

DRIFT, in navigation, a technical name for the deviation which a ship's course receives by the action of a contrary wind or currents.

DRILL–BABOON. See MANDRILL, Vol. XV, pp. 484–485.

DRILL–PRESSES. See MACHINE TOOLS, in these Supplements.

DRILLS, tools for boring holes in metals. See MACHINE TOOLS, Vol. XV, pp. 156, 157.

DRILLS, implements for sowing grain. Machines have long been used for sowing grain. The object of the "drill" is to deposit seed in the ground in rows and then cover it. In this method of seeding, great advances have been made since colonial times. About the time of the adoption of the United States patent law the mechanical drill began to take practical form in England (for description of English drills, see AGRICULTURE, Vol. I, p. 285). The first successful grain-drill in the United States was invented in 1837 by Moses Pennock of Chester County, Pennsylvania, and patented by him in March 1841. It was improved by his son and in 1853 received the highest award at the International Exhibition in New York. Many forms of the graindrill are now in use, over 5,000 patents for this machine having been issued in the United States alone. It has been developed in the United States and Great Britain to a high state of perfection.

DRINK QUESTION, THE. See LIQUOR LAWS, in these Supplements.

DRINKWATER, JENNIE MARIA, American author, whose surname is Conklin, was born near Portland, Maine, April 14, 1841, and educated at Brooklyn. In 1880 she married the Rev. Nathaniel Conklin. Her chief publications are *The Fairfax Girls; Second Best; Other Folk; Miss Prudence Cromwell; The Story of Hannah; Looking Seaward; Goldenrod Farm;* and *Dolly French's Household.*

DRISLER, HENRY, classical scholar and educator, was born on Staten Island, New York, on December 27, 1818, and was graduated from Columbia College in 1839. He became a teacher in the Columbia College Grammar School, tutor in Greek and Latin in Columbia College in 1843,

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adjunct professor in 1845, professor of Latin in 1857, professor of Greek to succeed Dr. Henry Anthon, deceased, in 1867, and acting president for a time in the last named year. He edited many classical text-books, including Liddell and Scott's great *Greek Lexicon*, and ranked among the foremost classical scholars of his time. He died on November 30, 1897. W.F.J.

DRIVER, SAMUEL ROLLES, an English educator and author; born in 1846, educated at Oxford, of which he was elected scholar in 1865, and graduated with first-class honors in 1869; fellow of New College from 1870 to 1882, and tutor from 1875 to 1882. He applied himself early to the study of Hebrew and other Semitic languages, and obtained the two University Hebrew scholarships in 1866 and 1870, respectively, and was appointed, in 1875, member of the Old Testament Revision Company. In 1882 he was appointed to the regius professorship of Hebrew at Oxford (with a canonry of Christ Church attached). He wrote *A Treatise on the Use of the Tenses in Hebrew* (1874); *Isaiah: His Life and Times, and the Writings Which Bear His Name* (1888); *Notes on the Hebrew Text of the Books of Samuel* (1890); and of various articles relating to the Old Testament and Hebrew philology; and was also the joint editor of *The Holy Bible, With Various Renderings and Readings from the Best Authorities*, published by the Queen's printers in 1889. As a Hebraist and student of the Old Testament, he established a reputation upon the Continent and in America.

DRIVING. In the United States, furious driving in cities generally is a misdemeanor, punishable by fine and imprisonment. In the absence of state laws, municipalities regulate the rate of driving.

DROBISCH, GUSTAV THEODOR, poet and humorist; was born in Dresden, Saxony, on December, 26, 1811, and became a writer in poetry and prose. He had a keen perception of the droll side of life and of the foibles of society, and portrayed them with irresistible humor, wit and satire. His best known work is a collection of miscellany called *Conceits and Satires*. He died in Dresden on April 15, 1882. W.F.J.

DROIT D'AUBAINE. See ALIEN, Vol. I, p. 506.

DROMORE, a town in the northwest of Down County, Ireland, on the Lagan, 17 miles S.W. of Belfast by rail. It is noted for its linen manufactures and as the burial-place of Jeremy Taylor. Population, 2,408.

DRONGO-SHRIKE, the birds of the family *Dicruridæ*, found in Asia, Africa and Australia. They are glossy black in color. In India they are called king-crows, because they so successfully attack intruders, as crows or kites.

DROSCHKE OR DROSCHKY, a term originally used in Russia to designate any light vehicle, and applied in Germany to a public hack or cab, in the place of a fiaker. The name of fiaker, a public vehicle, is derived from the street of St. Fiacre in Paris, where the first public hacks, introduced in 1662 under Louis XIV, halted in front of an inn, having St. Fiacrius for its patron and sign. G.A.S.

DROSERACEÆ. See INSECTIVOROUS PLANTS, Vol. XIII, pp. 140–147.

DROSOMETER, an instrument for measuring the quantity of dew that collects on a surface exposed to the open air during the night. The simplest drosometer is a tussock of wool, weighed when dry, and again after the accession of dew. The general form is that of a balance, the portion for the weight protected, while the other side is left exposed so as to collect the dew.

DROUYN DE L'HUYS, ÉDOUARD, a French statesman, born in Paris, Nov. 19, 1805; died in Paris, March 1, 1881. From 1833–36 he was secretary to the embassy in the Hague and *chargé d'affaires* at Madrid in 1840; director of commercial affairs in the Ministry Exterior, and was in 1842 elected a deputy. He served as minister of foreign affairs from 1848–49 when he was appointed ambassador at London, and held again his former post in 1850, and from 1852–55, when he concluded the alliance with England, and (for the fourth time) from 1862–66. His failure to force Prussia to a concession of a French protectorate over the Rhenish provinces led to his resignation. He also was a senator from 1851–56. G.A.S.

DROWN, THOMAS MESSINGER, chemist and educator, was born in Philadelphia on March 19, 1842, and was educated at the University of Pennsylvania, Yale, Harvard, Columbia, Freiberg, and Heidelberg. He was professor of chemistry at Lafayette College in 1874–81, and at the Massachusetts Institute of Technology in 1885–95, and since 1895 has been president of Lehigh University. He has also been chemist of the Massachusetts state board of health, and secretary and president of the American Institute of Mining Engineers. W.F.I.

DROWNING, as a capital punishment, was long the custom. Tacitus tells us that the Germans hanged their greater criminals, but that meaner and more infamous offenders were plunged under hurdles into bogs and fens. Drowning was also a Roman punishment. The *Lex Cornelia* decreed that parricides should be sewed up in a sack with a dog, cock, viper and ape, and thrown into the sea. The Anglo-Saxon codes ordered women convicted of theft to be drowned. The pit, ditch or well was for drowning women; but the punishment was sometimes inflicted on men. As late as 1611 a man was drowned at Edinburgh for stealing a lamb. The custom survived in Scotland until 1685, and in France as late as 1793. See also CAPITAL PUNISHMENT in these Supplements.

DROYSEN, JOHANN GUSTAV, a German historian; born in Treptow on the Rega, July 6, 1808; was professor of history at Berlin from 1833–40; at Kiel from 1840–51; at Jena from 1851–59, and from 1859–64 in Berlin, where he died, June 19, 1884. Among his historical works are *Translations of Aristophanes* (1881), and *of Œschylus* (1884); *History of Alexander the*

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Great (1833); *History of Hellenism* (1877–78). G.A.S.

DROZ, ANTOINE GUSTAVE, novelist; was born in Paris on June 9, 1832, and at first studied art, for which he inherited a taste from his grandfather, the sculptor, Jean Pierre Droz. Later he turned his attention with much success to writing fiction. His *Monsieur, Madame, et Bébé*, in 1866, was one of the most popular books of its time. He died in October, 1895. W.F.J.

DRUGGET, a woven and felted coarse woolen fabric, usually with a printed pattern, chiefly used for covering carpets, and hence often called crumbcloth. The name is also given to a stout dress fabric made with a linen warp and a worsted weft. This stuff is still made by hand-loom in Scotland.

DRUIDS, UNITED ANCIENT ORDER OF. See BENEFIT SOCIETIES, in these Supplements.

DRUM ARMATURE. See ELECTRICITY, § 81, in these Supplements.

DRUMFISH, a large North American fish (*Pogonias chromis*) belonging to the family *Sciænidæ*, and so named from its peculiar sound, probably made by the clapping together of its large flattened molar-like teeth. R.W.C.

DRUMLIN, a term in geology for a low hill formed of an unstratified mass of glacial deposit. Such hills are found in Ireland, Scotland, and in the United States in Wisconsin, New York, and the New England states. The drumlins are generally rounded and smooth, but sometimes are rough, with steep sides.

DRUMMOND, HENRY, a Scottish clergyman and scientist; born near Stirling, Scotland, Aug. 17, 1851; graduated from the University of Edinburgh and afterwards studied at Tübingen University, Germany; ordained a minister of the Free Church, and was first stationed in Malta. In 1884 he was appointed professor in science in the Glasgow Free Church College, after a service of seven years as lecturer. He traveled a great deal and wrote an account of his African trip, *Tropical Africa* (1888). But it is as a scientific theologian that he is known to the world. He wrote *Natural Law in the Spiritual World* (1883); *Pax Vobiscum; The Changed Life; The Programme of Christianity* (1891); *The Greatest Thing in the World* (1893); *The Ascent of Man* (1894); *The City Without a Church;* and *Baxter's Second Innings.* Died in Tunbridge Wells, Eng., March 11, 1897. See his *Life*, by George Adam Smith, D.D. (1898).

REV. HENRY DRUMMOND.

DRUMMOND, THOMAS, an American jurist; born in Bristol Mills, Maine, October 16, 1809. In 1830 he was graduated from Bowdoin College and removed to Illinois in 1845 where he practiced law. In 1860 he was appointed United States circuit court judge for Illinois and in 1869 judge of the United States circuit court for Illinois, Wisconsin and Indiana. He was retired for age in 1884, and died at Wheaton, Illinois, May 15, 1890. W.M.C.

DRUMMOND ISLAND, an island at the northern end of Lake Huron, 18 miles long and 10 wide, belonging to Chippewa County, Michigan.

DRUMMOND LAKE. See DISMAL SWAMP, Vol. VII, p. 225.

DRUMMOND LIGHT OR LIME-BALL LIGHT, a very intense light, produced by directing an ignited stream of oxy-hydrogen gas upon a ball of lime. It was invented by Thomas Drummond of the British navy, in 1826. It was first used in coast-survey work to signal from one station to another.

DRUPE. See BOTANY, Vol. IV, p. 137.

DRUSUS, CLAUDIUS NERO. See TIBERIUS, Vol. XXIII, pp. 356–359.

DRYBURGH, a beautiful ruined abbey in Berwickshire, five miles E.S.E. of Melrose, on the Tweed. It contains the graves of Sir Walter Scott and of his son-in-law, Lockhart.

DRYDEN, a village of Tompkins County, central New York, 30 miles N. of Owego, on the Lehigh Valley railroad. It contains a graded school, a woolen mill, tannery, and a newspaper-office. It has a magnetic spring, and Dryden Spring Place attracts many health-seekers. Population 1900, 699.

DRYING-MACHINE, a name applied to an apparatus for drying long webs of calico and other fabrics. See BLEACHING, Vol. III, p. 710.

DRYOPHIDÆ. See SNAKES, Vol. XXII, pp 203–206.

DRY-PLATE PHOTOGRAPHY. See PHOTOGRAPHY, in these Supplements.

DRY TORTUGAS, Florida, a coral bank with ten projecting and low-lying islets mostly covered with mangrove bushes, at the entrance to the Gulf of Mexico, about 70 miles W. of Key West, and 120 miles W.S.W. of Cape Sable, the southernmost point of the Florida mainland; administratively they belong to Monroe County. The Loggerhead lighthouse, 150 feet high, is on the southwesternmost islet; on Bird or Garden Key another lighthouse stands within Fort Jefferson. The fort was built from 1860 to 1862 and during the Civil War Confederate prisoners were interned there. It is still used as a military garrison post and occasional prison. C.L.S.

DUALIN, an explosive compound invented by Carl Dittmar. Its composition is: nitrate of potassa, 20 per cent; sawdust, 30 per cent; nitroglycerine, 50 per cent. It is more sensitive to heat than dynamite, and can be exploded by the slightest friction even when frozen. It has twice the explosive power of dynamite. See NITROGLYCERINE, Vol. XVII, pp. 534–535.

DUALISM, the name given to a philosophical theory, according to which two principles of different natures, original, and incapable of being derived the one from the other, lie at the bottom of everything; as, for example, the ideal and the real; the spiritual and the material; the

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good and the evil, etc. See EVOLUTION, Vol. VIII, pp. 653–654.

DUAL NUMBER. See GRAMMAR, Vol. XI, p. 36.

DUANE, JAMES CHATHAM, soldier and engineer, was born at Schenectady, N. Y., on June 30, 1824, and was graduated from Union College in 1844 and from West Point in 1848. He was instructor in engineering at West Point in 1858, and treasurer of that Academy in 1859–61. In the Civil War he served at Fort Pickens, at Washington, and in the campaign from the Rapidan to the James River and before Petersburg. He served on the lighthouse board, and was the first to use steam whistles as fog signals. He was for some years president of the New York Aqueduct Commission. He rose to the rank of brigadier-general of the regular army. He died on November 7, 1897.

W.F.J.

DUANE, WILLIAM, an American journalist and politician; born near Lake Champlain, New York, in 1760. The son of Irish parents, when a boy was sent by them to Ireland to receive his training. He displayed throughout his life the spirit of the Irish agitator, to which he added a spitefulness which brought him many enemies and few friends. He was a printer by trade, and in 1784 went to India and began the publication of the Calcutta *World*, but soon made himself obnoxious to the authorities and was sent to England. There he became connected with the London *Times*. He moved to the United States in 1795, and in 1798 became editor of the *Aurora* of Philadelphia, a paper, in its time, of great political influence. He made use of his position to attack the Presidential administrations of Adams and Madison. While at first he had considerable influence, it was soon lost by reason of the coarse and vilifying editorials written by him. He left the *Aurora* in 1822 and went to South America, but returned the next year. He was given a small office as an attaché of the supreme court, and retaining it until his death, which occurred in Philadelphia, Pennsylvania, Nov. 24, 1835.

DUANE, WILLIAM JOHN, lawyer, son of the somewhat scurrilous editor, William Duane; was born in Ireland in 1780, and learned the printing trade from his father. He was admitted to the Philadelphia bar in 1815, drew up the will of Stephen Girard, won the favor of President Andrew Jackson, and was appointed by the latter Secretary of the United States Treasury to succeed Louis McLane, when the latter, in 1833, refused to aid Jackson in his war upon the United States Bank by withdrawing the government funds therefrom. Duane, however, also refused to withdraw the deposits, and Jackson accordingly soon dismissed him from the place, which was then given to Roger B. Taney. Duane then resumed the practice of law. He died on September 27, 1865.

W.F.J.

DUBBS, JOSEPH HENRY, clergyman and educator, was born at North Whitehall, Penn., Oct. 5, 1838, was graduated from Franklin and Marshall College in 1856, and became a clergyman of the German Reformed Church. Since 1875 he has been professor of history and archæology at Franklin and Marshall College. He has written a *Manual of the Reformed Church*, *History of the Reformed Church*, and other works, besides a great number of pamphlets, encyclopædia articles, etc. W.F.J.

DUBLIN, the metropolis and capital of Ireland. For early history, see Vol. VII, p. 428. Since 1880 the condition of the poorer parts of the city has been improved and blocks of artisans' dwellings have been erected. The most imposing structure, opened 1890, is the museum and library of the Royal Dublin Society. Modern means of transportation have been introduced and the harbor facilities increased. Pop. 1901, including suburbs, 379,861.

DÜBNER, FREDERICK, a German philologist; born in Gotha, December 21, 1802. He studied at Gotha and at Göttingen, and from 1826 to 1831 was professor in the gymnasium at Gotha. He then went to Paris and assisted Didot in preparing Stephen's *Thesaurus*. He next turned his attention to the *Bibliotheca Græca*, and the value of this collection is mainly owing to him. He also wrote for the *Revue de Philologie*. He died near Paris, October 13, 1867. W.M.C.

DUBNITZA, a town of Bulgaria, 33 miles S. of Sofia. It has iron-works. Pop. 6,000.

DUBOIS, a village of Clearfield County, western central Pennsylvania, located in the coal region, 129 miles N.E. of Pittsburg, on the Buffalo, Rochester and Pittsburg, and Mahoning Valley railroads. It has a machine-shop, planing and lumber mills, and a sash and blind factory. Population 1890, 6,149; 1900, 9,375.

DUBOIS, AUGUSTUS JAY, engineer and educator, was born at Newton Falls, Ohio, on April 25, 1849, and was educated at Yale (1869) and Freiberg. He was professor of civil and mechanical engineering at Lehigh University from 1874 to 1876, and since 1876 has filled the chairs of mechanical engineering, until 1884, and since 1884 of civil engineering, in the Sheffield Scientific School of Yale University. W.F.J.

DUBOIS, CLÉMENT FRANÇOIS THÉODORE, a French organist and composer; born in Rosney, Aug. 24, 1837. He early attracted attention in Paris, by his playing, and in 1861 won the prix de Rome. Since 1877 he has occupied Saint-Saëns's position as organist at the Madeleine, Paris. He is well known as a composer, chiefly on account of his *Les Sept Paroles du Christ* (1867). Others of his works are *Le Pain Bis* (1879); and *Abes-Hamet* (1884); and a number of single pieces.

DU BOIS, CONSTANCE GODDARD, author, was born at Zanesville, Ohio, the daughter of Delafield Dubois. She has written many historical and other tales, and has devoted much attention to the improvement of the condition of the Indians.

W.F.J.

DUBOIS, JOHN, a Franco-American clergyman; born in Paris, France, August 24, 1764. He studied at the college of Louis le Grande and the seminary of St. Magloire. He was ordained

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a Roman Catholic priest in 1781. He was forced to flee from France during the revolution, and removed to the United States in 1791. His first charge in America was at Norfolk, Virginia, whence he was transferred to Richmond, where he was for a time a guest in the house of James Monroe, and was the friend of prominent citizens, Patrick Henry undertaking his instruction in the English language. From Richmond he was transferred to Frederick, Maryland, the only priest then stationed between Baltimore and St. Louis. In 1809 he founded Mount St. Mary's College, near Emmittsburg, Maryland, and was its first president. He also at this time assumed the duties of chaplain and director of the House of the Sisters of Charity, then founded by Mrs. Seaton in the neighborhood of Emmittsburg. He was subsequently appointed bishop of New York, the diocese including the state and New Jersey. In 1838 he obtained a coadjutor in the person of John Hughes, who became his successor. He died in New York city, December 20, 1842. W.M.C.

DU BOIS, PATTERSON, assayer and educator; is a son of William Ewing Du Bois, who for many years was United States assayer in the Philadelphia mint, and who left the notable collection of coins now treasured there. He was born in Philadelphia on October 10, 1847, and was for many years in the assay department of the mint. In later years he has devoted himself to writing and lecturing on educational topics. He was for a time an editor of *The Sunday School Times*. W.F.J.

DUBOIS, PAUL, a French sculptor; born in Nogent-sur-Seine, July 18, 1829. He studied under Toussaint, in Paris. His first exhibited work was *Saint-Jean, a Child*, in 1860, done at Florence. He was made an officer of the Legion of Honor and a member of the Institute. Among the more famous of his works are *A Florentine Singer of the Fifteenth Century; Charity*, and *Narcissus at the Bath*. Was also a portrait-painter, an example of his work is *My Children*. Died May 23, 1905.

DU BOIS-REYMOND, EMIL, a German physiologist; born in Berlin, Nov. 7, 1818; noted for his researches in animal electricity, described in *Researches in Animal Electricity* (1848–60). In 1851 he was elected to the Berlin Academy of Sciences, of which he was permanent secretary from 1867–95. From 1849–55 he was teacher of anatomy at the Academy of Arts, succeeding, in 1858, his teacher, Johannes Müller, in the professorship of physiology at the University of Berlin, where he died, Dec. 26, 1896. He also wrote *The Limits of Knowledge of Nature and Ignorabimus; Voltaire as Naturalist*. G.A.S.

DUBUFE, EDOUARD, a French painter; born in Paris, March 30, 1820. He studied under his father, Claude Dubufe and Delaroche. He made a specialty of portrait-work, although he has done much on religious subjects. Among his portraits are those of the Princess Mathilde, Empress Eugénie, Rosa Bonheur and Alexandre Dumas, the younger. He was an officer of the Legion of Honor. He died in Versailles, Aug. 11, 1883.

DUBUFE, ÉDOUARD MARIE GUILLAUME, a French painter, son of the preceding; born in Paris, May 16, 1853. He studied under Mazerolle, and was taught by his father. Among his works are *The Death of Adonis* and *A Study* (1877) and *April* and *Saint Cecilia* (1878). The first year he received a medal of the third class, and the second year one of the second class.

DUBUQUE, a city of eastern Iowa and capital of Dubuque County (see Vol. VII, p. 435). It has extensive manufactories of carriages, wagons and plows, and its lumber and pork-packing interests are large. It has also manufactories of wooden-ware, brick, leather, white lead, shot, engines, machinery, farming implements, beer, flour, soap, candles, artificial stone, boots and shoes, etc. In addition to an excellent system of public schools, its educational interests include a German Presbyterian Theological Seminary, St. Joseph College and Academy (Catholic), St. Mary's Academy, the Iowa Institute of Science and Arts, several convents, a business college, and an Episcopalian school. Pop., 1900, 36,297.

DU CAMP, MAXIME, author; was born in Paris on February 8, 1822, and traveled extensively in the East. He wrote *Egypt, Nubia, Palestine and Syria* (1852), *The Convulsions of Paris*, a history of the Commune in four volumes (1878–79), and *Paris: Its Organs, Its Functions and Its Life*, his *magnum opus*, in six volumes (1869–75). Other works of minor value were *Modern Chants*, a volume of lyrical poems (1855); *Convictions* (1858), and several novels, including *Memoirs of a Suicide* (1853); *The Six Adventures* (1857), and *The Man with the Gold Bracelet* (1862). He died at Baden-Baden on February 8, 1894. W.F.J.

DUCAT. See NUMISMATICS, Vol. XVII, p. 673.

DUCATO CAPE, an abrupt headland, in lat. 38° 33′ N., long. 20° 23′ E., at the southwest extremity of Leukas or Santa Maura, one of the Ionian islands, dreaded by sailors for the fierce currents around it. From its summit criminals were anciently cast into the sea.

DUCCIO DI BUONINSEGNA. See SCHOOLS OF PAINTING, Vol. XXI, p. 451.

DU CHAILLU, PAUL BELLONI, a Franco-American traveler and author; born in Paris, July 31, 1835. As a youth he went to live in the French settlement at the Gaboon, on the west coast of Africa, where his father was a merchant. In 1852 he removed to the United States, where he afterward became a naturalized citizen, under the name of "Chaylion." In October, 1855, he left New York for the west coast of Africa, where he remained nearly four years, traveling on foot and in canoes, unaccompanied by any white man, upwards of 8,000 miles. During this time he shot and preserved the skins of over 2,000 birds and more than 1,000

PAUL B. DU CHAILLU.

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quadrupeds. The greatest novelties in the collections he made were several gorillas, never before hunted, and rarely, if ever before seen by any European. The results of his expedition were given in his *Explorations and Adventures in Equatorial Africa* (1861), a work which provoked considerable controversy. In 1863 he left England on a second expedition, reaching the mouth of the Ogobai, western Africa, in October. Here he lost his scientific apparatus by the swamping of a canoe, and was obliged to send to England for a fresh supply, occupying himself meanwhile in hunting excursions, during which he again had an opportunity of studying the gorilla. He subsequently traversed large portions of previously unknown country, but was in September, 1865, obliged to return to the coast in consequence of a conflict with the natives. He published an account of this expedition under the title, *A Journey to Ashango Land* (1867). He also wrote *The Land of the Midnight Sun* (1881); *The Viking Age* (1889); *The Land of the Long Night* (1899); *The World of the Great Forest* (1900); *How Animals, Birds, Reptiles and Insects Talk, Think, Work and Live* (1900). He died in St. Petersburg, Russia, April 30, 1903. W.M.C.

"DUCHESS, THE." See HUNGERFORD, MRS., Vol. XXVII p. 340.

DUCHOBORTZI, one of the numerous sects of mystics, which flourish in Russia, traceable to the eighteenth century, who depend upon an inward light, like the Quakers; attach little importance to the sacraments, priesthood, and services of the church; and reject the doctrine of the Trinity and of the divinity of Christ. Alexander I allowed them to settle in Taurida, in south Russia; Nicholas I, in 1841, transferred them to Transcaucasia and Siberia, where they have become quite a powerful sect. Their refusal to bear arms led to their persecution by the government, and in 1899 some thousands of them emigrated to Canada.

DUCKBILL. See PLATYPUS, Vol. XIX, p. 225.

DUCK RIVER, rises in Coffee Co., Tenn., follows a westward course, and enters the Tennessee river 16 miles S.W. of Waverly; length about 200 miles; navigable for about 50 miles for small craft.

DUCKWEEDS, the common name of species of the family *Lemnaceæ*, small, free-swimming water-plants, including the smallest of flowering plants. The plant is a small, floating, leaf-like body, from which roots hang downward. The extremely reduced flowers arise from a pocket-like hollow of the thallus-like body. Duckweeds multiply rapidly by branching, each branch repeating the form of the parent body, and thus speedily cover the surface of stagnant water. The genera are *Lemna*, *Speirodela* and *Wolffia*. The species are regarded as very much reduced arums.

DUCLERC, CHARLES THÉODORE EUGÈNE, a French politician; born Nov. 9, 1813, at Bagnères-de-Bigorre, in the Pyrenees. At the revolution of 1848 he became Under-Secretary of Finance March 6, and Minister of Finance May 10, when he retired from active politics on the nomination of Cavaignac for the Executive. In 1870 elected to the National Assembly, he became president of the Republican Left; in 1875 Vice-President of the National Assembly, and a Senator in August, 1882, Minister of Foreign Affairs under Grévy, which post he held till Jan. 15, 1883. He died in Paris July 21, 1888. G.A.S.

DUCROT, AUGUSTE ALEXANDRE, a French soldier; born in Nevers, Feb. 24, 1817. He entered the army in 1840 as a lieutenant, and at the time of the battle of Sedan, was a general in command of a division. At that battle he was taken prisoner and imprisoned. He escaped, however, and reached Paris in time to take an active part in the last battles of the Franco-Prussian war, and to help suppress the Commune. He afterward was elected to the Assembly, and used his influence against the Empire. He published *The Day of Sedan* (1871); *The Defense of Paris* (1878), and works of minor importance. He died in Paris, Aug. 17, 1882.

DUCTILITY. See WIRE, Vol. XXIV, p. 647.

DUDLEY, BENJAMIN WINSLOW, surgeon, was born in Spottsylvania County, Virginia, on April 12, 1785, and was educated at Transylvania University and the University of Pennsylvania, from which latter he received his doctor's degree in 1806. He afterward studied in London under Sir Astley Cooper and in Paris under various eminent surgeons. When he returned to America in 1814 he already had a wide reputation as a skilful practitioner. He settled at Lexington, Kentucky, and remained there until 1854, ranking as the foremost surgeon west of the Alleghany Mountains. He was the first professor of surgery at Transylvania University, and was a particularly successful instructor. He ranked as one of the foremost lithotomists of his time, and wrote a number of papers on such operations. He died at Lexington on January 20, 1870. W.F.J.

DUDLEY, CHARLES EDWARD, an American public man; born in Staffordshire, England, May 23, 1780. He came with his mother to Newport, R. I., in 1784. He entered into mercantile pursuits and removed to New York, and in 1811 settled in Albany. He was State senator, 1820–25; mayor of the city in 1821 and 1828; and in 1829 was appointed United States Senator to serve out the unexpired term of four years of Martin Van Buren. He founded and endowed the Dudley Observatory at Albany. He died in Albany, Jan. 23, 1841. E.E.T.

DUDLEY, EDMUND, an English jurist and statesman under Henry VII. He and Richard Empson were the principal tools of Henry in his maladministration of law which brought such a hatred of the people on their head, that Henry VIII, successor of Henry VII, sent Dudley and Empson to the block, Aug. 18, 1510. G.A.S.

DUDLEY, HENRY BATE, a British journalist and clergyman; born in 1745, in Fenny Compton, England. A man of great ability, he distinguished himself in several lines. He was a writer of no mean talent; his *Rival Candidates* (1775), and *Travellers in Switzerland* (1793), both comic

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operas, established him among the dramatists of his time. His services as a magistrate were such as to bring him a baronetcy. As a clergyman, he became prebendary of Ely. He established the *Morning Post* in 1775 and the *Morning Herald* in 1780. He was the author of several pamphlets on political economy. He died in London, Feb. 1, 1824.

DUDLEY, JOSEPH, an American colonial governor; born in Roxbury, Mass., Sept. 23, 1647. He graduated at Harvard in 1665; was sent to England as agent of the Province in 1682 and 1689; was president of New England in 1686; and a few months later was made chief justice. He was chief justice of New York, 1690–93; lieutenant-governor of the Isle of Wight, 1694–71; and governor of Massachusetts, 1702–15. He died in Roxbury, April 2, 1720. E.E.T.

DUDLEY, PAUL, an American jurist; born in Roxbury, Massachusetts, September 3, 1675. He was graduated from Harvard College in 1690 and finished his law studies at the Temple in London, England. He returned to Massachusetts in 1702 with the commission of attorney-general, which he held until he was appointed judge in 1718. In 1745 he was appointed chief justice. In his will he bequeathed $500 to Harvard College, the interest of which was to be applied to the support of an annual lecture which, is called from its founder, the Dudleian lecture. He died in Roxbury, January 15, 1751. W.M.C.

DUDLEY, THOMAS UNDERWOOD, clergyman, was born at Richmond, Virginia, on September 26, 1837, and was educated at the University of Virginia. He served as an officer of the Confederate army in the Civil War, and afterward studied theology at the Virginia Theological Seminary and became a priest of the Protestant Episcopal Church. In 1875 he was made assistant bishop and in 1884 bishop of Kentucky, in which office he had a distinguished and useful career. In 1901 he was elected chairman of the house of bishops. He was the author of several ecclesiastical books. He died in New York City on January 22, 1904. W.F.J.

BISHOP DUDLEY.

DUE PROCESS OF LAW, a legal term which means according to law, in the regular course of its administration by courts of justice. The fifth amendment to the constitution of the United States provides that no person shall be deprived of life, liberty or property, without due process of law, and the fourteenth amendment provides that no state shall deprive a person of life, liberty or property without due process of law. The state constitutions contain similar provisions. The term "due course of law," or "the law of the land," is sometimes used in the same sense.

DUER, JOHN, an American jurist; born in Albany, N. Y., Oct. 7, 1782. He served two years in the army, and then studied law. He commenced practice in Orange County, N. Y., whence, about 1820, he removed to New York. In 1825 he was appointed a member of the statute revision committee. In 1849 he was elected a justice of the superior court of New York city, a position which he held till his death. In 1857 he became the presiding justice. He compiled six volumes of reports of cases decided in his own court. He died on Staten Island, Aug. 8, 1858. E.E.T.

DUER, WILLIAM ALEXANDER, an American jurist and educator; born in Rhinebeck, Dutchess County, New York, September 8, 1780. He studied law and was admitted to the New York bar in 1802. From 1814 to 1820 he was a member of the state legislature, taking a prominent part in the debates on the establishment of canals and other important questions. He was also the author of the New York state school laws, upon which the laws of the present day are based. In 1822 he was appointed judge of the supreme court in the third circuit, an office which he held until the close of 1829, when he was elected president of Columbia College. He retired from this office after twelve years of service. He was the author of a treatise on the *Constitutional Jurisprudence of the United States*, published in 1847; *A Life of William Alexander, Earl of Sterling*, and wrote numerous papers upon American historical subjects for the magazines and reviews. He died in New York city, May 30, 1858. W.M.C.

DUEZ, ERNEST ANGE, a French painter; born in Paris, March 8, 1843; studied in the atelier of Pills, and made his appearance in the Salon of 1868. He was a figure-painter of unusual talent. He was made an officer of the Legion of Honor in 1889. Among his paintings are *Combat Between Roland and Oliver* (1869); *The End of October* (1877); *Saint Cuthbert* (1879), and a number of scenes from Parisian life. He died in Paris, April 5, 1896.

DUFF, ALEXANDER, a Scottish Presbyterian missionary; born in Moulin, April 25, 1806. He went to India in 1829, the first missionary sent out by the Church of Scotland to that country. He was the first missionary to combine educational with religious teaching. He founded a school at Calcutta which grew into large proportions. He joined the Free Church party of the Church of Scotland after the rupture of 1843. He continued in missionary work until 1863, when his health compelled him to remain in Scotland. He was a professor in New College, Edinburgh, at the time of his death. He was perhaps the most influential member of the Free Church. He died in Edinburgh, Feb. 12, 1878.

DUFF, SIR MOUNTSTUART ELPHINSTONE GRANT, a British lawyer and statesman; born in 1829, and educated at Edinburgh and Oxford, where he graduated in 1853. He was called to the bar in 1854, and entered the House of Commons in 1857,

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as member for the Elgin burghs, continuing to represent that constituency in the Liberal interest till 1881. He was appointed Under Secretary of State for India in 1868, and held that office till 1874. On the formation of Mr. Gladstone's second administration in May, 1880, he was appointed Under Secretary of State for the Colonies. This office he resigned in July, 1881, on being appointed governor of Madras. During his successful administration of this great province, he made several tours from end to end of the presidency, in order to see with his own eyes what was requisite to be done. In 1886 he resigned the governorship. He was lord rector of the University of Aberdeen from 1866 to 1872. He is the author of *Studies in European Politics*, and other works.

DUFFERIN AND AVA, Frederick Temple Hamilton-Temple Blackwood, Marquis of, a British diplomat, statesman and author; born in Florence, Italy, June 24, 1826, of Irish parentage. He was the son of Hon. Price Blackwood, fourth baron of Dufferin. He was educated at Eton and at Christ Church, Oxford, and succeeded to the title of baron in 1841. During the potato famine in Ireland, he visited the affected districts and gave a straightforward account of his terrible experiences in *A Narrative of a Journey from Oxford to Skibbereen*. He also wrote on *Irish Emigration, and the Tenure of Land in Ireland; Mr. Mill's Plan for the Pacification of Ireland Examined*, and *Contributions to an Inquiry on the State of Ireland*. In 1855 he was attached to Lord John Russell's mission to Vienna. In 1859 he made a yacht voyage to Iceland, and published the highly popular *Letters from High Latitudes*. In 1860 he he was sent by Lord Palmerston as British commissioner in Syria, where he investigated with firmness and ability the difficult question of the massacre of the Christians and was rewarded with a K.C.B. From 1864 to 1866 he was under-secretary of state for India, but was transferred from that post to the War Office, as under-secretary, where he remained until June, 1867. From 1867 to 1872 he was chancellor of the Duchy of Lancaster, and was then appointed governor-general of Canada. He ranks among the highest of the administrators of the Dominion. The growing prosperity of Manitoba was carefully encouraged, the discontent which inspired British Columbia to secede from the Dominion was overcome by his wise administration. Upon his return to England in 1878 when the Marquis of Lorne succeeded him, honors were showered upon him in the shape of honorary degrees. Appointed ambassador to Saint Petersburg in 1879, he was sent to Constantinople in May, 1882, to conclude a convention with the Porte for the joint occupation of Egypt. In October, 1882, he went to Cairo, and remained there until April, 1883, to settle the affairs of the country after Araby Pasha's rebellion. Immediately after his arrival, the Dual Control was abolished by Khedival decree. In December, 1884, he succeeded Lord Ripon, who had become highly unpopular with the European community, as the Viceroy of India. In December, 1885, Burmah was annexed to England on the deposition of King Thebaw, and in a Budget speech made shortly afterwards the Viceroy announced the necessity of increased military preparations in view of the southward advance of Russia. The attack on Penj-deh was replied to by the fortification of Herat under British supervision, but the crisis gradually passed away, and in 1886 the Viceroy was able to congratulate the Afghan Boundary Commission on the completion of its labors. Lord Dufferin's viceroyalty came to an end in 1888, when he was created a marquis and was appointed minister at Rome in 1888, and ambassador to France in 1891. A volume of his *Speeches and Addresses* appeared in 1882 and *Speeches Delivered in India* (1890). He died at Clandeboye, Ireland, February 12, 1902. W.M.C.

MARQUIS OF DUFFERIN.

DUFFERIN, Lady Harriet, an English authoress, and wife of the Marquis of Dufferin and Ava, was born in 1843 at Killyleagh Castle, County Down, Ireland, her father being Captain Archibald Rowan Hamilton. She married Lord Dufferin in 1862, and contributed largely to her husband's popularity while he filled the posts of Governor-General of Canada and India, and served the crown on his various embassies at St. Petersburg, Constantinople, Rome and Paris. In Canada, during his administration, in the years 1872–78, Lady Dufferin took a hearty interest in woman's educational work, and by her social graces and inimitable tact she endeared herself to all. In India she devoted herself with rare enthusiasm to philanthropic work among the native women, an account of which she published in 1889 in *A Record of Three Years' Work*, and in *Our Viceregal Life in India*, which appeared in the following year. In 1891 she published *My Canadian Journal*, an interesting narrative of viceregal journeys through various portions of the Canadian Dominion, with some acute chapters on the social life as well as the physical beauties of the country.

DUFFIELD, George, clergyman, was born in Pennsylvania on October 7, 1732, was graduated from Princeton, and became a Presbyterian minister. For a time he was chaplain of the Continental Congress, and he was ardently devoted to the cause of American independence. He was a leader of the "New Light" party in the church and was the first stated clerk of the General Assembly. He died on Feb. 2, 1790. W.F.J.

DUFFIELD, George, 2nd, grandson of George Duffield, clergyman, was born in Pennsylvania in 1794 and became a minister of the Presbyterian Church. He wrote a number of books, on slavery,

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the episcopacy, millenarianism, and other topics. He died in 1868. W.F.J.

DUFFIELD, GEORGE, 3rd, son of George Duffield, 2nd, clergyman, was born at Carlisle, Penn., on September 12, 1818, and was graduated at Yale in 1838 and from Union Theological Seminary in 1840. He was the pastor of a number of Presbyterian churches and was the author of many poems and hymns, some of which — such as *Stand up, Stand up for Jesus* — have gained wide popularity. He was for some years one of the regents of the University of Michigan, and he received the degree of D.D. from Knox College, Illinois, in 1871. His son was Samuel A. W. Duffield, clergyman and author (q. v.). He died on July 6, 1888. W.F.J.

DUFFIELD, JOHN THOMAS, an American mathematician; born in McConnellsburg, Pennsylvania, February 19, 1823. He was graduated from Princeton in 1841 and from the Princeton Theological Seminary in 1844. He taught at the Philadelphia Union Academy and was then called to Princeton where he was adjunct-professor of mathematics in 1847, and professor of mathematics in 1856. He wrote *The Discovery of Gravitation* (1863); *The Philosophy of Mathematics* (1867), and other works. He died in Princeton, New Jersey, April 10, 1901. W.M.C.

DUFFIELD, SAMUEL AUGUSTUS WILLOUGHBY, an American clergyman and poet; born in Brooklyn, New York, September 24, 1843. He was graduated from Yale College in 1863 and became a Presbyterian minister at Bloomfield, New Jersey. He wrote *English Hymns* (1866); *Latin-Hymn Writers* (1877), and contributed numerous poems to the magazines. He died in Bloomfield, May 12, 1887. W.M.C.

DUFFY, SIR CHARLES GAVAN, statesman; was born in Ireland in 1816, and became a journalist in Dublin and Belfast. He joined Thomas Davis and John Dillon in 1842 in founding the *Nation*, the organ of "Young Ireland." In 1844 he was tried and convicted for sedition, but his conviction was quashed by the House of Lords. He was associated with O'Connell and Smith O'Brien, organized the Independent Irish party, and was elected to Parliament. In 1856 he went to Australia, became Victorian minister of public works, and prime minister in 1871. He was knighted in 1873, and in 1877 was speaker of the Victorian assembly. He published *Ballad Poetry of Ireland* in 1850; *Young Ireland* in 1880, and *Four Years of Irish History, 1845–49*, in 1883. He died on February 9, 1903. W.F.J.

DUFFY, JOHN GAVAN, Australian statesman, son of Charles Gavan Duffy; was born in Dublin on October 15, 1844, and has filled various ministerial offices in Victoria, Australia. W.F.J.

DUGHET, GASPARD. See POUSSIN, Vol. XIX, p. 670.

DUHAMEL, JOSEPH THOMAS, clergyman, was born in Canada on November 6, 1841, and entered the priesthood of the Roman Catholic Church. In 1874 he became bishop and in 1886 first archbishop of Ottawa, Canada. W.F.J.

DÜHRING, EUGEN KARL, a German philosopher and political economist; born in Berlin, Jan. 12, 1833. He was appointed referendary in the court of justice, but resigned and devoted himself to the study of philosophy and national economy. From 1864 to 1877 he was a private tutor in the Berlin University. He wrote extensively on economical and philosophical subjects; among them, *Capital and Labor* (1865); *The Cost of Living* (1865); *Critical Basis of Popular Economy; History of National Economy and Socialism* (1879); and *Theory and Logic of the Sciences* (1878).

DUHRING, LOUIS ADOLPHUS, physician and educator, was born in Philadelphia on December 23, 1845, and was educated at the University of Pennsylvania, medical department. He served in the Philadelphia Hospital, and then pursued those studies in London, Paris and Vienna for several years. He was the head of a dermatological dispensary in Philadelphia from 1870 to 1880, and from 1871 to 1876 was lecturer at the University of Pennsylvania. Since 1876 he has filled the professorship of diseases of the skin in that university. He is the author of a work on skin diseases which has been translated into many other languages; of an Atlas of skin diseases, and of various other works. W.F.J.

DUILLIAN COLUMN. See LATIN, Vol. XIV, p. 329.

DUKERIES, THE, a familiar English name for the wooded district around Worksop, in Nottinghamshire, from the number of ducal residences it contains. The most interesting of these is Welbeck Abbey, the seat of the Duke of Portland, which lies four miles southwest of Worksop. It is approached by a tunnel two miles in length, leading to a curious series of underground apartments, including a large library, a ballroom, a picture-gallery with some valuable paintings, and a spacious riding-school. Worksop Manor, adjoining the town on the southwest, was formerly a seat of the Duchess of Norfolk, until its purchase by the Duke of Newcastle. The magnificent domain of this last-named nobleman, Clumber Park, is situated three miles southeast of Worksop. The house contains a fine collection of historical portraits and the lake is an angler's paradise. Thoresby, formerly the property of the Duke of Kingston, is here and these park glades reach Sherwood Forest, the legendary greenwood home of Robin Hood. The Dukeries is a resort of tourists and artists.

DULAG, a town in Leyte, near Manacagan Mt., Philippines, on E. coast of island. Pop. 1903, 14,884.

DULCE Y GARAY, DOMINGO, Marquis of Castell-Florit, soldier; was born in Spain about 1806, rose to eminence in the Spanish army, and took a leading part in the revolution of 1854. He was captain-general of Cuba in 1862–66, and won honorable distinction for his vigorous suppression of the African slave trade. He was an associate of Marshal Prim in the revolution which dethroned Isabella II, and in 1869 returned to Cuba as captain-general, but resigned in a few months, and died on November 29, 1869. W.F.J.

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DULCIMER, a musical instrument resembling a flat box, with sounding-board and bridges, across which run wires tuned by pegs at the sides. It is played by striking the wires with a small piece of wood in each hand, or more usually with two cork-headed hammers. The dulcimer is one of the most ancient of instruments, appearing in Assyrian sculptures, and may be regarded as the ancestor of the piano. It is used to-day in Hungary by the gipsies, and is known in Transylvania as the "santir." It resembles very much the psaltery, the only great point of difference being in the manner of striking the wires. The psaltery is played by means of plectra of ivory or metal, and sometimes with the fingers.

DU LHUT or DU LUTH, Daniel Greysolon or Gresolon, Sieur de, pioneer; was a Frenchman, who came to America in early colonial days, and did much exploring in the upper valley of the Mississippi, and in the region of Lake Superior and in Canada. He was a contemporary of Hennepin and La Salle (q. v.), and on at least one occasion rescued the former from captivity among the Indians. He engaged in the fur trade, and seems to have had more influence with the Indians than almost any of his associates. History has paid somewhat less attention to him than to Hennepin, La Salle and others, but he deserves honorable remembrance as one of the foremost pioneers of the northwest. The very spelling of his name is uncertain, the various forms which we have indicated having been used, together with others. While, however, modern writers have generally adopted the form Du Lhut, and while there is reason to believe it is the more correct, the alternative Du Luth has been adopted as the name of the city at the head of Lake Superior, which is perhaps his best memorial, and which is said to have been founded by his son more than a hundred years before it became an organized city. (See Duluth, infra.) W.F.J.

DULONG, Pierre Louis, a French physicist and chemist; born in Rouen, Feb. 12, 1785; became, in 1820, professor, and in 1830, director of the Polytechnical School of Paris. He died July 19, 1838. Besides his work on the composition of chloride of nitrogen (1811), he, with Petit, discovered the Dulong-Petit law: that the specific heat, multiplied with the atomic weight, gives approximately the same product, *i. e.*, atomic heat, with all aggregate elements. G.A.S.

DULSE or DILLESK. See Algæ, Vol. I, p. 449.

DULUTH, a city of northeastern Minnesota, and capital of St. Louis County (see Vol. VII, p. 449). The city received its name from Jean Du Lhut, who built a hut on Minnesota Point in 1760. It dates as a city from 1869. Duluth is a port of entry, most advantageously situated at the western extremity of Lake Superior, at the head of navigation on the great lakes. It is also at the eastern terminus of the Northern Pacific, Duluth and Iron Range, St. Paul and Duluth, Great Northern, Duluth, Missaba and Northern, Chicago, St. Paul, Minneapolis and Omaha, Duluth and Winnipeg, and Lake Superior and Mississippi railroads. The harbor of Duluth has recently been improved greatly by the United States government, which has expended large sums in dredging. The harbor is protected by a narrow strip of land, called Minnesota Point, which forms a natural breakwater, and through which there is a ship-canal. Duluth has large saw-mills, blast-furnaces, grain-elevators with a combined capacity of over 20,000,000 bushels, car-works, and over 433 other manufactories. Numerous regular lines of steamers connect the city with the lake ports. Duluth has fine public schools and buildings, the high school building costing $300,000. It has private, business, college-preparatory and parochial schools, and a large public library. Duluth has one of the finest park and boulevard systems in America. The terrace or boulevard drive, 9 miles in length, winds about the hillsides at a height, in some places, of 500 feet above the lake shore, connecting Glenwood, Grand View and Cascade parks. This system of driveway and parks is rapidly being extended, and will cover about 50 miles. Extensive deposits of iron, granite and freestone are found in the vicinity. Population 1880, 3,483; 1890, 32,725; 1900, 52,969. See Duluth, Vol. VII, p. 449.

DUMAGUETE, capital of the province of Negros Oriental, P. I., north of point of same name on S. E. coast. Inhabitants chiefly engaged in gathering turtle shells and trading in cotton. Pop., 1903, 14,894.

DUMAS, Alexandre, the younger, a French novelist; was born in Paris, July 28, 1824; was educated at the Collége Bourbon. He was the son of Alexandre Davy Dumas, the author of *Monte Cristo* and the *Three Musketeers*, and the grandson of General Dumas, a distinguished officer of the first empire. The younger Dumas was brought up among actors and literary people, and at an early age began to write poetry and sketches. His first important work, *La Dame aux Camélias* (1848), was produced as a drama in 1852. It forms the basis of Verdi's opera, *La Traviata*. M. Dumas's novels deal chiefly with the *demi-monde*. He wrote a number of bright comedies. He became a member of the French Academy in 1875, and a grand officer of the Legion of Honor in 1894. Among his most popular writings are *Le Fils Naturel* (1858); *L'Ami des Femmes* (1864), produced in New York in 1896, under the title, *The Squire of Dames; L'Affaire Clémenceau* (1873); *Dénise* (1885); and *Francillon* (1887). Died in Paris, Nov. 27, 1895.

ALEXANDRE DUMAS (FILS).

DUMAS, Jean Baptiste André, a French chemist; born in Alais, July 14, 1800. He made numerous important discoveries in organic chemistry, isomerism, the law of substitutions, and other departments of chemical philosophy. He

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was professor of chemistry at the Athenæum, and afterward at the Sorbonne. From 1849 to 1851 he was Minister of Agriculture and Commerce, and afterward became a life senator. He was a member of the Academy of Sciences, of the Institute, and of the French Academy. His chief work is a *Treatise on Chemistry Applied to the Arts*. He died in Cannes, April 11, 1884.

DU MAURIER, George Louis Parmella Busson, a Franco-English caricaturist, book-illustrator and author; born in Paris, March 6, 1834. In 1851 he studied chemistry at University College, London, but returned to Paris and adopted art as a profession. After doing miscellaneous work in illustration and caricature for *Once a Week* and the *Cornhill Magazine*, he finally joined the staff of *Punch*, the pages of which he has enriched with well-known caricature sketches of society life. He was elected an associate of the Royal Society of Painters in Water-Colors. During 1890 he published a series of essays on his art, and numerous reprints of his sketches in *Punch*. He has illustrated Thackeray's *Henry Esmond*, and *The Story of a Feather*, by Douglas Jerrold, and a number of other works. He was more famous as a writer than an artist. In 1891 he published *Peter Ibbetson*, which attracted attention, but did not attain the popularity of his later work, *Trilby*, which, published in 1894, was the phenomenal success of that or many a year. It is an attractive story of artist life in the Quartier Latin of Paris, with a pathetic and more than beautiful center figure, who gave her name to the tale. A tinge of hypnotism, "out of the mysterious East," added to the crispest of dialogue, completed the positive quantities of the work. It appeared serially in *Harper's*, and, while it was favorably received, the *furore* did not come until the entirety of the story came in book form. Then a "Trilby craze" seized America and traveled across the Atlantic. The story was also dramatized and was a success on the boards. But to attribute to *Trilby* any permanent place in English literature is beyond the dreams of any reviewer. In 1896 a new story, *The Martian*, was published in *Harper's Magazine*, and to its first appearing a melancholy interest attaches, owing to the demise, in London, Oct. 8, 1896, of its versatile author. In his novels, as well as in his art contributions to *Punch*, he struck an entirely new note. With not a little of the art and much of the *bonhomie* of Thackeray, he had none of that novelist's biting cynicism, for his pictorial satires of society and representations of Bohemian life are wrought in the manner of an accomplished and gay-hearted man of the world.

GEORGE DU MAURIER.

DUMB. See Deaf and Dumb, Vol. VII, pp. 5–13.

DUMB-CANE (*Dieffenbachia Saguine*), a plant of the family *Araceæ*, differing remarkably from the plants of that family generally, in its almost arborescent character, but agreeing with them in its acridity, which is in none of them more highly developed. It has a cylindrical stem, with ringed scars and oblong-ovate leaves. It is a native of the West Indies, and has received its English name from the property which it has of producing dumbness when chewed, its acrid poisonous juice causing an immediate swelling of the tongue, accompanied with excruciating pain. It has, however, been used medicinally.

DUMICHEN, Johannes, a German Egyptologist; born in Weissholz, Silesia, Oct. 15, 1833. After a course of study in archæology at Berlin and Breslau, in 1862 he made an expedition into Egypt, studying the monuments of the valley of the Nile, exploring Nubia, the Soudan and parts of the White and Blue Nile. He returned to Prussia in 1865, with valuable copies of hieroglyphic inscriptions. Afterward he was sent on several scientific expeditions, and in 1872 was appointed a professor at the University of Strasburg. Among his works are *Geographic Inscriptions on the Ancient Monuments of Egypt* (1866); *Temples and Tombs of Ancient Egypt, Their Sculptures and Inscriptions* (1872); and a *History of Ancient Egypt* (1877).

DU MOND, Frank V., artist, was born at Rochester, N. Y., in 1865, and studied art in Paris under Boulanger, Lefebvre and Benjamin Constant. He received a medal at the Paris Salon of 1890, and is an associate of the National Academy of Design. W. F. J.

DUNA FÖLDVAR. See Földvar, Vol. IX, 311.

DUNBAR, Paul Laurence, author; was born of African parentage at Dayton, Ohio, on June 27, 1872, and was educated at the Dayton high school. He has done newspaper work, and has written novels and several volumes of poems, is a frequent contributor to the principal magazines, and has appeared in public as a reader of his own poems and as a lecturer. W. F. J.

DUNCAN, Sara J., the maiden and pen-name of Cotes, Mrs. Everard, q. v., XXVI, p. 291.

DUNCAN, William Wallace, clergyman, was born at Boydton, Virginia, on December 20, 1839, and was educated at Randolph-Macon and Wofford Colleges. He became a minister of the Methodist Episcopal Church, South, in 1859; was a chaplain in the Confederate army in the Civil War; was professor of intellectual and moral philosophy in Wofford College in 1875–86, and was elected a bishop in 1886. W. F. J.

DUNCKER, Maximilian Wolfgang, historian; born in Berlin, Oct. 3, 1811. After studies at Bonn and Berlin he settled to the study of history at Halle, and became professor there in 1842. His greatest work is his *History of Antiquity*, which embraces the early history of the Egyptians, Babylonians, Lydians, Persians, and Hindus. Died in Anspach, July 22, 1886.

DUNDAS or JUBA ISLANDS, British East Africa, a chain of about 500 coral islets fringing the coast southward from the mouth of the Juba River on the Indian Ocean. C. L. S.

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DUNDAS, a strait in North Australia, separating Melville Island from Coburg Peninsula, and connecting the Arafura Sea with Van Diemen's Gulf. It is 18 miles wide and 40 long.

DUNDAS, a town of Wentworth County, southern Ontario, at the head of Burlington Bay, west of Lake Ontario, on the Grand Trunk railroad and the Desjardins canal. It has unlimited water-power, and manufactures iron castings, machinery, tools, woolen and cotton goods and wooden articles. Population 1901, 3,173.

DUNDAS, an island in Dixon Entrance, British Columbia, 40 miles N.E. of Queen Charlotte Island, and separated by Chatham Sound from the most southerly of the Alaskan Islands. Lat. 54° 25′ N., long. 30° 35′ E.

DUNDAS, Henry. See Melville, Viscount, Vol. XV, pp. 851–852.

DUNDEE, a village of Monroe County, southeastern Michigan, on the Raisin River, 44 miles S.W. of Detroit, on the Ann Arbor, the Cincinnati, Jackson and Mackinaw, and the Lake Shore and Michigan Southern railroads. It contains flouring-mills, a furniture factory, creameries, a pulp-mill, tannery, and factories where lumber and staves are made. The region about is a fertile agricultural one. Population 1900, 1,118.

DUNDEE, a village of Yates County, western central New York, 3 miles W. of Seneca Lake and 32 miles N. of Elmira, on the Fall Brook railroad. It has foundries, flour-mills, a brewery and a planing-mill. Population, 1900, 1,291.

DUNDRUM BAY, an inlet of the Irish Sea, on the east coast of Ireland, in County Down, five miles S. of Downpatrick. It is 13 miles wide at the entrance and only 5 miles long to its inmost recess, forming a long curve into the shore.

DUNE. See Geology, Vol. X, p. 236; Sahara, Vol. XXI, pp. 157–158.

DUNEDIN, New Zealand, a seaport city of South or Middle Island at the head of the picturesque land-locked Otago Harbor on the E. coast. New features include the Town Belt, an encircling driveway, improved waterworks, electric lighting and street-railways, botanical and acclimatization gardens, and the Jubilee Park. See Vol. VII, p. 467. Pop., 1901, 52,390. C.L.S.

DUNFISH, codfish that have been cured so that they are of a dun color. The usual process, formerly much used in New England, was to pack them in salt and keep them covered in a dark place for two or three months. They were then unpacked, resalted and covered, and after two or three months more they were ready for use. R.W.C.

DUNGENESS, England, a low-lying projection in the English Channel with a light-house. It is the southernmost point of Kent. C.L.S.

DUNGLISON, Robley, physician and educator, was born at Keswick, England, in 1798, and came to America in 1822. He was professor of medicine in the University of Virginia from 1824 to 1833, professor of materia medica and therapeutics in the University of Maryland from 1833 to 1836, and after 1836 professor of the institutes of medicine and medical jurisprudence in Jefferson Medical College, Philadelphia. He is best known by his writings, which have world-wide acceptance as standard treatises on physiology, therapeutics, materia medica, and medical science generally. He has been called, with justice, the "father of American physiology." He died on April 1, 1869. W.F.J.

DUNKIRK, an important city of Chautauqua County, New York, in the western part of the state. It is a port of entry on Lake Erie, and is reached by the Lake Shore and Michigan Southern, the Erie (of which it was the original western terminus), the New York, Chicago and St. Louis, and several other railroads. It has a good harbor, which is marked with a lighthouse. Its population in 1890 was 9,416, and in 1900 it was 11,616. W.F.J.

DUNLAP, a village of Harrison County, western Iowa, on Boyer River, 51 miles N.E. of Omaha, on the Chicago and North-Western railroad. It has a flour-mill, a newspaper-office, a fine hotel and carries on a thriving trade. Population 1900, 1,355.

DUNLAP, William, an American artist and dramatist; born in Perth Amboy, New Jersey, February 19, 1766. He studied art in New York city and under Benjamin West in London. Upon his return to America he wrote several plays, including *The Father* (1789); *Leicester* (1794), and *André* (1798). He also wrote *Life of George Frederick Cooke* (1813); *Life of Charles Brockden Brown* (1815); *History of the American Theater* (1832), and *History of the Rise and Progress of the Art of Design in the United States* (1834). He died in New York city, September 28, 1839. W.M.C.

DUNLIN. See Sandpiper, Vol. XXI, p. 273.

DUNMORE, an important village of the Lackawanna valley, in Lackawanna County, northeastern Pennsylvania, three miles N.E. of Scranton, on the Erie and Wyoming Valley railroad. The coal business is the chief employment of the town, as rich mines of anthracite are in the vicinity. Population 1890, 8,315; 1900, 12,583.

DUNMORE, Earl of, whose name was John Murray, was born in Scotland in 1732, and succeeded to the peerage as fourth earl in 1756. He was appointed governor of New York, and afterward of Virginia, in 1770. In 1773 he dissolved the Virginia legislature because of its adoption of resolutions for the appointment of a Committee of Correspondence with the other colonies for concerted action to secure their rights. Another dissolution followed in 1774, because of the appointment of a fast day over the Boston Port bill. In 1775 he prohibited the meeting of a convention, and removed the powder from the Williamsburg arsenal to a ship of war, thus provoking a revolt of the people. When he removed his seat of government to a warship, the legislature voted that he had thus abdicated. He engaged in acts of war against the colony, and tried to rouse the slaves to revolt. After he had

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burned Norfolk he was driven out and returned to England in 1776. He died in 1809. W.F.J.

DUNNAGE, a name applied to miscellaneous fagots, boughs, bamboos, odd mats or sails, or pieces of wood, laid in the bottom of the hold to keep the cargo of a ship out of the bilge-water, or placed between parts of the cargo to keep them steady.

DUNNETT HEAD. See CAITHNESS, Vol. IV, p. 574.

DUNNOTTAR CASTLE, the ancient seat, now in ruins, of the Keiths, the Earls Marischal of Scotland, on the Kincardineshire coast, 1½ miles S. of Stonehaven. It occupies the top of a rock 4½ acres in extent and 160 feet high, overhanging the sea, with a deep though dry chasm between it and the mainland, and it is approached by a steep, winding path. The area is surrounded by a wall. Dunnottar Castle was dismantled after the rebellion of 1715, on the attainder of the last Earl Marischal.

DUNRAVEN, WYNDHAM THOMAS WYNDHAM-QUIN, EARL OF, a British yachtsman; born at Adare Abbey, County Limerick, Ireland, Feb. 12, 1841. He was graduated from Christ's College, Oxford. He entered the army, but left after two years' service, and engaged in journalism as war correspondent for the London *Daily Telegraph*. He was chosen Under-Secretary for the Colonies by Lord Salisbury in 1881 and again in 1885. After 1887 he took little part in politics, but devoted himself to sport, and became a recognized British authority on hunting. To the American people he is best known on account of his yacht-racing experiences. With his yacht, the *Valkyrie*, he tried thrice to win the American cup, each time without success. The last trial was in 1895, and resulted in a dispute, in which Dunraven accused the Americans of unfair treatment and tactics. The charges were disproved and he was censured by the British and American press.

DUNS, JOHN, a Scottish Free Church clergyman; born in 1820, in Duns, Berwickshire, Scotland. After his graduation from Edinburgh he entered the ministry of the Free Church in 1844, and continued in active pastoral labor until 1864, when he was appointed professor of natural science in New College, Edinburgh. The *North British Review* has been edited by him since 1857. Among his publications are *Christianity and Science* (1860); *Biblical Natural Science* (1868); and *Speculative Natural Science and Theology* (1877).

DUNSTANBOROUGH CASTLE, a picturesque ruin on the basaltic sea-cliffs of the Northumbrian coast, eight miles N.E. of Alnwick. Crystals of quartz found here are called Dunstanborough diamonds and amethysts.

DUNSTER, HENRY, an American educator; born in Lancashire, England, about 1612. He was the first president of Harvard College, and was inaugurated as such, Aug. 27, 1640. He was president until 1654, when, having become a supporter of the principles of the Baptists, he was persuaded to resign his office. He was respected as a modest and pious man, and esteemed an excellent Oriental scholar. In conjunction with Richard Lyon he improved the new version of the Psalms made by Eliot, Welde, and Mather, printed in 1640. He died in Scituate, Mass., Feb. 27, 1659. E.E.T.

DUNTZER, JOHANN HEINRICH JOSEPH, a German philologist; born in Cologne, July 11, 1813. In 1836 he became privat-docent in Bonn, where he had received his education. In 1846 he took charge of the Cologne Catholic gymnasium library. He is the author of a number of philological and historical works. Among his publications are *Goethe's Faust in Its Unity and Perfection* (1836); *The Myth of Doctor Faust* (1848); *Schiller and Goethe* (1859); *The Poetry of Aristotle* (1840); and *Fragments of the Epic Poetry of Greece* (1842).

DUODENUM. See DIGESTIVE ORGANS, Vol. VII, pp. 196, 197.

DUPANLOUP, FÉLIX ANTOINE PHILIPPE, bishop of Orléans; born at St. Felix, Savoy, Jan. 3, 1802. He was ordained in 1825, became in 1828 tutor of the young Prince of Orleans, in 1835 first vicar at the Church of St. Rock, in 1837 emperor of the Little Seminary of St. Nicolas, in 1838 grand-vicar to the archbishop of Paris, and was created a Roman prelate and apostolic prothonotary and doctor of theology by Gregory XVI. Appointed bishop of Orléans in 1849, Dupanloup was one of the foremost and earnest champions of Papal temporal power and of independence of church and education from governmental supervision. In the Vatican Council he vehemently opposed the dogma of Papal infallibility, but submitted to it later on. For his instigation of a crusade against Germany in 1870, he was held a prisoner for a while by the German troops. In 1871 he was elected to the National Assembly, where he advocated a fusion of the Legitimists with the Orléanists. In 1875 he became senator for life, and died Oct. 11, 1878, near Grenoble. Among his writings are *On Education* (3 vols., 1855–57); *Select Works* (4 vols., 1865); *New Select Works* (7 vols., 1873–75). G.A.S.

DUPONCEAU, PIERRE ÉTIENNE (PETER STEPHEN), was born in France on June 3, 1760, and came to America as secretary to Baron Steuben in 1777. He served in the American army, was naturalized in 1781, and then entered the office of the Secretary for Foreign Affairs. In 1785 he was admitted to the bar and rose to eminence. He declined the chief justiceship of Louisiana, and wrote a number of scholarly works on philology. He died on April 1, 1844. W.F.J.

DUPONT, HENRY, an American powder manufacturer; born near Wilmington, Delaware, Aug. 8, 1812. He was graduated from the West Point Military Academy in 1833, and for a year afterward served in the army. He joined his father at the Dupont Powder Works, established in 1800, in Delaware, and from that time until his death continued in the business. During the Civil War he was major-general of the state militia, and, by his prompt and severe measures, prevented the secession of the state. He supplied the larger part of

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the powder used by the Union army during the war. Died in Wilmington, Del., Aug. 8, 1889.

DUPONT, SAMUEL FRANCIS, an American naval officer; born in Bergen Point, New Jersey, September 27, 1803. He entered the navy in 1817 and was promoted to commander in 1845. He took an active part in the Mexican War and during the Civil War was in command of the South Atlantic blockading squadron. He was promoted to rear-admiral in 1862. He wrote a treatise on coast defense. He died in Philadelphia, Pennsylvania, June 23, 1865. W.M.C.

DUPORTAIL, LOUIS LEBEQUE, French soldier, was engaged by Franklin and Deane to come to America in the Revolution, and was made a brigadier-general in 1777 and a major-general in 1781. He was with Washington at Monmouth, and directed the engineering operations at Yorktown. He returned to France in 1782, and was made field marshal and minister of war, but fell into disgrace and died in 1802. W.F.J.

DUPRÉ, JULES, painter; born in Nantes, France, in 1812. Self-taught, he exhibited, at the Salon of 1831, five landscapes which at once called attention to his ability. He was classed by critics of his time as the grandest portrayer of field-life in France, and was even more popular at the time of his death than at any time previous. Among his works are *The Return of the Flock; The Sluice;* and *The Landscape.* His *Balloon* and *Old Oak* are in the Museum of Art, New York; and another *Old Oak* is in the Walters Gallery, Baltimore. Died at L'Isle-Adam, near Paris, Oct. 6, 1889.

DUPREZ, GILBERT LOUIS, the most famous tenor singer of his time; born in Paris, Dec. 6, 1806, the 12th of the 22 children of a Paris perfumer. At the age of ten he entered the Paris Conservatoire and studied under Choron; in 1820 he sang in the chorus of *Athalie*, at the Théâtre Français; made his début at Milan about 1824; in 1825–28 sang at the Odéon, Paris, with no great success; and in 1828–36 in Italy, creating the role of Edgardo, in *Lucia*, at Naples, in 1835, the part having been composed expressly for him. From 1837 to 1849 he sang with great success at the Grand Opéra, Paris, creating a large number of tenor parts, including those in *La Favorita*, *Othello*, and *I Lombardi*. In 1842–50 he was professor of singing at the Conservatoire; and in 1853 founded an École Spéciale de Chant, which turned out many fine singers. In 1865 he was decorated with the Legion of Honor. He composed eight operas, an oratorio (*The Last Judgment*), two masses, and some romances and chamber music; and wrote *L'Art du Chant* (1845); *La Mélodie* (1873); *Souvenirs d'un Chanteur* (1880); and *Sur la Voix* (1882). Died at Passey, Sept. 23, 1896.

DUPUY, CHARLES ALEXANDRE, a French statesman; born at Puy, Nov. 5, 1851. He began his career by teaching philosophy in various colleges in the provinces, and became school inspector. In 1885, just after he had been appointed head master of Corsica College, he was elected to the Chamber of Deputies as an advanced Republican. In Dec., 1892, he took office for the first time in M. Ribot's ministry, on whose fall, in March, 1893, he became premier. He was in the cabinet of President Casimir-Perier until 1895, and in 1898 became premier again, but resigned in 1899.

DUQUESNE, an iron-manufacturing town in Allegheny Co., Pa., S. E. of Pittsburg. Pop. 1900, 9,036.

DUQUESNE, FORT. See PITTSBURGH, Vol. XIX, p. 161.

DUQUOIN, Illinois, a city of Perry County on the main line and Eldorado & St. Louis division of the Illinois Central railroad, 68 miles S.E. of St. Louis, Mo. It is a coal mining and manufacturing center. Pop., 1900, 4,353. C.L.S.

DURA DEN, a small glen between Cupar and St. Andrews, in Fife, Scotland, through which runs a tributary of the Eden; famous on account of the numerous beautifully preserved fossil fish entombed in its yellow sandstone.

DURA MATER. See ANATOMY, Vol. I, p. 759.

DURAMEN. See BOTANY, Vol. IV, p. 89.

DURAN, CAROLUS AUGUSTE ÉMILE, a French painter; was born in Lille, July 4, 1837. In 1853 he began to study in Paris; in 1861 he went to Rome and afterward to Spain, where his style was influenced powerfully by Velasquez. For *L'Assassiné* (1866) he gained his first medal; and in 1878 he exhibited his design, *Gloria Mariæ Medicis*, for a ceiling in the Luxembourg. He is most widely known, however, by portraiture, which is distinguished by great vigor, force of coloring, and power of direct realism. Among his paintings are *The Evening Prayer* (1863), a portrait of Émile Girardin, an equestrian portrait of Mlle. Croizette, and portraits of his own children.

DURANCE, France, an affluent of the Rhone, which it joins 3 miles below Avignon after a S.W. course of 160 miles from its source in the Cottian Alps. Through an aqueduct 50 miles long, it furnishes the water-supply of Marseilles. C.L.S.

DURAND, a city, the capital of Pepin Co., Wis., on the Chippewa river (here navigable), and on the Chicago, Milwaukee, and St. Paul railroad, 20 miles W.S.W. of Eau Claire; has a lumber-mill, six creameries, factories of woodenware; and trades largely in wheat and pork. Pop. 1900, 1,458.

DURAND, ALICE MARIE CÉLESTE (FLEURY), born in Paris, Oct. 12, 1842; died in Paris, May 26, 1902. She was educated by her father, and went with him to St. Petersburg, Russia, where he was professor of modern languages in the university. She contributed to Russian journals under the pseudonym "Henry Gréville." In 1872 she married Émile Durand, professor of French in the college at St. Petersburg, and returned to France, where she wrote novels on Russian life, etc., and contributed to French periodicals. Among her works, published under the name "Henry Gréville," are *Dosia* (1876); *Madame de Dreux* (1881); *Aurette* (1891); and *Péril* (1891).

DURAND, ASHER BROWN, an American artist and engraver; born in South Orange, New Jersey, August 21, 1796. His engraving of Trumbull's *Declaration of Independence* first brought him into notice, and for many years his services were in demand for portraits and figure

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pieces. In 1835, having been a regular contributor of paintings to the exhibitions of the National Academy of Design, he finally abandoned engraving as a profession and devoted himself mainly to landscape painting. The Corcoran Art Gallery at Washington, contains his *Mountain Forest* (1869). His other well known works include *The Close of Day; Franconia Notch*, and *The Capture of André*. From 1845 to 1861 he was president of the National Academy of Design. He died in New Jersey, Sept. 17, 1887. W.M.C.

DURAND-CLAY, ALFRED; born in 1841; distinguished himself as chief engineer of the works of purifying the River Seine and of carrying the sewage of Paris to fields exposed to irrigations, begun in 1869. He was appointed teacher at the School for Bridges and Roads and at the Institute of Liberal Arts at Paris, where he died April 30, 1888. He published many works on sewage and sewerage in *Annales des Ponts et Chaussées*. G.A.S.

DURANGO, Colorado, the seat of La Plata County, and terminus of branches of the Denver & Rio Grande, and the Rio Grande Southern railroads, on the Animas River, 358 miles S.W. of Denver. It was settled in 1881, and is the trade center of a coal-mining, farming, fruit, and stock-raising region, with large smelting, and iron-founding establishments. Pop., 1900, 3,317. C.L.S.

DURANT, HENRI, a French physician; famous as the originator of the Red Cross Society. The horror and despair with which he contemplated the terrible scenes that attended or immediately succeeded the battle of Solferino, June 24, 1859, led him to write the book *Un Souvenir de Solferino*, published in 1862, in which was popularized the idea of such a society as now exists under the name of the Red Cross Society for the care of the wounded and sick in battle. He was long baffled in his endeavors in this direction, but he was at length rewarded by the conclusion, in August, 1863, of the Geneva convention, and the institution of the Red Cross Society. Delegates were present from Austria, Baden, Bavaria, Belgium, France, Great Britain, Hanover, Hesse-Darmstadt, Italy, Prussia, Russia, Spain, Saxony, Sweden, Switzerland and Wurtemberg. The work of the society was first brought into operation during the Franco-Prussian war.

DURANT, HENRY TOWLE, lawyer, merchant and philanthropist, was born at Hanover, New Hampshire, on February 20, 1822, and was educated at Harvard, where he was graduated in 1842. He then changed his name from Henry Welles Smith, which he had originally borne, to that of Henry Towle Durant, by which he was ever after known. For some years he was a prominent lawyer in Boston, and then turned his attention to manufacturing and mercantile enterprises. Upon the death of a much-loved son, in 1863, he retired from business and decided to devote his life and fortune to good works. He was for some years a lay preacher, but finally turned his attention to the promotion of higher education of women. To this end he built Wellesley College, at Wellesley, Massachusetts, at a cost of $1,000,000, and gave it an endowment of $50,000 a year. It was opened in 1875. He died in Wellesley on October 3, 1881. W.F.J.

DURAZZO, a maritime town of Albania, European Turkey, built on the rocky peninsula of Peli, in the Adriatic, lat. 41° 19′ N., long. 19° 27′ E. It is fortified, and is a place of considerable antiquity. Its situation in a fertile district gives it an export trade in grain, oil, etc.; but in recent years, owing to partial failures in crops and disease in olives, the exports have been small. Population, 7,000.

DURBAN, the seaport of the colony of Natal, situated on a railroad, and on the northern shore of a nearly land-locked tidal bay. The 30th degree of south latitude passes about six miles to the south of the town, and the 31st degree of east longitude about two miles to the west. The population at the census taken in 1901 was 48,410. Durban or Port Natal is situate 800 miles from Capetown. The climate, though hot in one or two summer months, is healthy and suitable for Europeans, the death rate for 1887 being 17 per 1,000. The town was laid out by the Dutch, who formed a republic in Natal before the British, under Sir Benjamin D'Urban, took the colony in 1842.

DURBIN, JOHN PRICE, clergyman and author, was born in Kentucky in 1800, was educated at Miami University and Cincinnati College, and became a preacher of the Methodist Episcopal Church. In 1826 he was professor of languages in Augusta College, Kentucky; in 1831 was chaplain of the United States Senate; in 1832 became editor of the *Christian Advocate* in New York, and from 1834 to 1845 was president of Dickinson College. He afterward travelled abroad; was missionary secretary of the Methodist Episcopal Church, and wrote several books. He died on October 18 1876. W.F.J.

DURESS, personal restraint or force, or the fear of injury to the person, or of imprisonment. When any contract has been entered into, or any transaction made, or act done, under duress, the consequences thereof may be avoided by the party thus compelled, or unduly influenced, to act. The acts which will constitute duress, and give the injured party the right to redress, have been considerably extended in recent times, and it is now generally the law that the restraint of property, or a threat of destroying or carrying away property, when accompanied with apparent power to carry the threat into execution, will constitute such duress as to avoid a contract entered into for the purpose of protecting the property threatened. Duress of person or property is generally sufficient ground for the recovery of a payment of money to avoid the threat, where the payment might otherwise be considered a voluntary payment. Thus the payment of money levied as a license under a void city ordinance may be recovered from the city, if the payment was made under threat of arrest or imprisonment. Excessive charges paid to a railroad company refusing to carry or deliver goods, under

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such circumstances that the goods would otherwise perish or be greatly injured, have been recovered upon the ground of duress.

DURET, FRANCISQUE JOSEPH, a French sculptor; born in Paris, Oct. 19, 1804. He first attracted public attention by his statue of *Mercury*, finished in 1831. He afterward did a large amount of statue-work. Among his best executions are statues of Molière, Richelieu, and Chateaubriand the *Fisher-Boy Dancing* (1833); *Neapolitan Dancer* (1838); and *Vintager* (1839). He was awarded many prizes, and was made a member of the Institute. He died in Paris, May 25, 1865.

DURFEE, JOB, an American jurist; born in Tiverton, R. I., Sept. 20, 1790. He graduated at Brown University in 1813 and studied law. He was a member of the Rhode Island legislature, 1813–19 and 1827–29; and a Representative in Congress, 1821–25. In 1833 he was appointed associate justice of the supreme court of Rhode Island, and in 1835 became chief justice. He died in Tiverton, July 26, 1847. E.E.T.

DURHAM, a city and the county seat of Durham County, North Carolina, in the north-central part of the state. It is most noted as the center of a tobacco producing region, its name serving as a trade-mark of tobacco. It is 20 miles north of Raleigh, on the Richmond and Danville, the Norfolk and Western, and the Durham and Northern railroads. Its population in 1900 was 6,679. W.F.J.

DURHAM BREED OF CATTLE. See AGRICULTURE, Vol. I, p. 343.

DURIVAGE, FRANCIS ALEXANDER, author, was born in Boston in 1814, and became a popular writer, mostly over the signature of "The Old Un." He was the author of poems, stories, and plays. He was also the translator, in association with W. S. Chase, of Lamartine's *History of the French Revolution of 1848;* edited an encyclopædia, and was connected with *Ballou's Illustrated* (magazine). He spent his life chiefly in Boston and died on February 1, 1881. W.F.J.

DURKEE, CHARLES, an American statesman; born in Royalton, Vt., Dec. 10, 1805. He removed to Wisconsin and served in the Territorial legislature in 1836 and 1838. He sat in Congress as a Free-Soil Republican from Wisconsin from Dec. 3, 1849, to March 3, 1853, was a delegate to the World's Peace Convention in Paris; and was elected United States Senator from Wisconsin as a Republican, serving from Dec. 3, 1855, to March 3, 1861. He was appointed governor of Utah in 1865, and occupied that position until failing health caused him to resign. He died at Omaha, Neb., Jan. 14, 1870. E.E.T.

DUROC, GÉRARD CHRISTOPHER MICHEL, DUKE OF FRIULI, a French general; born Oct. 25, 1772, at Pont-à-Mousson; served under Napoleon I in Italy as aide-de-camp, and in Egypt as brigadier-general. A trusted friend of the great Corsican, he was sent on several diplomatic missions, he fought with distinction at Austerlitz, Aspern, Essling and Wagram and took part in the Russian campaign, after which he reorganized the Imperial Guards. He was killed May 22, 1813, at Markersdorf. G.A.S.

DÜRRENSTEIN, a town of the governmental district Krems in lower Austria, on the left bank of the Danube, has ruins of an old castle, in which Richard Cœur-de-Lion was held a prisoner in 1193. G.A.S.

DURSLEY, a town of Gloucestershire, south western central England, 15 miles, S.W. of Gloucester by rail. Population of parish, 2,344.

DURUY, VICTOR, a French historian; born Sept. 11, 1811, in Paris; teacher of history at the Collége Henry IV, and at the Polytechnical School of Paris, and, in 1863, appointed Minister of Public Instruction by Napoleon III, retired in 1869, and became a Senator. Since 1879, member of the Institute of France, and since 1885 of the French Academy, he died in Paris, November 25, 1894. Aside from his diverse school-histories, he wrote *History of the Romans* (7 vols., 1870-74); *History of the Greeks* (3 vols., 1874). G.A.S.

DURYEA, JOSEPH TUTHILL, an American clergyman; born in Jamaica, New York, December 9, 1832. He was graduated from Princeton in 1856 and from the Princeton Theological Seminary three years later. He was then ordained minister in the Presbyterian Church, joined the Dutch Reformed Church in 1862, returned to the Presbyterian Church in 1867 and in 1879 joined the Congregational Church. Until 1888 he was pastor of the Boston Congregational Church, then removed to Omaha, Nebraska, where he was called to the First Congregational Church. In 1895 he removed to Brooklyn, New York, where he died May 17, 1898. W.M.C.

DUSE, ELEONORA, an Italian actress; born about 1860, in Venice. The child of poor parents, she began to earn her living as a strolling player. Going on the stage in 1874, she achieved no great degree of success until 1893, when she scored a hit in New York and Boston. This recognition of her abilities at once assured her success, and her subsequent display of talent established her popularity and gave her a place among the foremost of actresses.

ELEONORA DUSE.

DÜSSELDORF, one of the handsomest cities of Western Germany, in the Rhine province, Prussia. Among the new improvements, in line with its extension and growth, are enlargement of harbor, new central station, boulevards, iron bridge across the Rhine, an academy of art in the Renaissance styie, the art exhibition building, the industrial art school, and the Heil Empfängniss Kirchen Pop. 1900, 213,711. See Vol. VII, p. 488.

DUSSARD, HYPOLITE, a French political economist; born at Morez, Sept. 4, 1798; was from 1843–46 editor-in-chief of the *Journal des*

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Economists; became in 1848 prefect of the department of Lower Seine and member of the state council appointed by the Constitutional Assembly. He died at Myer, Jan. 22, 1876. He wrote *L'Exposition Universelle de Londres* (1851); *Le Crédit et La Production Agricole* (1853).

G.A.S.

DUST, ATMOSPHERIC. See CHEMISTRY, in these Supplements.

DUSTIN, HANNAH, colonist and patriot, was born in 1659, and married Thomas Dustin in 1677. When on March 15, 1697, the Indians attacked Haverhill, Mass., she let herself, ill in bed, be captured so that her husband and children might escape. She was taken far into the woods, with her week-old baby and nurse. The Indians murdered the child, whereupon she resolved to be avenged. One night, camped on an island in the Merrimac near what is now Concord, N. H., she stabbed to death and scalped nine of her guards as they slept, a captive English boy killing the tenth and chief. Then with the boy and nurse she descended the river in a canoe, and after indescribable perils and hardships regained her home and friends at Haverhill. The General Court of Massachusetts received the scalps as trophies of her valor, and gave her and the boy fifty pounds sterling each. The governor of Maryland added a reward. In 1874 the States of Massachusetts and New Hampshire erected a granite monument in her memory, bearing her name and those of her companions, Samuel Leonardson and Mary Neff.

W.F.J.

DUTCH EAST INDIES, a name applied collectively to the Dutch possessions in the East Indies, including Java and Madura, Sumatra, Borneo, Riau-Lingga Archipelago, Banca, Billiton, Celebes, Molucca Archipelago, and the small Sunda Islands. They are situated between lat. 6° N. and 11° S. and between long. 95° and 141° E. In 1602 the Dutch created their East India Company. This company slowly conquered the Dutch East Indies and ruled them during nearly two centuries. This company had a monopoly of all trade east of the Straits of Magellan. They governed as though an independent state. They founded Batavia, in Java, and established a large trade. After the dissolution of the company in 1798, the Dutch possessions were governed by the mother-country. Politically, the territory, which is under the sovereignty of the Netherlands, is divided into (1) lands under direct government, (2) vassal lands, and (3) confederate lands. With regard to administration, it is divided into residencies, divisions, regencies, districts, and dessas (villages). (For earlier information concerning the countries of Dutch East India, see those countries, severally, in these volumes.) The superior administration and executive authority of Dutch India rests in the hands of a governor-general. He is assisted by a council of five members, partly of a legislative, partly of an advisory character. The following table gives the area and population of Java, including Madura, and the outposts, either official or carefully estimated:

Territorial Divisions.	Area. English sq. miles.	Population at the end of 1897.
Java and Madura	50,554	25,697,701
Island of Sumatra: Sumatra, West Coast	31,649	1,353,315
Island of Sumatra: Sumatra, East Coast	35,312	335,432
Island of Sumatra: Benkulen	9,309	158,767
Island of Sumatra: Lampongs	11,284	137,501
Island of Sumatra: Palembang	53,497	692,317
Island of Sumatra: Atjeh	20,471	531,705
Riau-Lingga Archipelago	16,301	107,861
Banca	4,446	93,600
Billiton	1,863	41,558
Borneo, West Coast	55,825	370,775
Borneo, South and East Districts	156,912	809,803
Island of Celebes: Celebes	49,390	1,448,722
Island of Celebes: Menado	22,080	549,138
Molucca Islands	43,864	399,208
Timor Archipelago	17,698	119,239
Bali and Lombok	4,065	1,044,757
New Guinea to 141° E. long	151,789	200,000
Total	736,399	34,091,399

Of the total population in 1896, only 67,156 were Europeans. Of the remainder, about 460,000 were Chinese. There is entire freedom in religious worship. In 1896 there were 103 missionaries of various societies at work, and there were 309,258 Christians.

The total revenue, according to the budget estimates for 1898, was about $55,760,000, and the expenditure about $61,800,000, showing a deficit of about $6,040,000. About one-third of the annual expenditure is for the army and navy, and another third for the general administration, both in Java and in the Netherlands.

In 1896 about 8,950,399 acres were under cultivation, the greater part of which was the property of the government and European owners. The principal products are tobacco, coffee, rice, sugar, cotton, and indigo. The amount raised has increased from year to year. The government ceased to cultivate sugar in 1891, and turned the plantations over to private parties. In 1896–97 the product of the tin-mines of Banca and Billiton was 15,600 tons. There were 328 mines in the two islands.

The imports in 1896 amounted to about $67,330,000, and the exports about $79,850,000. At the end of 1896 there were about 1,112 miles of railways, 300 post offices, 6,669 miles of telegraph lines, with 109 offices, and 28 telephone-offices. The legal coins are those of Holland, as are the weights and measures. There were, in 1896, 162 public elementary schools for Europeans, with 14,280 pupils, and 501 public schools for natives, with 78,759 pupils, and 657 private schools for natives, with 44,838 pupils. See also INDIAN ARCHIPELAGO, Vol. XII, p. 857.

DUTCHFLAT, a mountain village of Placer County, northeastern California, 67 miles N.E. of Sacramento. There are productive hydraulic gold-mines here. Pop. 1890, 682.

DUTCH LANGUAGE AND LITERATURE. See HOLLAND, Vol. XII, pp. 87–101.

DUTCH WEST INDIES. The Dutch possessions in the West Indies are Surinam, or Dutch Guiana (see Vol. XI, pp. 223–25), and the colony

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of Curaçao (see Vol. VI, p. 626). These colonies were founded through the agency of the Dutch West India Company, which was organized in 1621, and for over fifty years planted and maintained its colonies in North and South America and the West Indies. This company began to lose power about 1674, and ceased to exist in 1794. The area of Surinam is 46,060 square miles, and the population at the end of 1896 was 66,959, besides about 12,000 Indians and negroes living in the forest. The capital is Paramaribo, with a population of 30,500. There were, in 1896, 54 schools, with 7,130 pupils. The productions for 1893 were: sugar, about 12,413,000 pounds; cacao, about 6,397,000 pounds; bananas, 591,128 bunches; coffee, about 72,110 pounds; rice, about 51,712 pounds; rum, about 70,000 gallons; and molasses, about 400,000 gallons. Gold was discovered in 1876, and the value of the product to the end of 1896 was about $8,450,000. The imports in 1897 amounted to about $2,300,000, and the exports, about $2,140,000.

Dutch Curaçao consists of the islands of Curaçao, Bonaire, Aruba, St. Martin (as far as it belongs to Holland), St. Eustache, and Saba. It has an area of 403 square miles, and a population of 51,524 in 1899. At the end of 1899 there were 33 schools with 5,538 pupils. The imports for 1899 were about $641,000, and the exports (including Curaçao island), about $85,175.

DUTIES, in the broadest sense of the term, means taxes, but in the limited sense in which it is generally used, the term refers to a tax levied upon imported or exported goods, and in this sense has much the same meaning as imports or customs. See CUSTOMS DUTIES, Vol. VI, p. 643.

DUTTON, CLARENCE EDWARD, soldier and scientist, was born at Wallingford, Conn., on May 15, 1841, and was graduated from Yale in 1850. He entered the army in the Civil War as a volunteer and served until the end of the war. Afterward he entered the ordnance corps at Washington, and devoted his attention to geology, being attached for a time to the U. S. Geological Survey. He has written a number of official reports and other treaties on the geology of the high plateaus of Utah, the Hawaiian volcanoes, the Charleston earthquake of 1886, and other topics. W.F.J.

DUUMVIR, in ancient Rome, one of two officers united in the performance of the duties of an office, and appointed usually for some special magistracy or command. The duumvir usually was chosen for ability, and was treated with great respect. Municipal towns had judges, who were their chief magistrates, and were known as duumviri. Superintendents of the erection of buildings and equipment of navies were duumviri.

DUVAL, CLAUDE, cutpurse, about whom many undeserved romances have been woven, was a Frenchman, born in 1643, who went to England with Charles II, was a highwayman for some years, but was captured while drunk and hanged on January 21, 1670. W.F.J.

DUVERGIER DE HAURANNE, PROSPER, a French politician and writer; born at Rouen, Aug. 3, 1798; in 1824 contributor of the *Globe*, and in 1831, as member of the Chamber of Deputies, an ardent supporter of the monarchy. In 1837, however, he sided with the Left Center, defending the latter by his work *The Principles of Representative Government and Their Application* (1838). In 1840 he opposed the Ministry of Guizot. In the Constitutional Assembly and in the Legislature, however, he sided with the Royalists. A most bitter opponent of Napoleon III, he was imprisoned Dec. 2, 1851, and banished, but recalled. His principal work is *History of Parliamentary Government in France from 1814–1848* (10 vols., 1857–72). Since 1870, a member of the French Academy, he died May 19, 1881. G.A.S.

DUVEYRIER, HENRI, a French African explorer; born in Paris, Feb. 28, 1840. In 1857 he visited Algiers, and from 1859–61 the Central Sahara, southern Algiers, Tunis, Tripoli, and Fessan. In 1874 he again visited southern Tunis, and in 1876, Morocco. He killed himself at Sèvres, April 25, 1892. His principal work is *Exploration of the Sahara*. He also published the annuals of the *Société Géographic*, and was editor of the *Dictionnaire de Géographie Universelle*. G.A.S.

DUYCKINCK, EVERT AUGUSTUS, author, was born in New York City on November 23, 1816 was educated at Columbia College (1835), and became the editor of various literary periodicals, the chief of them being the *Literary World*, which he founded in 1847. His most important work appeared in 1856. This was an *Encyclopædia of American Literature*, prepared by him and his brother, George L. Duyckinck, a work which still retains a standard rank. In 1865 he added a *Supplement* to it. Other works of his were *The Wit and Wisdom of Sidney Smith*, *A History of the War for the Union*, *The National Portrait Gallery of Eminent Americans*, a *History of the World*, and *Eminent Men and Women of Europe and America*. He edited the poems of Philip Freneau, and wrote a memoir of that poet. He died in New York on August 13, 1878. W.F.J.

DUYCKINCK, GEORGE LONG, author, brother of Evert A. Duyckinck (q. v.), was born in New York City on October 17, 1823, and was educated at New York University, from which he was graduated in 1843. After extended travels in Europe he joined his brother in publishing the *Literary World* and in preparing the *Encyclopædia of American Literature*. Later he became treasurer of the Church Book Society, and prepared for it a series of biographies of prominent clergymen of the Church of England. He died in New York on March 30, 1863. W.F.J.

DUYSE, PRUDENS VAN, a Belgian poet; born in Dendermonde, in Belgium, Sept. 28, 1804. After completing his academical career, he was appointed archivist of his native town, from which he was removed to the same office in Ghent. He soon afterward received the office of professor of national history in the Athenæum.

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He was one of the chief contributors to the revival of Flemish literature, and wrote two volumes of poetry, *Vaderlandsche Poezy* (1840) and *Het Klaverblad* (1848). Died in Ghent, Nov. 13, 1859.

DVINSK, a district town of Western Russia, on the Duna (Dwina), 183 miles by rail northwest of Vitebsk. It has been the official name of DÜNABURG since 1893, which see, VII, 531. Pop. 1897, 72,230.

ANTONIN DVOŘÁK.

DVOŘÁK, ANTONÍN, a Bohemian musical composer; born Sept. 8, 1841, at Mühlhausen-on-the-Moldau (Nelahozeves), in Bohemia; at 16 entered the Prague Organ School. Applying for help to the Minister of Public Instruction. He was befriended by Brahms. He produced several operas at Prague, but it was his *Stabat Mater* (op. 58), produced under the composer's own directions in London in 1883, which stamped him as a really great composer. His *Spectre's Bride* (op. 69), composed for the Birmingham Festival of 1885, met with a very enthusiastic reception; as also did his oratorio, *St. Ludmila* (op. 71), at Leeds in 1886. The honorary degree of doctor of music was conferred upon him by Cambridge University in 1891; and at the Birmingham Festival in the same year his *Requiem* was produced. A dramatic four-act opera, *Dimitrij* (op. 64), produced at Prague, 1882, proved a great success. In Aug., 1892, he went to the U. S. as director of the National Conservatory of Music, New York; and Oct. 12, he produced a new cantata, entitled *Columbus*, at the Metropolitan Opera House. One of his latest works is *The American Flag*, a cantata (op. 102). Died, May 1, 1904.

DWARFED-TREE CULTURE, the process of causing trees to grow stunted or dwarfed. Dwarfed trees are characteristic ornaments in Chinese and Japanese houses and gardens. Their production depends upon the prevention of an abundant flow of sap. The trees are planted in small flower-pots, and are very sparingly supplied with water; their strongest shoots are pinched off, and their branches bent and twisted in various ways. These trees often abound in flowers and fruit. See HORTICULTURE, Vol. XII, p. 247.

DWIGHT, a village of Livingston County, Illinois, in the northeast-central part of the state, 60 miles southwest of Chicago. It is known as the place of origin of the "Keeley Cure" for drunkenness. (See KEELEY, LESLIE E., in these Supplements.) It is reached by the Chicago, Burlington and Northern and the Indiana, Illinois and Iowa railroads. Population in 1900 was 2,015. W.F.J.

DWIGHT, a post village of Richland Co., N. Dakota, on the Great Northern railroad, 6 miles by rail W. N. W. of Wahpeton; has 2 churches and an academy. Pop. township (1900), 623.

DWIGHT, EDMUND, manufacturer and philanthropist, was born at Springfield, Massachusetts, in 1780; founded industrial establishments at Holyoke and Chicopee, and was one of the founders and benefactors of the normal school system of Massachusetts. He died on April 1, 1849. W.F.J.

DWIGHT, FRANCIS, educator, was born in Massachusetts in 1808, and was educated at Harvard (1827). He became a lawyer, but in 1838 turned his whole attention to educational affairs, especially in the common schools. He died on December 15, 1845. W.F.J.

DWIGHT, HARRISON GRAY OTIS, missionary, was born at Conway, Massachusetts, on November 22, 1803, and was educated at Hamilton College, from which he was graduated in 1825. He went to Constantinople in 1830 as a pioneer missionary to the Armenians, under the patronage of the American board, and for many years worked there with great success. He wrote several books on his experiences and observations in the eastern mission field, and conducted some archæological explorations in Asia Minor and Persia. He died on January 25, 1862. W.F.J.

DWIGHT, JOHN SULLIVAN, musical critic, was born in Boston on May 13, 1813; was educated at Harvard (1832), and became a Unitarian minister. He was one of the founders of the famous Brook Farm community, but left it in 1848 and returned to Boston, where he engaged in literary work and musical criticism, for which latter he is best known. He founded *Dwight's Journal of Music* in 1852, and made it one of the foremost periodicals of the kind. He was the author of *God Save the State* and some other poems, and translated many of the poems of Goethe and Schiller. He died on September 5, 1893. W.F.J.

DWIGHT, SERENO EDWARDS, an American clergyman; born in Greenfield, Conn., May 18, 1786; son of Timothy Dwight (q. v.). He graduated at Yale in 1803; was a tutor there from 1806 to 1810, during which period he studied law, being admitted to the bar in 1811. In 1816 he was licensed to preach, and was chaplain to the United States Senate, 1816–17. In September, 1817, he was ordained pastor of the Park Street Church, Boston, Mass., but resigned his charge in 1826, owing to ill health. He returned to New Haven and engaged in writing the life and editing the works of Jonathan Edwards. A boys' school which he started in New Haven proved a failure, and in March, 1833, he was chosen president of Hamilton College, N. Y., but he resigned the position in September, 1835. He died in Philadelphia, Nov. 30, 1850. E.E.T.

DWIGHT, THEODORE, an American author; born in Northampton, Mass., Dec. 15, 1764; brother of Timothy Dwight (q. v.). He studied law and became an eminent member of his profession, and a leading speaker and writer of the Federalist party. He served several terms in the Connecticut Senate and sat in Congress as a Representative from Dec. 1, 1806, to March 3, 1807. He was editor of the *Hartford Mirror*, the leading Federalist organ in Connecticut, and during the Hartford Convention in 1814 he acted as its

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secretary. In 1833 he published a history of that convention. Between 1815 and 1817 he edited the *Albany Daily Advertiser*, and in the latter year established the *New York Daily Advertiser*, which he edited till 1836. He died in New York, June 11, 1846. E.E.T.

DWIGHT, THEODORE, author, son of Theodore Dwight and nephew of Timothy Dwight, was born on March 3, 1796, and was the author of *A Tour in Italy*, *A Summer Tour in New England*, *The Northern Traveller*, *The Kanasa War*, *A Life of Garibaldi*, and numerous text-books on history and geography. He died on October 16, 1866. W.F.J.

DWIGHT, THEODORE WILLIAM, educator; born in Catskill, N. Y., July 18, 1822; was graduated at Hamilton College in 1840, and then entered Yale Law School. In 1842 he was appointed a tutor in Hamilton College, and in 1848–58 he was professor of law and polity, history, and political economy in that institution. In the latter year he became professor of municipal law at Columbia College, where he won a wide reputation. In 1886, when five professors of Andover Theological Seminary were tried before a board of visitors on the charge of heterodoxy, Dr. Dwight served as their counsel. He was the legal editor of *Johnson's Universal Cyclopædia* and wrote *Influence of the Writings of James Harrington on American Political Institutions;* etc. He died in Clinton, New York, June 28, 1892. J.J.H.

THEODORE W. DWIGHT.

DWIGHT, THOMAS, physician and educator, was born in Boston on October 13, 1843, was graduated from the Harvard Medical School in 1867, and also studied abroad. After being an instructor and lecturer at Harvard and Bowdoin from 1872 to 1883 he succeeded Oliver Wendell Holmes as Parkman professor of anatomy at Harvard in the latter year. From 1873 to 1878 he was editor of *The Boston Medical Journal*, and wrote much for its pages. In 1884 he gave a course of lectures before the Lowell Institute, in Boston, on "Mechanism of the Bones and Muscles." He is the author of several important medical works and numerous essays. W.F.J.

TIMOTHY DWIGHT.

DWIGHT, TIMOTHY, clergyman and educator, grandson of Timothy Dwight, president of Yale College in 1795–1817, was born at Norwich, Conn., on November 16, 1828, and was educated at Yale (1849) and Yale Divinity School (1851). He studied at Bonn and Berlin; was professor of sacred literature and New Testament Greek at Yale from 1856 to 1886, and was president of Yale from 1886 to 1899. He was a member of the American committee for the revision of the Bible, and has edited and written a number of important works, including *The True Ideal of An American University*. W.F.J.

DWIGHT, WILLIAM BUCK, geologist, son of Harrison Gray Otis Dwight (q. v.), was born at Constantinople on May 22, 1833, and was educated at Yale (1854), Union Theological Seminary (1857), and Sheffield Scientific School (1859). He has been an instructor at West Point, at Vassar College and elsewhere; founded a female institute at Englewood, N. J., and has made some important inventions. He is now New York state examiner in geology, at Poughkeepsie, N. Y., and professor of natural history and curator of museum at Vassar College. W.F.J.

DWIGHT, WILLIAM THEODORE, clergyman, son of Timothy Dwight, president of Yale College in 1795–1817, was born in Connecticut on June 15, 1795, was educated at Yale (1813), and became a prominent Congregational minister. He died at Andover, Mass., on October 22, 1865. W.F.J.

DYAKS OR DAYAKS, the Malay name for the race which constitutes the bulk of the aboriginal population of Borneo. See BORNEO, Vol. IV, p. 51.

DYER, ALEXANDER BRYDIE, soldier, was born at Richmond, Virginia, on January 10, 1815, and was educated at West Point, being graduated in 1837. He was an ordnance officer in the Mexican War, and afterward had command of an arsenal in North Carolina. During the Civil War he was in charge of the arsenal at Springfield, Massachusetts, and then of the Ordnance Bureau of the War Department at Washington. He was made brevet major-general of the United States army, in 1865, for distinguished services. Among his chief services to the army was his invention of the Dyer projectile for cannon, which came into wide use and was of great value. General Dyer died at Washington on May 20, 1874. W.F.J.

DYER, ELIPHALET, an American jurist; born at Windham, Conn., Sept. 28, 1721. He graduated at Yale in 1740; turned his attention to the study of the law, and was admitted to the Connecticut bar. He served as a representative to the General Court from 1743 to 1762. In 1755 he was appointed colonel of a regiment of Connecticut volunteers which was raised for the conquest of Canada. He was a delegate to the Stamp Act Congress in 1765; was appointed a justice of the Supreme Court of Connecticut in 1766; was a delegate to the Continental Congress from 1774 to 1779 and from 1780 to 1783; and was chief justice of the Supreme Court of Connecticut from 1789 to 1793. He died at Windham, Conn., May 13, 1807. E.E.T.

DYER, GEORGE, author; was born near London, England, on March 15, 1755, was a schoolmate of Charles Lamb, and was graduated at Cambridge in 1778. He became a teacher and a

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Baptist minister at Cambridge and Oxford, and after 1792 a parliamentary reporter in London. He wrote much for reviews in poetry and prose, but most excelled as a classical scholar, being the chief editor of 141 volumes of Latin classics, and furnishing all the original matter for them except the prefaces. He also wrote histories of Cambridge and Oxford. He became blind in 1830, and died on March 2, 1841. W.F.J.

DYER, THOMAS HENRY, an English historian; born in London, May 4, 1804. He visited Athens, Rome and Pompeii, and studied their ancient topography. He was the author of many valuable historical works. Among his publications are *History of Modern Europe* (1864); *Ruins of Pompeii* (1866); and *Ancient Athens* (1873). He died in Bath, England, Jan. 30, 1888.

DYER, WILLIAM TURNER THISTLETON, a British botanist; born in St. James, Westminster, England, July 28, 1843. He was graduated from Oxford in 1873; was professor of botany at the Agricultural College, Cirencester; at the Royal College of Science for Ireland; for the Royal Horticultural Society; and director of the Royal Gardens at Kew. He published *Flora of Middlesex* (1869); *How Crops Grow* (1869); and an English edition of *Sach's Text Book of Botany* (1875).

DYER'S-BROOM (*Genista tinctoria*), a European shrub of the bean family *Leguminosæ*, naturalized in the United States, chiefly in New England. Known also as "dyer's green weed," a well-known source of yellow coloring matter which, by a mordant, becomes a permanent green also. It is also known as "wood waxen," and green weed. It is frequently confounded with "dyer's-weed" (*Reseda luteola*) q. v. It is said to be the plant *Genêt*, which gave its name to the Plantagenet family. W.R.B.

DYERSBURG, the county seat of Dyer County, western Tennessee, on the north fork of the Forked Deer River, and on the Chesapeake, Ohio, and Southwestern railroad, 45 miles N.W. of Jackson. It contains a carriage factory, foundry, grist-mill, saw-mill, hotels, and newspaper-offices, and manufactures cottonseed-oil, machinery of various kinds and wooden bowls; is supplied with electric lights and city water. Population 1890, 2,009; 1900, 3,647.

DYERSVILLE, a village of Dubuque County, eastern Iowa, situated on Beaver Creek, and on the Chicago, Great Western and Illinois Central railroads, 24 miles W. of Dubuque. It has a flouring-mill and breweries and a very large trade in live-stock. Population 1900, 1,323.

DYER'S-WEED (*Reseda luteola*), an erect single-stemmed annual of the mignonette family (*Resedaceæ*) attaining a height of 2 or 3 feet, a native of Great Britain, and at one time much cultivated for the dye afforded by it, which, according to the different mordants employed, is either green, yellow, or blue. The color called Dutch pink is also obtained from it. W.R.B.

DYKES, JOHN BACCHUS, a British composer; born at Hull, March 10, 1823; graduated at Cambridge; was ordained in 1847, and appointed precentor of Durham Cathedral in 1849. In 1861 he received the degree of Mus.D. from the University of Durham, and in 1862 was presented to the vicarage of St. Oswald's, in that city. Dr. Dykes was a joint editor of *Hymns Ancient and Modern*, and composed many anthem and hymn tunes, among which are *Lead, Kindly Light; Nearer, My God, to Thee;* and *Jesus, Lover of My Soul.* He died in Durham, Jan. 22, 1876.

DYKES, JAMES OSWALD, an English Presbyterian clergyman and author; was born at Port Glasgow, Scotland, Aug. 14, 1835; graduated at Edinburgh in 1854; studied theology at Heidelberg and Erlangen. He was ordained minister and elected colleague of Dr. Candlish in Free St. George's, Edinburgh. Compelled to resign this charge through feeble health, he visited Australia, where he remained for three years. In 1869 he became minister of Regent Square Presbyterian Church, London, and was appointed principal of the Theological College, Queen Square. His works are *Beatitudes of the Kingdom* (1872); *Relations of the Kingdom* (1874); *From Jerusalem to Antioch* (1874); *Abraham* (1877), *Sermons* (1882 and 1892); and did editorial work of the *British and Foreign Evangelical Review* for a number of years.

DYNAMETER OR DYNAMOMETER. See MECHANICS, Vol. XV, p. 774. For the dynameter used in optics, the double-imaged micrometer, see MICROMETER, Vol. XVI, p. 261; and for the marine dynameter, see HARBORS AND DOCKS, Vol. XI, pp. 409–410.

DYNAMITE, an explosive substance of great energy composed of nitroglycerin mixed with pulverized silica or infusorial earth, in proportion of three parts of the former to one part of the latter. It is safer than nitroglycerin, being less liable to explosion from moderate shocks or from spontaneous decomposition. Ignited in the open air, dynamite burns slowly, but it is as readily exploded as nitroglycerin itself, by means of a detonating fuse, and though not equal in bursting or breaking power to uncombined nitroglycerin on account of the absorption by its inert constituents of part of the heat developed by the exploding shock, it is greatly superior to gun powder instead of which, or gun cotton, it is employed in blasting coal and stone, removing piles, felling trees and clearing stumps from forest land. It is a powerful agent for destruction of fortifications and ships either when thrown from cannon or used in the form of torpedoes. It may also be used with advantage for breaking up large iron castings. In continuous masses dynamite transmits detonation at the rate of from 19,500 to 21,600 feet a second. Confinement is not requisite for its explosion and it can be used in damp situations without impairing its action. It explodes if heated to a high degree, also on sharp percussion or heavy pressure. It should not be kept in hermetically sealed receptacles of metal or other solid material. At a low temperature dynamite loses its tendency to explode by detonation From the manufacture of dynamite the

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best absorbants are kaolin, tripoli, alumina and sugar.

DYNAMITE CRUISER, a cruiser designed especially for utilizing dynamite guns in naval warfare. Such a vessel was built by the United States Government and launched in 1888. It was constructed of unusually light scantling and plating, is long and narrow, and sits low in the water. It has powerful engines and attains a high speed. Its main armament consists of three pneumatic dynamite guns placed side by side, close together in the forward part of the ship. These three parallel tubes are built into the ship, about fifteen feet of the muzzles protruding above the forecastle deck, inclined at an angle of about twenty degrees, the ends of the muzzles of the tubes rising about five feet above the deck planking. The remainder of the tubes run down to the hold of the ship where the compressed air machinery is, and where the ammunition and the breech and loading mechanism are situated.

DYNAMITE-GUN. Nine of these guns are in use by the U. S. Government, and England and Brazil each owns one. Mefford, of Detroit, appears to have been the first to suggest the use of compressed air for discharging dynamite or other high explosive projectiles. Prior to 1890 Lieut. (now Capt.) E. Zalinski became interested in the idea, and developed the gun, which is generally known by his name, with the assistance of Engineers Sewall, Reynolds and Pratt, early experiments being made at Sandy Hook, N. J. Later Capt. John T. Rapieff, of New York, further improved the guns and perfected them. These guns differ from all previous pneumatic guns in that they do not emit their whole supply of compressed air at each discharge, but retain the air in a reservoir, admitting it to the barrel or discharge-tube at a pressure below that in the storage-chamber. The greatest difficulty in the designing of the gun lay in the construction of the valves or ports for admitting the compressed air. It was essential that they should act in a very minute space of time, in order to furnish useful service, and it was also necessary that they should be very strong and exact in action. By a somewhat complicated arrangement, this result was obtained, and the air introduced at an effective pressure of 1,000 pounds, the pressure being increased as the projectile moved along the tube. In this manner dynamite has been thrown a distance of 6,000 yards, and those interested in its manufacture are developing means for increasing this range.

The Maxim-Schupphaus system of throwing aërial torpedoes from guns by means of a special powder which starts the projectile with a low pressure and increases the velocity by keeping the pressures well up throughout the whole length of the gun, is the most recent claimant for recognition in the field of dynamite-guns. It is possible to use powder in this gun, of a sort invented for the purpose by Dr. Schupphaus. This special powder is made up in the form of cylindrical sticks perforated lengthwise, and capable of giving out the gases at the forward ends while burning. The initial pressure given out by this powder on ignition in a 30-foot gun is calculated to be only one sixteenth of the pressure applied to the projectile just before it leaves the muzzle. This great acceleration of speed, combined, with a safe initial pressure, is productive of a long range, and 10 miles has been claimed for this gun, though this remains to be proven. The explosive used with this gun is maximite, which owes its force principally to nitroglycerin. A 20-inch gun 30 feet long is being manufactured to test this system on a large scale.

A new form of gun for using powder to discharge dynamite cartridges has been built on an experimental scale. It has a tube bent into a flat coil, so that it appears like three tubes laid parallel and connected by bends. The dynamite cartridge is placed in the last straight section of the tube and the powder is fired in the first straight section. As a consequence, the expanding gases have to travel through the first and second tube sections and around two bends before reaching the dynamite. Thus the shock is regulated so that the dynamite can be thrown as readily as with compressed air, while the force so obtainable is greater than can be had through any arrangement of valves for letting in compressed air.

C. H. COCHRANE.

DYNAMO, ALTERNATING CURRENT. See ELECTRICITY, § 85, in these Supplements.

DYNAMO-ELECTRIC MACHINE. See LIGHTING, Vol. XIV, pp. 637–639; and ELECTRICITY, § 79, in these Supplements.

DYNE. See ENERGY, Vol. VIII, p. 187.

DYSPNŒA. See RESPIRATION, Vol. XX, p. 500.

DYTISCIDÆ, a genus of water-beetles. See COLEOPTERA, Vol. VI, pp. 116–118.

DYVLETT GHYREY, a Crimean khan, the last who ruled without Russian protection. See CRIMEA, Vol. VI, p. 520.

DZIGGETAI OR DZEGGETAI, a wild ass, more horse-like than the others. It is probably the hemionus ("half-ass") of Herodotus and Pliny. It inhabits the plateaus of central Asia. The dziggetai, the kiang and the koulan are regarded by many naturalists as varieties of the same species. See HORSE, Vol. XII, p. 179; and ASS, Vol. II, p. 626.

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EADS—EAMES

EADS, James Buchanan, engineer, was born at Lawrenceburg, Indiana, on May 23, 1820, and was largely self-educated. He invented a diving bell and pumping boat for raising sunken vessels, and established the first glass works west of Ohio, at St. Louis in 1845. In the Civil War he built for the government in 100 days eight light draught gunboats for river service, the first ironclads ever used. Later he built six larger turret vessels, carrying the largest guns. In 1867–74 he built the great steel arch bridge across the Mississippi at St. Louis, which ranks among the engineering wonders of the world. Next he undertook the colossal work of deepening the mouth of the Mississippi River, by means of jetties, and despite much opposition succeeded where all his predecessors had failed. He planned a general improvement of the Mississippi River, to secure deep water for navigation and to prevent floods, but his plans were never executed. They were generally regarded as practicable, and as offering a promise of efficiency, and an appropriation for their execution was actually made by Congress, but before work could be begun the appropriation was withdrawn. He also planned a ship railroad for the conveyance of the largest vessels across the Isthmus of Tehuantepec, which was never built. He was the first American recipient of the Albert medal in England. He died on March 8, 1887. W.F.J.

JAMES B. EADS.

EAGLE, Order of the Black, in Prussia, an order founded by the Elector of Brandenburg, on Jan. 17, 1701, the day of his coronation as king of Prussia. The number of knights, in addition to the princes of the royal family, was originally thirty, but now is unlimited. They must at their nomination be at least thirty years of age, and their noble descent for four generations is necessary. The insignia of the order consists of an octagonal cross of blue enamel, and eight black eagles displayed between the arms of the cross. The cross is suspended by a broad ribbon of orange color across the left shoulder, and it is accompanied by an embroidered silver star fastened on the left breast. Knights of the Black Eagle are likewise knights of the Red Eagle, first-class. The Order of the Red Eagle was originated in 1734 by the Markgraf Georg Frederick Charles, and was raised to the second rank by Frederick William II, in 1791. Only those having this order can receive the cross of the Black Eagle. The decoration consists of a white Maltese cross surmounted by a royal crown with the Brandenburg red eagle in the corner. Both decorations are for meritorious services, and are granted by the emperor.

EAGLE–HAWK, a name applied to the members of the genus *Spizaëtus*, which are also sometimes called crested eagles, inhabiting all of Africa, the southern Asiatic regions, and Central and South America. The name is also given to members of the genus *Nisaëtus*, having a somewhat similar habitat; also to eagles of the genus *Morphnus*, such as the harpy-eagle. R. W.C.

EAGLE–OWL (*Bubo*), a genus of the owl family (*Strigidæ*), characterized by a somewhat incomplete facial disk, two tufts of feathers (*horns* or *egrets*) of considerable size on the head, ears with small openings (*conches*), legs and toes covered with feathers, short, strong curved bill, and long, curved, sharp claws. To this genus belong the largest of the nocturnal birds of prey. The eagle-owl of Europe (*Bubo maximus*) is little inferior in size to the golden eagle, and preys on quardupeds such as hares, rabbits and young deer, and on grouse, partridges and other kinds of game. It seizes its prey with its feet, and seldom touches it with the bill till its struggles are over. It is an inhabitant of many parts of Europe and Asia, but it is only an occasional visitor in Britain. The eagle-owl of America (*B. Virginianus*), the Virginian horned owl, or great horned owl, is very similar to the species just noticed, but of inferior size, although still a large and powerful, as it is also a bold, bird. It carries off with ease almost any inhabitant of the poultry-yard. It is found in nearly all parts of America. See Owl, Vol. XVIII, p. 94.

EAGLE PASS, Texas, the seat of Maverick County, on the Rio Grande at the Mexican border, where the Mexican International railroad joins the Southern Pacific. It exports coal, cattle, hides, and wool. Pop., 1900, 2,620. C.L.S.

EAGLE–RAY. See Ray, Vol. XX, pp. 312–313.

EAGLE ROCK, a village of Bingham County, south-eastern Idaho, on the Snake River, and on the Union Pacific railroad. It is the market place for a large part of Snake River valley. Population 1890, 938.

EAGLE–WOOD, the wood of *Aquilaria agallocha*, a tall Indian tree of the wood aloe family. See Aquilaria in these Supplements and Cambodia, Vol. IV, p. 641. W.R.B.

EAGRE or EAGER. See Bore, in these Supplements.

EAMES, Charles, diplomat, was born at New Braintree, Mass., on March 20, 1812, was graduated from Harvard College in 1831, and in 1845 became a journalist in Washington. He was a

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U. S. commissioner to Hawaii in 1850, and minister to Venezuela in 1851–58. Afterward he won distincton as an admiralty lawyer. He died on March 16, 1867. W.F.J.

EAMES, WILBERFORCE, librarian, was born at Newark, N. J., on October 12, 1855, and became assistant librarian of the Lenox Library, New York, in 1885, and librarian in 1893. He has edited and written a number of important works on American bibliography. W.F.J.

EAMES, EMMA, an American prima donna. See STORY, in these Supplements.

EAR, DEVELOPMENT OF. See SENSE-ORGANS, in these Supplements.

EAR, DISEASES OF. See EAR, Vol. VII, p. 514.

EARLE, PLINY, physician and alienist, was born at Leicester, Massachusetts, on December 31, 1809. He was educated for the medical profession, and devoted his attention chiefly to mental disorders. He became superintendent of the Bloomingdale Asylum for the Insane in New York in 1844. In 1865 he was put in charge of the Massachusetts State Hospital for the Insane, at Northampton for twenty years. He founded the system of lecturing to the insane, and introduced many other valuable reforms into the asylums. He was the author of *The Curability of Insanity* and other works, including many contributions to periodicals. He died on May 18, 1892. W.F.J.

EARLHAM COLLEGE, a co-educational institution maintained by the Society of Friends,

LINDLEY HALL, EARLHAM COLLEGE.

at Richmond, Indiana. It was organized first in 1859. In 1902 there were 14 in the faculty, 298 students, and the institution possessed a library of about 31,000 volumes. Since organization, up to 1901, 508 had been graduated. In addition to the regular collegiate courses, of which there are eight, instruction is given in music and the fine arts. The college is especially fortunate in its museums and laboratory facilities.

EARLL, ROBERT EDWARD, an American naturalist; born in 1853, in Waukegan, Illinois. Graduated at Northwestern University in 1877, and from that time until his death was connected with the Smithsonian Institution at Washington, and the National Museum. He did his first work with the Fish Commission, and represented the United States at the International Fisheries Exhibition in London in 1883, and as curator of the National Museum had charge of the museum's exhibits at the expositions at Louisville and New Orleans in 1884 and 1885; Cincinnati, 1888; Chicago, 1893; and Atlanta, 1895. He died in Washington, District of Columbia, March 20, 1896.

EARLVILLE, a city and railroad center of La Salle County, northern central Illinois, 70 miles W.S.W. of Chicago, on the Chicago, Burlington and Quincy and Chicago and Northwestern railroads. It also has considerable trade in the agricultural products of the vicinity. Population 1890, 1,058; 1900, 1,122.

EARLY, JUBAL ANDERSON, soldier, was born in Virginia on November 3, 1816, and was graduated from West Point in 1837. After a year's service in the Seminole War he became a lawyer and was elected to the Virginia legislature. He served in the Mexican War and was for a time military governor of Monterey. In the Civil War he was a Confederate lieutenant-general and one of the most conspicuous commanders in the Southern army. He took a prominent part in the battles of Bull Run, Gettysburg, Spottsylvania C. H., and Lynchburg. In 1864 he made a raid upon and nearly captured the city of Washington, and invaded Pennsylvania as far as Hambersburg. He was badly defeated by Sheridan at Winchester on September 19, 1864, and again at Fisher's Hill three days later. He was finally routed by Custer at Waynesboro, Va., on March 2, 1865, whereupon Lee relieved him of his command. After the war he lived in Canada for some years and wrote a *Memoir of the Last Year of the War*, largely in self-vindication, and also a critical history of *Jackson's Campaign against Pope in 1862*. He returned to Virginia and practiced law with success, and also lent his name as manager of the notorious Louisiana State Lottery, in association with his fellow-soldier, General Pierre G. T. Beauregard,—a performance which gave him pecuniary profit but no honor. He died on March 2, 1894. W.F.J.

JUBAL A. EARLY.

EARNEST. See SALE, Vol. XXI, p. 207.

EAR-SHELL, the common name of the mollusks of the genus *Haliotis*. See ABALONE, in these Supplements.

EARTH-ALMOND OR CHUFA, a species of sedge (*Cyperus esculentus*) whose tuberous roots are used in the south of Europe as a vegetable, and in making a popular drink called *orchatas de chufas*. It has been successfully grown in the warmer parts of the United States, and has been recommended as a substitute for coffee.

EARTH-HOUSES, EIRD-HOUSES OR YIRD-HOUSES, the name which seems to have been generally given throughout Scotland to the primitive underground buildings which in some

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places are call'd also "Picts' Houses," and in others, it would appear, "weems," or caves. The earth-house, in its simplest form, is a single irregularly shaped chamber from 4 to 10 feet in width, from 20 to 60 feet in length and from 4 to 7 feet in height, built of unhewn and uncemented stones, roofed with unhewn flags, and entered from near the top by a rude doorway, so low and narrow that only one man can slide down through it at a time. See ARCHÆOLOGY, Vol. II, p. 295, 296; and ARCHITECTURE, Vol. II, p. 336.

EARTH-NUT, a common name given to the edible tubers or underground parts of many plants, as seeds of *Arachis hypogæa*, whose pods ripen underground, and sometimes are called earth-nuts or "ground-nuts," or, far more commonly, "peanuts," or in the South, where they are cultivated, "goober peas," or "goobers"; tubers of species of BUNIUM (q.v., in these Supplements), an umbelliferous plant of Europe; tubers of various species of *Cyperus;* tubers of *Erigenic bulbosa*, an early spring umbellifer, otherwise called "turkey pea," or "pepper-and-salt"; tubers of *Apios tuberosus*, a low, creeping leguminous plant, etc.

EARTHQUAKES. A treatise on seismology relative to the phenomena of earthquakes is found in Vol. VII, p. 526, under EARTHQUAKE. The theories advanced as to the origin and causes of earthquakes and the demonstrations of the action and effect of these seismic disturbances, as given in the article mentioned, have been supplemented by recent careful investigations and to the knowledge thus acquired through seismological research, the world is more indebted to Japan than to any other one country for valuable information obtained. It is not strange that such is the case considering the alertness of the Japanese mind coupled with the other significant fact that Japan is the home of the earthquake. The Japanese Year Book of 1905 states that Japan was visited by 17,750 earthquakes during the thirteen years ending 1887. During the five succeeding years 5,900 were recorded or 1,180 on an average per year. The latter period compared with the former shows an average annual decrease of these earth quiverings of 170. The same annual decrease up to 1906 would reduce the shocks to an approximate average of three daily. A large majority of these have been so trivial as to be unnoticed, except to those in charge of the delicate instrument which registers them. The severe shocks have come at periods averaging two and a half years and the really disastrous ones have averaged about fifty years apart. One of the severest of modern years occurred in 1891. (See JAPAN, Vol. XXVII, p. 442.) This was followed by an alarming shock in 1894 and the next destructive earth wave visited Formosa, an island of Japan, April 14, 1906, in which over 100 lives were lost and thousands more rendered homeless.

The great variety of apparatus devised by Japan is too extensive for description but it is claimed on the best of authority that the seismometry developed in Japan revolutionized the seismometry of the world. From the sensitive instruments thus invented, it has been learned that earthquakes are much more frequent than at first supposed and that considerable areas of our planet are subject to slight tremors from earth waves every hour in the day on an average. Those who live far north of the equator do not notice the feeble pulsations under their feet but the seismologist with his wondrously ingenious instruments so sensitive that they register the slightest seismic movement is able to demonstrate the persistent recurrence of earth throbs. The instruments used for this purpose are called seismoscopes and seismographs. The former is used to ascertain the extent and direction of the greatest vibration in a shock, and the latter records the period and rapidity with which the earth's undulations follow one another. In order to obtain full information of the direction, extent, velocity, and rate of acceleration of the movement at any epoch in the disturbance, instruments are so adjusted as to measure the vertical and horizontal movements and to give tracings of the irregular undulations and successive displacements of the ground which accompany every earthquake. The amplitude, period and form of the tracings made by the instrument are measured and from these calculations are made to ascertain the character and effect of the shock.

With all the advance that has been made in recent years in the construction of delicate and ingenius instruments and devices for registering the action of earthquakes, much still remains to be known concerning the origin and causes of these disturbances. Seismologists claim that the occasional displacements of the earth's crust are due to the sliding, crushing together and expansion of matter forming the inner layers of the earth's surface and the compressive and elastic properties that inhere in all bodies when acted upon by tremendous exterior forces. The ultimate action of these forces is manifested on the earth's surface and may be transmitted through long distances with but slight movement of the rock molecules intervening. The nearer the wave approaches the earth surface the less the resistance becomes and when it reaches the point where the expansive force exceeds the restraining compression it breaks forth with destructive energy. Like all forces in nature, the earthquake wave follows the line of least resistance and the deeply imbedded rock rigidity of some sections may swerve the dynamic energy from its straight course by curves and angles causing it to appear on the surface at widely separated points, leaving intermediate sections only slightly affected. How far down in the interior of the earth this original force is generated or the causes of its impulse are matters of speculation and theory which have not yet crystallized into positive knowledge.

Following the seismic disturbances in the spring of 1906 in California and other parts of the world, Prof. John Milne, an eminent authority on seismology, was quoted as advancing the theory to the effect that the disturbances of that period were

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not due to the supposed shrinking, shifting and readjustment consequent upon the contraction of the globe, but were caused by the abnormal deviation of the globe itself from its true axis and the jar incident to its return to its true axis. This distortion followed by a sudden replacement, it was held, would cause a sufficient strain on the earth's crust to account for the violent quakes experienced. This axial displacement, scientifically demonstrated, was attributed to extra energy concentrated on the earth by the sun owing to the causes producing sun spots and which by the great differences of corresponding temperatures immense accumulations of ice at one of the poles brought about a variation of the earth's equilibrium subsequently restored by the action of other forces.

The relationship of volcanoes to earthquakes is a mooted question. It has been made quite clear in some instances that certain earth vibrations are the direct concomitants of volcanoes and in many other cases contemporaneous manifestations of these two terrestrial forces can be traced only to the remotest of identical causes. The one very often follows the other in quick succession but the subterranean conditions of the earth's segment favorable to both kinds of convulsions may cause action of the one independently of the forces producing the other. In the earthquake of 1868 in which San Francisco received a severe shock, a connection between that disturbance and the Kilauea and Mauna Loa volcanoes, previously occurring, was fairly well established. But all attempts to connect the great California earthquake of 1906 (which see further on) with the eruption of Mount Vesuvius preceding it not more than a fortnight were inconclusive. Although the earth tremblings occurring in Tuscany a week after the active eruptions of the volcano may be associated with its after effects.

Mount Vesuvius and its eruption of 1906 is so closely associated in mind with the seismic disturbances of that year that a brief account of its activity and the results is here inserted. The eruption broke forth with violent force on April 5, and continued for ten days, although during that period the violence which marked its first outbreak subsided to such an extent on several occasions as to give hope of its action ceasing. It had almost entirely stopped on the 10th, but two days afterwards volcanic action began with renewed energy and the next day again subsided gradually. For several weeks following, it intermittently emitted smoke and ashes but without any great damage. The ejection of molten matter during its intensified periods of activity exhibited greater force and destructive properties than any other time since the historic eruption of '79. Huge incandescent rocks were hurled two thousand feet into the air, and three great streams of lava shot into the heavens accompanied with electric displays and earth tremblings that struck the inhabitants with terror as they rushed from the awe-inspiring scene. The smaller particles of dust, it was estimated, were projected to a vertical height of five miles. The ashes fell upon hundreds of roofs within a radius of twenty miles with disastrous results. At this distance ashes fell in Naples in such quantities as to break in the roofs of residences and public buildings. Immense streams of lava poured down the mountain sides destroying property, dwellings and villages. Four towns—Bosco Trecase, Torre dell' Annunziata, Torre del Greco, and Ottajano—were almost overwhelmed, beside many little habitations and hamlets which were wholly wiped out. The famous Funicular Railway was destroyed, also the hotel near the crater, and the royal observatory was partially demolished. The destruction of life, it was claimed, reached a total of 2,000 souls. The loss of property was estimated at $85,000,000.

To return to the subject of earthquakes. One of the most serious seismic disturbances of recent times in the United States occurred at Charleston, S. C., and vicinity on August 31, 1886. There had been a few noticeable tremors previous to the culminating shock but they were not of sufficient force to attract much attention or to be taken as premonitions of danger. The great shock struck the city with terrifying suddenness and lasted about a minute. This was followed by other earth waves doing some further damage to buildings already partially wrecked but they occurred at increasing intervals and with decreasing severity until quiet was restored. The most violent movements were located west of the city some twelve or fifteen miles and were vertical in action, while those in the city moved in an oblique direction but were very destructive. Seven-eighths of the houses were so far demolished as to require rebuilding or repairs to fit them for occupancy and losses in damage were estimated over $8,000,000. Twenty-seven persons were killed outright, others were fatally injured, while many others suffered temporary inconvenience from nervous prostration or falling debris. Charleston recovered rapidly from the shock and soon resumed her place in business activity and growth among the important seaport cities of America.

The next severe earthquake in the United States occurred on the Pacific Coast April 18, 1906. The devastation and ruin wrought in San Francisco by the shock and the conflagration immediately following in the city made it the most notable and appalling disaster of the kind ever experienced in the country. The sudden and terrifying rocking of the earth that swayed and shattered buildings, destroying life in the wreckage, began at 5:13 a. m., and lasted three minutes. Some minor vibrations succeeded the first great wave at intervals but were of comparatively little consequence. While the climax of disturbance was at San Francisco or within a radius of 100 miles from that city, tremors were recorded, about the same time, at far distant points. The seismograph at Washington, in the Government Weather Bureau office, showed such violent agitation that the pen passed off the recording sheet. Although not violent enough to be felt by individuals, the delicate instrument denoted vibrations of considerable magnitude which continued for three hours with

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gradually diminishing force. The wave was registered in Baltimore and Pittsburgh, and a telegram from the observatory at Vienna, Austria, the same day, stated that the seismograph recorded a distant earthquake of great force and destructiveness. The registrations made synchronized with the shock at San Francisco and showed that the general effect extended not only across the American continent but beyond it. At Santa Rosa, sixty miles north of San Francisco, the shock caused much destruction of property and nearly 100 lives. At Palo Alto, the Leland Stanford Jr. University suffered great damage, and Salinas, Napa, San Jose, Hollister, Santa Cruz and other towns suffered severely. But the great damage and fatality occurred in San Francisco. Almost the entire business section of the city and many residence blocks, boarding houses, hotels and private dwellings were twisted out of shape or hurled to the earth. Then flames broke out and raged with maddening fury, doing far more damage to property than the earthquake did, though the latter caused the main loss of life, estimated at 1,000 or over. Total destruction of property from both causes was estimated at $300,000,000. A.R.R.

EARTHS, in chemistry, are substances formerly regarded as elements, but now known to be compounds of a metal with oxygen and which are insoluble in water. The list includes alumina, glucina, zirconia, thoria, didymia, lantana, ceria, yttria, terbia, erbia. They do not alter vegetable colors, are soluble in acids, and are precipitated from their solutions by ammonia, potash, or soda. Their alkaline homologues are lime, magnesia, baryta and strontia. W.R.B.

EARTHWORK. See FORTIFICATION, Vol. IX, pp. 379–392.

EARTHWORM (*Lumbricus*), a genus of *Annelida*, of the order *Terricolæ*. There are many species, all of them pretty closely resembling in characters and habits the common earthworm or dew-worm (*L. terrestris*). It has no head distinct from the body, no eyes, no antennæ, nor any organs external to the rings of which its body is composed, except minute bristles pointing backwards, of which each ring bears four pairs, and which are of use in its locomotion. It sometimes attains to nearly a foot in length, and more than one hundred and twenty rings have been counted in its body. The end at which the mouth is situated is pointed and the tail is flattened, while the general form is cylindrical. The mouth consists merely of two lips, the upper lip elongated; there are no teeth nor tentacles, and the worm subsists by swallowing fine particles of the soil, from which its digestive organs extract the digestible matter, the rest being voided often in little intestine-shaped heaps, called *worm-casts*, on the surface of the ground. The locomotion of the earthworm is effected by means of two sets of muscles, which enable it to contract and dilate its rings, its bristles preventing motion backward, and the whole muscular effort thus resulting in progress, while the expansion of the rings, as it contracts the anterior segments, and draws forward the hinder parts, widens a passage for it through earth whose particles were close together before. Earthworms are thus of very great use, their multitudes continually stirring and loosening the soil through which they work their way, and moles, pursuing them for food, stir and loosen it still more, while worm-casts gradually accumulate on the surface to form a layer of the very finest soil, to which it is supposed that the best old pastures, in a great measure, owe their high value. See WORM, Vol. XXIV, p. 712.

EASDALE, a small isle on the west coast of Argyleshire, central western Scotland, in the Firth of Lorne, 10 miles S.S.W. of Oban. It contains one and a half square miles, and is situated in Kilbrandor parish.

EAST AFRICA, BRITISH. See AFRICA, in these Supplements.

EAST AFRICA, GERMAN. See AFRICA, in these Supplements.

EAST AFRICA, PORTUGUESE. See AFRICA, in these Supplements.

EAST AURORA, a village of Erie County, New York, in the suburbs of Buffalo, noted as the site of a famous horse-breeding farm. It also contains a printing establishment, and is a favorite place of suburban residence. Its population in 1900 was 2,366. W.F.J.

EAST BRADY, a village of Clarion County, Pennsylvania, in the western part of the state. It is 36 miles north of Pittsburg, and on the edge of the oil region, and its chief industries are thus connected with the iron and oil trades. It is reached by the Allegheny Valley railroad, and lies on the Allegheny River. Its population was 1,233 in 1900. W.F.J.

EAST BRIDGEWATER, a township and village of Plymouth County, Massachusetts, in the eastern part of that state. It is 23 miles south of Boston, in the heart of a crowded manufacturing region, on the Matfield River, and has many industrial establishments in the iron, cotton, leather, and earthenware trades. It is on the Old Colony division of the New York, New Haven and Hartford railroad. Its population was 2,911 in 1890 and 3,025 in 1900. W.F.J.

EASTBURN, MANTON, clergyman, was born in England on February 9, 1801, came to America in boyhood, and was graduated from Columbia College in 1817. Five years later he became a minister of the Protestant Episcopal Church. In 1842 he was made assistant bishop and in 1843 bishop of the diocese of Massachusetts. He declined a lecturership on poetry in Columbia College, but lectured before the New York Athenæum on Hebrew, Latin, Italian, and English poetry, and wrote several books, including *Essays and Dissertations on Biblical Literature*. He died on Sept. 11, 1872. W.F.J.

EAST CAPE, the name of the most easterly headlands of the island of Madagascar, of the North Island of New Zealand, and of Siberia, or Asiatic Russia. The first is in lat. 15° 20′ S., and long. 50° 15′ E.; the second in lat. 37° 40′ S., and long. 178° 40′ E., being almost precisely the

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antipodes of Carthagena, in Spain; and the third is that extremity of the Old World which is nearest to the New, being separated by Bering's Strait from Cape Prince of Wales in America. It is in lat. 60° 6′ N., and long. 169° 38′ W.; or rather, to follow the natural reckoning, 190° 22′ E. It is a bold, rocky promontory of syenite, almost cut off from the mainland by swamps and shallow lakes. On the north side is the village of Uédle, comprising some eighty or ninety rude huts, with a population of about two hundred and fifty. The name of East Cape is applied, also, to the southeastern extremity of New Guinea, in Goschen Strait.

EASTER ISLAND. See POLYNESIA, Vol. XIX, p. 442; and RAPANUI, Vol. XX, p. 285.

EASTERN ARCHIPELAGO. See INDIAN ARCHIPELAGO, Vol. XII, pp. 854–860.

EASTERN EMPIRE. See *Byzantine Empire*, under GREECE, Vol. XI, pp. 102–108.

EASTERN ROUMELIA. See TURKEY, Vol. XXIII, p. 693.

EASTERN SHORE. See MARYLAND, in these Supplements.

EAST GREENWICH, a city and the county seat of Kent County, Rhode Island, on Greenwich Bay, near the head of Narragansett Bay. It is the site of a well-known academy and of some cotton and woolen mills, and is reached by the New York, Providence and Boston division of the New York, New Haven and Hartford railroad. Its population was 2,775 in 1900. W.F.J.

EAST HADDAM, a township of Middlesex County, south-central Connecticut, on the Connecticut River. It contains a music seminary, three britannia-shops, and thirteen cotton-mills. Population 1890, 2,599; 1900, 2,485.

EASTHAMPTON, a town of Hampshire County, Massachusetts, in the west-central part of the state. It is the seat of Williston Seminary, and of numerous industries, and is reached by the Connecticut River and the New York, New Haven and Hartford railroads. Its population was 5,603 in 1900. W.F.J.

EAST HARTFORD, a town in Connecticut, opposite Hartford, on C. River. Pop. 1900, 6,406.

EAST HUMBOLDT MOUNTAINS are a range of lofty mountains in Elko County, Nevada, in the northeastern part of that state. They extend in a north and south direction for about fifty miles, and attain in places a height of 12,000 feet. W.F.J.

EAST INDIA COMPANIES, companies organized in the seventeenth and eighteenth centuries for the promotion of trade and planting of colonies. These companies were formed by the governments of Great Britain, Holland, Denmark, France and Sweden. The company was granted a charter, which generally gave it a monopoly of the colonial and foreign trade within a certain district. Over that district the company was given exclusive control, and ruled without interference on the part of the home government. It was permitted to organize armed forces and equip navies for the protection of its rights. The clash between companies of different nationalities generally resulted in war between the governments. In some cases the companies paid an annual tax to the government, but usually no such payment was demanded. The first company organized for the East Indian trade was that of England, in 1600. It was chartered by Queen Elizabeth, as "The Governor and Company of London Merchants trading with the East Indies." This company made settlements in India, and established itself to such an extent that it became the most powerful body in its time. In 1784 Parliament appointed a government board of control, and in 1858 the company ceased its active existence, when India was made a crown province. The Dutch company was formed in 1602. It vied with the British company for the supremacy of the East Indian seas. It was a great power until 1674, when, wearied by a constant warfare, it began to decline, and in 1795 its existence was at an end. Denmark organized a company in 1618, which led a varied existence, with several disruptions, until 1729, when its properties were turned over to the state. France founded her company in 1664. It lived until 1769, when the government assumed control of its properties. Sweden did not organize for the Indian trade until 1741, and reorganized the company on government basis in 1806. The British company made the larger part of its settlements in India proper, at Calcutta, in Bengal, in Bombay and Madras. The Dutch company worked in Java, Sumatra and neighboring islands, which to-day are included in the Dutch East Indies. France and Denmark maintained stations on the Coromandel Coast. See ASIA, Vol. II, p. 613; and GEOGRAPHY, Vol. X, pp. 185, 186.

EAST LIVERPOOL, a city of Columbiana County, Ohio, on the eastern border of that state. It lies on the Ohio River, about 34 miles northwest of Pittsburg, Penn., with which city it has close business relations. Its chief industries are potteries, of which it has many, producing almost all kinds of ware, but chiefly the heavier and coarser varieties. It is reached by the Cleveland and Pittsburg railroad. Its population was 16,485 in 1900. W.F.J.

EASTMAN, a town and the capital of Dodge County, southern central Georgia, on the Southern railroad, and between the Little Ocmulgee River and Sugar Cox Creek. The land about is covered with trees and stock-farms, and large quantities of yellow pine, cotton and wool are shipped. Population 1890, 1,082; 1900, 1,235.

EASTMAN, ELAINE GOODALE, authoress, was born at Mount Washington, Mass., on October 9, 1863, was educated at home, and in childhood, together with her sister, Dora Read Goodale, wrote many poems which attracted wide attention. She married Dr. Charles A. Eastman in 1891. From 1883 to 1891 she was a teacher in and supervisor of Indian schools at Hampton, Va., and in South Dakota. She has written *Journal of a Farmer's Daughter*, *Apple Blossoms*, *In Berkshire with the Wild Flowers*,

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and *All Round the Year*, all but the first-named being in collaboration with her sister. She has also written much for magazines. W.F.J.

EASTMAN, JOHN ROBIE, astronomer, was born at Andover, N. H., on July 29, 1836, and was educated at Dartmouth College (1862). Until 1865 he was an assistant in the United States Naval Observatory, and since that date professor of mathematics in the navy until 1898. He has observed many solar eclipses, edited the second Washington Star catalogue, and was first president of the Washington Academy of Sciences. W.F.J.

EASTON, a town and the capital of Talbot County, eastern Maryland, situated in a fine fruit region, on a navigable branch of the Great Choptank River. It has several schools, an orphan asylum, gas-works, peach-canning and fruit-drying establishments, and manufactories of lumber, farm-implements and castings. Population 1890, 2,939; 1900, 3,074.

EASTON, a township and village of Bristol County, Massachusetts. It is a manufacturing place, and is reached by the Old Colony railroad, 23 miles south of Boston. Its population was 4,837 in 1900. W.F.J.

EASTON, a city of eastern Pennsylvania, and county seat of Northampton County (see Vol. VII, p. 616). Easton is delightfully situated on the right bank of the Delaware River, at the mouth of the Lehigh. A chain bridge across the Delaware connects it with Phillipsburg, New Jersey. It is an important railroad center, being on the Delaware, Lackawanna and Western, the Lehigh Valley, the New Jersey Central, the Belvidere Delaware, the Easton and Amboy, and the Lehigh and Susquehanna railroads. It is the outlet of a rich agricultural region, and has various manufactories, as well as iron-works, tanneries, machine-shops and paint-works. Lafayette College (Presbyterian) is located at Easton. Population 1890, 14,481; 1900, 25,238.

EAST ORANGE, a city of Essex County, New Jersey, adjoining Newark. It is largely a place of residence for Newark and New York business men, but has some industries. It is reached by the Lackawanna and Erie railroads. Its population was 21,506 in 1900. W.F.J.

EASTPORT, a city and port of Washington County, Maine, and the most easterly place in the United States, lies on Moose Island, in the western edge of Passamaquoddy Bay. It has a fine harbor, in which, however, there is a tide of twenty-five feet, and which is subject to dense fogs. Its chief industries are ship-building and fishing, and catering to the needs of summer guests, who are numerous there and on the nearby Canadian island of Campobello. Its population was 5,311 in 1900. W.F.J.

EAST PROVIDENCE, a town in Rhode Island, across the river from Providence. Pop. 1900, 12,138.

EAST RIVER, the strait between New York harbor and Long Island Sound. It is twenty miles long and separates New York city on the west from Brooklyn on the east. Its narrowest part is the Hurlgate, or Hellgate, which is about the middle of its course. Here the rocks which once obstructed the passage have been removed by blasting. The name—clearly a misnomer for an arm of the sea—is convenient, as contrasted with the North River, or Hudson, and may have arisen from the river-like action of the tides—an action so powerful as to have here and there materially deepened the channel.

EAST ST. LOUIS, a city of St. Clair County, southwestern Illinois, located on the Mississippi River, opposite St. Louis, Missouri. A steel bridge across the Mississippi connects the two cities. East St. Louis is an important railroad center, no less than ten railways either passing through or terminating in the city. The largest stock-yards in the United States, those of the National Stock Yards' Company, are located here. They comprise 650 acres. The city contains extensive car-shops, foundries, rolling-mills, nail factories, gas-works, soda factory, breweries, etc. In 1900, the city had 183 industrial establishments, employing 5,642 workmen, whose yearly products amounted to $33,560,000. The Howe Literary Institute (Baptist) is located here. The city was visited, May 27, 1896, with a tornado, which killed over five hundred people and damaged property to the amount of about $10,000,000. Population 1890, 15,169; 1900, 29,655.

EAST WEYMOUTH, a station in Weymouth township, Massachusetts, on the New York, New Haven and Hartford railroad, 30 miles S. E. of Boston. Boot and nail factories are situated here. Population of Weymouth 1890, 10,866; 1900, 11,324.

EASTWICK, EDWARD BACKHOUSE, an English orientalist and diplomat; born in Warwick, March 14, 1814. He was graduated from Oxford and entered the service of the East India Company in 1836. He was assistant secretary in the Indian office in 1860 and in 1863 was secretary of legation in Persia. He wrote many translations from Persian and Hindu, including Sadi's *Gulistan* or *The Rose Garden* (1852); and the version of Pilpay's fables called *Anvar-i Suhaili* (1854). He also wrote a *Journal of a Diplomat's Three Years' Residence in Persia* (1864). Between 1878 and 1882 he brought out editions of the *Lay of the Empress*. He died in Ventnor, Isle of Wight, July 16, 1883. W.M.C.

EATON, a town and the county seat of Preble County, Ohio, on the western border of that state. It is near the head of Seven Mile Creek, and is reached by the Pittsburg, Cincinnati, Chicago and St. Louis railroad. Its population was 3,155 in 1900. W.F.J.

EATON, DANIEL CADY, botanist, was born at Fort Gratiot, Mich., on September 12, 1834, and was graduated from Yale College in 1857. He studied botany under Asa Gray at Harvard and was graduated there in science in 1860. During the Civil War he was a clerk in the U. S. Commissary department. In 1864 he became professor of botany at Yale College and Sheffield Scientific School, and there had a distinguished career. His chief work was *Ferns of North America*. He died on June 29, 1895. W.F.J.

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EATON, Dorman Bridgman, reformer, was born at Hardwick, Vt., on June 27, 1823, and was graduated from the University of Vermont in 1848 and from the Law School of Harvard in 1850. He assisted Judge Kent in editing his famous *Commentaries*, and was a successful lawyer, but paid chief attention to municipal and civil service reform. He drafted various important codes for New York City, and organized in his own house the first American Civil Service Reform Association. From 1883 to 1886 he was the first U. S. Civil Service Commissioner. He wrote and lectured much upon the subject of good government. He died on December 23, 1899. W.F.J.

EATON, Edward Dwight, clergyman, was born at Lancaster, Wis., on January 12, 1851, and was educated at Beloit College (1872) and Yale Divinity School. He also studied at Leipzig and Heidelberg. He has been lecturer at Andover Theological Seminary, pastor of several Congregational churches, and president of Beloit College since 1886. W.F.J.

EATON, George Washington, educator, was born at Huntingdon, Penn., on July 3, 1804, and was graduated from Union College in 1829. He was a professor in Georgetown College, Ky., in 1831–33, and in the latter year became connected with the Hamilton Literary and Theological Institution, at Hamilton, N. Y., as professor of mathematics. When it was transformed into Madison University—it is now Colgate University—he was its professor of ecclesiastical history, and of systematic theology. In 1856 he was elected its president, and was also professor of mental and moral philosophy, filling both places until 1868. He died on August 3, 1872. W.F.J.

EATON, John, educator, was born at Sutton, N. H., on December 5, 1829, and was graduated from Dartmouth College in 1854. He became a teacher and superintendent of schools, a chaplain in the army, a colonel of negro troops in the Civil War, state superintendent of schools in Tennessee in 1867–69, U. S. commissioner of education in 1871–86, president of Marietta College in 1886–91, and president of Sheldon College, Salt Lake City, in 1895. In 1898 he was inspector of education in Porto Rico. He wrote several books and many official reports and magazine articles, chiefly upon educational topics, and was twice president of the American Social Science Association. Died Feb. 9, 1906.—W. F. J. *Revised by* A.R.R.

EATON, John Henry, an American statesman; born in Tennessee in 1800. He received a liberal education; studied law; was admitted to the bar, and practised his profession in Nashville. He was elected United States senator from Tennessee (in the place of George W. Campbell, resigned) and was unanimously re-elected, serving from Nov. 16, 1818, to March 9, 1829, when he was appointed Secretary of War by President Jackson. This position he held until June 18, 1831. He was governor of Florida, 1834–36, and minister to Spain, 1836–40. He died in Washington, D. C., Nov. 17, 1856. E.E.T.

EATON, William, an American soldier; born in Woodstock, Conn., Feb. 23, 1764. He was consul at Tunis, 1799–1803, and in 1804 was appointed naval agent for the United States in the Barbary States. In 1805 he led an expedition which stormed and captured Derne, and fought a general engagement for the release of Christian captives. For these services the State of Massachusetts voted him 10,000 acres of land. He died in Brimfield, Mass., June 1, 1811. E.E.T.

EATON, William Wallace, an American public man; born in Tolland, Conn., Oct. 11, 1816. He was a member of the State House of Representatives for several years, and of the State Senate in 1850; United States senator, 1875–81; Representative in Congress, 1883–85. He died at Hartford, Conn., Sept. 21, 1898. E.E.T.

EATON, Wyatt, artist, was born in Canada of New England parentage on May 6, 1849, studied art in New York and Europe, under Whistler, Gérôme, and others, and finally under Millet at Barbizon. He exhibited at the Paris Salon in 1874, returned to America in 1876, was a founder of the Society of American Artists, has had a successful career, especially as a portrait painter. W.F.J.

EATON RAPIDS, a small city of Eaton County, Michigan, in the south-central part of the state. It is on Grand River, 16 miles from Lansing, and through the presence of some mineral springs has become a health resort. It is reached by the Lake Shore and Michigan Southern and the Michigan Central railroads, and had in 1900 a population of 2,103. W.F.J.

EATONTON, a city and the county seat of Putnam County, Georgia, in the north-central part of the state. It is on the Middle Georgia and Atlantic railroad, 37 miles from Macon, and had in 1900 a population of 1,823. W.F.J.

EAU CLAIRE, a city of western central Wisconsin, and capital of Eau Claire County, situated at the head of steamboat navigation on the Chippewa River, and at the mouth of the Eau Claire River. It is the center of important lumber interests, and has excellent railroad facilities, being on the Chicago, Milwaukee and St. Paul, the Chicago, St. Paul, Minneapolis and Omaha, and the Wisconsin Central railroads. The two rivers divide the city into three sections. The public buildings are the courthouse and city hall. The streets are well paved and lighted with gas and electricity. The industrial establishments include saw-mills, flouring-mills, grain-elevators, iron-foundries, paper-mills, machine-shops, etc. Lumber is the principal article of export. Population 1900, 17,517.

EAU CRÉOLE, a fine liqueur, made in Martinique, by distilling the flowers of the Mammea apple (*Mammea Americana*) with spirit of wine.

EAU DE JAVELLE, a bleaching fluid and antiseptic, containing salt, potassium hypochlorite and potassium carbonate. It is a powerful poison when administered to human beings.

EAUX BONNES, a watering-place of southwestern France, in the department of Basses

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Pyrénées, situated 20 miles S.S.E. of Oléron. It stands in a narrow gorge surrounded by rocks, and is much frequented on account of its hot sulphurous springs, which are four in number, and are used for bathing purposes. Their temperature does not exceed 91° F.

EAUX CHAUDES, Les, three miles S.W. of Eaux Bonnes, and a similar place of resort. The springs of both places have the same properties. See Pyrenees, Vol. XX, p. 133.

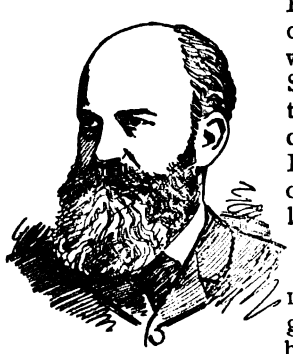
EBELING, Christoph Daniel, a German geographer; born in Hildesheim, Germany, Nov. 20, 1741. In 1769 he became a teacher in the commercial school in Hamburg, and in 1784 professor of Greek and history in the gymnasium in that city. He contributed extensively to various periodicals, and published several works on history and geography. He possessed a wide reputation for his knowledge of the geography of America. His extensive collection of books and papers is in the library of Harvard University. His principal publication was *Geography and History of North America* (1799). He died in Hamburg, June 30, 1817.

EBENACEÆ, a family of dicotyledonous plants, consisting of trees and shrubs, with alternate leathery leaves and axillary flowers, which are gamopetalous, somewhat leathery, and generally unisexual, the fruit fleshy. Numerous species are known, mostly tropical, but a few are natives of temperate countries. The wood is, in general, remarkable for its hardness, as the different kinds of ebony and other species of *Diospyros;* and on account of this quality, even that of species which never attain the ordinary size of timber trees, is sometimes accounted valuable. The only American representative is *Diospyros Virginiana*, the well-known "persimmon," or "date-plum."

EBENSBURG, a borough and the capital of Cambria County, southwestern central Pennsylvania, on the Pennsylvania railroad, 12 miles W. of Altoona. It is in a heavily timbered country, which is also very beautiful; hence it is popular as a health and summer resort. Its industries are iron-working, wool-weaving and tanning. Population 1890, 1,202; 1900, 1,574.

EBERNBURG, Germany, a village of the Rhine palatinate at the confluence of the Alsenz with the Nahe, 25 miles S.W. of Mainz. Here are the ruins of the Sickingen castle which figured in the Reformation as the refuge of Melanchthon and other leaders. Pop., 500.

C. L. S.



GEORG M. EBERS.

EBERS, Georg Moritz, a German Egyptologist and novelist, was born at Berlin, March 1, 1837. At the universities of Göttingen and Berlin he made Egyptology his principal study, and later he visited the principal museums of Egyptian antiquities in Europe. In 1870 he was called to Leipsic as professor. During his sojourn in Egypt, in 1872–73, he discovered the Papyrus *E*, known under his name, a very important document, on account of the insight it gives into the language and culture of the ancient Egyptians. In 1876 he was stricken with paralysis, and at once occupied himself with imaginative composition, as a relief from ennui, the state of his health precluding more serious studies, his first work being *An Egyptian Princess* (1864). Of his novels, *Uarda: A Romance of Ancient Egypt* (1877), is the most popular. It was followed by *Homo Sum* (1878); *The Sisters* (1880); *The Emperor* (1881); *The Burgomaster's Wife* (1885); *Serapis* (1885); *Cleopatra* (1894); *In the Fire of the Forge* (1895); and *Arachne* (1898). His Egyptian stories afford evidence of scientific study. His scientific works include *Through Goshen to Sinai* (1872); *Papyros Ebers* (1875); *Egypt: Descriptive, Historical, and Picturesque* (1878); *Coptic Art* (1892). Died in Munich, Aug. 8, 1898.

EBERSWALDE, a town of Prussia. See Neustadt-Eberswalde, XVII, 375. Educational facilities have been increased. Pop. 1900, 21,654.

EBERT, Adolf, a German scholar of Romanic languages; born June 1, 1820, at Cassel. He studied philology from 1840–44, and became professor at Marburg, where he edited a *Manual of Italian National Literature* (1854). In conjunction with Ferd. Wolf he founded in 1859 the *Annals of Romanic and English Literature*. In 1862 he became professor of Romanic and in 1873 also of English philology in Leipsic, where he published his principal work *A General History of the Literature of the Middle Ages*. He died July 1, 1890.

G. A. S.

EBERT, Karl Egon, an Austrian poet; born at Prague, Bohemia, June 5, 1801. He was educated there and at Vienna, and from 1825 to 1857 was librarian at Donaueschingen. His chief works are *Poems* (1824); *Wlasta: A Bohemian National Heroic Poem* (1829); and *The Cloister: A Narrative Idyl* (1833). He died Oct. 24, 1882.

EBONITE. See India Rubber, XII, 883.

ECCENTRIC, in machinery. See Mechanics, Vol. XV, p. 771.

ECCENTRICITY, a mathematical term which, in the older mathematical works, is used as the name of half the distance between the foci of an ellipse or hyperbola. More properly, the eccentricity is the *ratio* of half the distance between the foci to the semi-major axis.

ECCLESFIELD, England, a parish of the West Riding of Yorkshire, five miles by rail north of Sheffield. It is a busy industrial center, with coal and iron mining and noted manufactures of cutlery and hardware. Population, 1901, 34,150.

C. L. S.

ECCLESIOLOGY, the name which has been given, in the British Islands, to the study of church architecture and decoration. It has a literature of its own, including a monthly journal, called *The Ecclesiologist.* There are societies for promoting its study, one of which, "The Ecclesio-

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logical Late Cambridge Camden Society," has published *A Handbook of English Ecclesiology* (London, 1847).

ECCLESTON, SAMUEL, clergyman, was born in Maryland on June 27, 1801, and was educated at St. Mary's College, Baltimore, and in France. He was made vice-president of St. Mary's in 1827 and president in 1829, coadjutor bishop of Baltimore in 1834 and archbishop and primate of the United States in 1835. He died on April 21, 1851. W.F.J.

ECHEGARAY, DON JOSÉ, a Spanish author; born in Madrid in 1835. In 1858 he became professor of mathematics and physics at the Madrid Academy of Engineering. For his many scientific publications he was elected to the *Real Academia de Ciencias*. The greatest fame he won however, as a dramatist. His *La Esposa del Vengador*, *i. e.*, the wife of the avenger (1874), is a product of effective action, forcible characteristic and noble language. It was followed by *La Ultima Noche* (1876); *Mar Sin Orillas* (1880); *Conflicto entre dos Deberes* (1885); *Lo Sublime en lo Vulgar* (1890); *Marina* (1893). G.A.S.

ECHENEIDIDÆ, a family of fishes characterized by a sucking disk on the upper surface of the head, by which they attach themselves to other fishes. The *Remora* is a well-known representative of the family. See PILOT-FISH, Vol. XIX, p. 105.

ECHIMYD (*Echimys*), a genus of South American rodent quadrupeds, having the tail scaly, and the fur coarse and mingled, with flattened spines. They are known as "spiny rats."

ECHINIDEA. See ECHINODERMATA, Vol. VII, pp. 544–547.

ECHINOCACTUS, a genus of cactus plants, comprising more than two hundred species, most of which belong to Mexico and the United States. They are globose or oval, mostly strongly ribbed, with clusters of spines (often very stout) on the ribs, and usually very showy flowers borne near the apex. See CACTUS, Vol. IV, pp. 555–556; and HORTICULTURE, Vol. XII, pp. 274–275.

ECHINUS. See ARCHITECTURE, Vol. II, p. 407.

ECHIUM, a genus of boraginaceous plants, of which there are about fifty species, represented by the common blueweed or viper's bugloss (*E. vulgare*, a native of Europe), but having become a weed in the United States.

ECHIURIDÆ, a family of greatly degenerated annelid worms. The larva is normal, but the adult is modified, so that the exact affinities are uncertain. They are all marine. Some species are found on coasts of the United States. See ANNELIDA, Vol. II, p. 63.

ECHO. See ACOUSTICS, Vol. I, p. 00.

ECHO CAÑON, a noteworthy gorge in the Wasatch Mountains in Summit County, Utah, in the northern part of that state, not far from Ogden and Salt Lake City. W.F.J.

ECKERT, THOMAS THOMPSON, telegraph manager, was born in Ohio on April 23, 1825, and at an early age became a telegraph operator. In the first part of the Civil War he was superintendent of military telegraphs for the army of the Potomac, and in the latter part he was general superintendent of military telegraphs, rising to the military rank or brevet brigadier-general. In 1864–66 he was assistant Secretary of War at Washington. In 1866 he became connected with the Western Union Telegraph Company, in 1875 became president of the Atlantic and Pacific Telegraph Company, in 1880 president of the American Union Telegraph Company, and in 1881 vice-president and general manager, and in 1893 president, of the Western Union Telegraph Company. W.F.J.

ECKFORD, HENRY, an American shipbuilder; born in Irvine, Scotland, March 12, 1775. He learned his trade in Quebec, and in 1796 removed to New York. In 1812 he was employed by the government to build warships on the lakes. He built the steamship *Robert Fulton*, which in 1822 made the first successful voyage from New York to New Orleans and Havana. In 1820 he was appointed naval constructor at Brooklyn and built the *Ohio*. He subsequently constructed vessels of war for various European powers and for some of the South American republics. In 1831 he organized a navy yard at Constantinople, where he died, Nov. 12, 1832. E.E.T.

ECKMÜHL OR EGGMÜHL, village in Lower Bavaria, 12 miles S.E. of Regensburg. The scene of defeat of Archduke Karl by Napoleon, April 22, 1809. G.A.S.

ECLAMPSIA. See PATHOLOGY, Vol. XVIII, p. 400.

ECLECTIC SCHOOL OF MEDICINE. See AMERICAN ECLECTIC SCHOOL OF MEDICINE, in these Supplements.

ECLIPSE. See ASTRONOMY, Vol. II, pp. 702–703.

ECLIPTIC. See ASTRONOMY, Vol. II, p. 674.

ECLOGUE. See PASTORAL, Vol. XVIII, p. 350.

***ECOLOGY**, sometimes written **ŒCOLOGY**, a department of plant physiology so recently organized that it can be outlined only in an imperfect way. It is that phase of physiology which deals with plants in their external relations, as distinct from physiology proper, which deals with the internal economy of the plant. The main facts of ecology are not new, but their organization into a separate department of botany is comparatively recent. The subject deals with plants as living organisms in their broadest relationships, and has been styled the "biology of plants," but the word *biology* has too broad an application to be so restricted. In the following outline an attempt is made to present the main subjects of ecology, rather than a well-organized syllabus.

A. MODIFICATIONS OF FORM AND FUNCTION.

1. *The plant as modified by its environment.*

a. *By food.*

(1) Holophytes: the word signifies "the whole plant," and refers to those plants whose mode of life is entirely of the ordinary kind, which includes almost all green

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plants, which construct their substance from absorbed carbon dioxide, water, soluble nitrogen salts, and other salts; that is, from wholly inorganic materials. The province of ecology is to consider the various adaptations of the plant as a whole to obtain such food-material.

(2) Parasites: the adaptations of plants to secure their food-material from other living beings, including the general effect of parasitism upon plant-structure.

(3) Saprophytes: the adaptations of those plants whose nutrition is like that of ordinary animals, in that they are entirely dependent upon organized food, material obtained from dead organisms or from the products of living ones.

(4) Carnivorous plants: the adaptations of those plants which supplement the ordinary inorganic food of green plants by various contrivances to secure and absorb animal food. In this category fall *Dionæa*, *Drosera*, *Sarracenia*, *Nepenthes*, etc., with their elaborate traps of various kinds, as well as those plants which secure the same result by the simpler device of glandular secretions.

b. *By medium.*

(1) Those plants suspended in the atmosphere, as bacteria and other minute forms.

(2) Those plants supported in the atmosphere, as numerous species of epiphytic Orchids, Bromelias, etc.

(3) Those plants suspended in liquid, as numerous algæ, yeast, etc.

(4) Those plants surrounded by earth, as the truffles.

(5) Those plants partly in one medium and partly in another, as ordinary terrestrial plants in earth and atmosphere, ordinary aquatics in earth and water, and some in earth, water and atmosphere.

c. *By moisture.*

(1) Xerophytes: those plants which are adapted to dry localities, finding their extreme expression in the highly modified forms of deserts, as the *Cactaceæ* and numerous others. Often spoken of as "xerophilous plants."

(2) Hygrophytes: those plants which are adapted for wet places, sometimes called "hygrophilous" or "hydrophilous plants."

d. *By heat.*

(1) Megatherms: those plants adapted to a high temperature average, as palms.

(2) Mesotherms: those plants adapted to a moderate temperature average, as the orange.

(3) Microtherms: those plants adapted to a low temperature average, as oaks.

(4) Hekistotherms: those plants adapted to an arctic temperature, as the arctic lichens.

In addition to the four "heat groups" here indicated, there are a number of other groups not so readily defined.

2. *The organs as modified by environment.*

This phase of ecology has been very little studied, but represents a fertile field for investigation.

3. *Dependence of the plant upon other organisms.*

a. *Symbiosis:* certain plants have entered into relations of mutual helpfulness, in many cases having become so completely adapted as to be absolutely dependent upon one another. A prominent example is the group known as "lichens," which are various groups of fungi and algæ living in intimate symbiotic relations. The resulting combination makes it possible for these organisms to live in conditions which would be impossible for either alone.

b. *Mycorhiza:* really a special phase of symbiosis, referring to the connection found to exist between certain fungi and the roots of plants, notably trees (especially amentaceous trees), orchids, *Leguminosæ*, etc. The absorbent region of the roots is covered by a dense mycelial growth of the fungus, which is thought to promote the absorption of organic matter of the soil by its decomposition.

c. *Root-tubercles:* upon the roots of certain plants, notably the *Leguminosæ* (clover, peas, beans, etc.), gall-like growths are found, known as tubercles. These tubercles are formed through the irritation of a parasitic fungus, which has entered the root by way of the root-hairs. The relation between the fungus and green plant, however, seems to be one of symbiosis, since it is connected with the assimilation, by the latter, of free nitrogen. As a rule, plants cannot assimilate free nitrogen, but plants with root-tubercles can grow in a soil containing no trace of nitrogen compounds. The process is not understood, but the evident source of nitrogen is the free nitrogen of the atmosphere obtained by way of the soil, and combined in usable form by the fungus of the tubercle or some bacterial form of the soil. The association of the tubercle with this form of nitrogen assimilation has been demonstrated, but its immediate relation to the process is still a subject of inquiry.

d. *Mites and ants:* these insects are often utilized by plants for protective purposes, which are then called *myrmecophilous* ("ant-loving") plants. Sugar secretions secure the presence of certain ants, which keep off injurious ants and other destructive insects. In *Acacia sphærocephala*, regular "food-bodies" for the ant police are provided at the tips of the leaflets; in other species, various forms of ant shelter and colonization are provided.

4. *Specific adjustments.*

a. Protection against cold.
b. Protection against animals.
c. Collecting or shedding rain.
d. Devices for climbing.
e. Distribution of seeds.

5. *Natural life period.*

Under this category fall those factors and structures which determine the duration of plants, as in the case of annuals, biennials and perennials.

6. *Vitality of the plant and of its parts.*

The power of endurance of plants, as a whole, and of their different organs in particular, varies widely, and gives rise to a large series of adaptations.

7. *Germination and sprouting.*

a. Resting period.
b. Maturity of seeds and spores.
c. Conditions for germination.
d. Characteristics of seedlings.
e. Unfolding of buds.
f. Characteristics of young shoots.

B. Reproduction.

1. *Distribution and adjustment of the organs.*

a. *Monœcism:* a condition in which the two sets of sexual organs are separated from each other, but occur on the same plant.

b. *Diœcism:* a condition in which the two sets of sexual organs occur on different plants, and individual plants thus become male and female.

c. *Hermaphroditism:* a term used in special connection with "flowers," and indicating that stamens and pistils occur in the same flower, although morphologically these structures are not sexual. The various adaptations of the hermaphrodite flower for reproductive purposes fall under the following grouping:

(1) Dichogamy: in which the stamens and carpels of the same flower come to maturity at different times. If the stamens mature first, it is a case of *protandry;* if the carpels mature first, it is *protogymy.*

(2) Heterogamy: in which stamens and carpels mature together, but other adaptations have appeared to prevent close-pollination; as *dimorphism*, in which two forms of flowers occur; and *trimorphism*, in which there are three forms.

2. *Pollination by wind.*

Plants in which the agent of pollen-transfer is the wind, in which the adaptive structures are an abundance of powdery and even winged pollen, and absence of color, odor and nectar. Known as "anemophilous" plants, such as pines, oaks, grasses, etc.

3. *Pollination by insects.*

Plants in which there occurs the greatest variety of adaptive structures in relation to insect-visits, such as form, color, odor, nectar, character of pollen, etc. "Entomophilous" plant.

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4. *Pollination by birds, snails, etc.*

The humming-birds especially are notable agents of pollen-transfer in certain plants, known as "ornithophilous" plants, while snails and other crawling forms serve the same purpose in certain clustered flowers.

5. *Protection of pollen from enemies and rain.*

The nectar-secretions provided for the attraction of desirable insects is equally attractive to other insects, notably ants, whose visits would prove useless, or even destructive. Devices to ward off these "unbidden guests" are almost as numerous as those to secure the presence of favorable visitors. Protection is necessary, also, against grazing animals, and against the injurious effects of rain upon both pollen and nectar.

6. *Effects of cross and close fertilization.*

A subject elaborately worked out by Charles Darwin, and further enriched by a vast body of additional observations.

7. *Apogamy.*

The production of the sporophyte from the gametophyte without the formation of a sexual spore. In case the development is from an unfertilized oösphere, it receives the name of *parthenogenesis*. The conditions of apogamy, and of reproduction in general without the use of a spore, are subjects of great ecological interest.

C. Development of the Plant Kingdom.

1. *Spontaneous generation.*
2. *Theory of descent.*
   a. Variation.
   b. Natural selection.
   c. Heredity.

This division of the subject presents that phase of biology which is undoubtedly of the deepest import.

D. Geographical Distribution.

1. *Means of distribution.*
2. *Influence of climate.*
3. *Influence of soil and of man.*
4. *Zones limited by elevation.*
5. *Zones limited by latitude.*
6. *Tension lines.*

To the botanist it will be apparent that the above outline is not sufficiently inclusive, but it will serve to present the range of subjects included under the head of Ecology.

John M. Coulter.

ECONOMICS, a term which in its original and restricted sense denotes the classification and management of domestic affairs, but in its later and more comprehensive meaning includes the adjustment of social conditions throughout the entire body politic. The subject of Political Economy, which is now the main branch of economics, is treated elaborately in its historical development and the relation it bears to government, in volume XIX of this Encyclopædia. This branch of the subject applied originally to the management of the industry, production, income and expenses of the state, but as each epoch is a transition period in economics, changes in economic theories are constantly taking place. The transition, in the main, ranges from the art of directing household affairs to the larger field of state regulation and then reverting to abstract principles deals merely with the science of wealth and the problems pertaining to exchange value. It is a well-established fact that personal desire for gain, coupled with corporate extension of power, injected confusing and misleading elements into the deduction of economists, thus distorting the natural application of doctrines into illy-defined and vague theories and causing political economy to be called the dismal science. If this designation were appropriate it was because economic theory had been degraded and shackled, its truths dislocated, and its harmonies ignored; when brought back into its own proper symmetry, it radiates hope and light. The 20th century promises a greater transformation in economic thought than any of the previous epoch-making periods of this science. As time passes and social problems become more complex, economics, in its broadest sense, requires more advanced statesmanship to regulate affairs of state. As nations develop and human society evolves new economic phases of political and social questions arise. In the course of development not only the public utilities that make up the national wealth are to be considered but the sources of that wealth in its component and individual parts. Thus it is that the tendency of development in progressive nations is toward a more democratic application of the principles of government. The dominant doctrines of the classical system of economy, whose theories were founded on the tenets of private capitalistic enterprise, have found extreme and uncompromising opponents in the socialists of the 19th century, who protest against private ownership of capital and advocate the common ownership of the means of production and distribution. Different phases of communistic plans are by no means new, but socialism may be said to have been given its first positive interpretation and status by Karl Marx in the last half of the 19th century and, after that time, exerted a wide influence on the economic thought of the period. Another important and far-reaching innovation on old economic theories was made during this late era by Henry George, who, with remarkable ingenuity and logic, enunciated the theory of the single tax. Among his followers are some of the most progressive economists of the day. One of the latest phases of economic thought has been toward the means of securing the application of the political philosophy, which appeals to the thinking masses. This means is furnished by what is known as Direct Legislation, which, of itself, is not an economic principle but the means by which the achievement of an end is brought about. It operates through the initiative and referendum. The former includes a demand on petition of a certain number of citizens, for the formulating and listing of a desired measure and the latter is the requirement that, on a like request, the measure shall be referred to the people for their verdict. If a majority vote in favor of it, it becomes a law and if not, it is rejected. By this means, measures of public interest or economic questions that concern the people's welfare are disposed of on their merits, as seen by the people themselves rather than viewed through the partisan glasses of their political representatives. From an economic standpoint it is an educator of the masses and invests questions pertaining to government and human welfare with a new and fascinating interest. It is claimed for it that it accentuates the individuality of voters, broadens

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public views, cultivates a fraternal spirit, and will hasten the realization of the sublime principle involved in the brotherhood of man and the destiny of humanity. Switzerland adopted the optional referendum as a part of its national law in 1874, and 1891 incorporated the initiative in its federal constitution, and since the latter date has had Direct Legislation in full operation. Direct Legislation was adopted in the states of South Dakota, 1898; Utah, 1900; Oregon, 1902, and Nevada, 1904. Its trend in the United States was further shown, in 1903–4, by the passage of a law in Illinois authorizing a municipal referendum vote on the disposition of public utilities; by amendments formulated in the legislatures of Missouri and Montana, in 1905, to be adopted or rejected by the voters of their respective commonwealths in 1906, and by resolutions embodying similar provisions presented or pending in the majority of the states of the Union in 1905. A.R.R.

ECONOMY, a socialist village of Beaver County, western Pennsylvania, on the right bank of the Ohio River, and on the Pittsburg, Fort Wayne and Chicago railroad, about 17 miles from Pittsburg. The settlement was planted in 1825 by immigrants from Germany. The inhabitants own everything in common—3,500 acres of land, upward of 100 houses, with a church, a school, a museum and manufactories of wool, cotton and silk. Population, 413.

ÉCORCHÉ, a figure showing the muscles of the human body, and used by artists for the study of anatomy. It is generally made of plaster or *papier mâché* and is so constructed as to reveal the exterior muscles and some of those lying deeper. Drawings are sometimes made to serve the same purpose. R.W.C.

ÉCOUTES, in military operations connected with siege-works, are listening-places. They are small galleries, excavated at regular distances, and going out beneath and beyond the glacis, toward the lines and batteries of the besiegers. Their purpose is to enable the garrison to hear and estimate the works being carried on by the sappers and miners of the enemy.

ECRASEUR, the name of an instrument invented by M. Chassaignac consisting of a hollow stem through which passes a fine chain or wire which is passed around the base of a growth, or tumor or organ, and gradually tightened until it passes through the structure. The advantage of this instrument over the knife is that it causes little or no bleeding, the torn vessels spontaneously contracting and closing. It is especially adapted to tumors, polypi and piles, and has been used to remove the tongue in cases of cancer. In the galvanic ecraseur the general arrangement is the same, but the wire noose is insulated and connected with a battery that it may be heated to redness during its passage through the tissues that it may cauterize as well as crush them. As the pain caused by this instrument is very great, the patient should be placed under the action of an anæsthetic. W.R.B.

ECTROPIUM, an everted condition of an eyelid, produced either by a tumefaction of the inner membrane, or by a contraction of the skin covering the eyelids, in consequence of which it does not cover the globe of the eye. It is capable of being remedied by a slight surgical operation.

ECUADOR (República del Ecuador). According to the latest official statistics, the area of the republic is 116,000 square miles, divided into 16 provinces and one territory, with a population of 1,205,600—100,000 whites, 300,000 mixed, and 870,000 Indians, besides an unknown number of uncivilized Indians. The capital, Quito, has a population of 40,000. Other chief cities are Guayaquil, with a population of 51,000; Cuenca, 30,000; Riobamba, 18,000; and Latacunga, 15,000. The religion of the republic, according to the constitution, is Roman Catholic, to the exclusion of every other. Primary education is gratuitous and obligatory. There is a university at Quito, and university bodies in Cuenca and Guayaquil. There are 35 secondary schools and 1,088 primary schools, with about 70,000 pupils. There are also a military school, commercial schools, and technical schools.

The revenue for 1900 was estimated at $4,134,050, and the expenditure $4,483,891. The public debt in 1900 was about $7,105,000; the payment of interest has been suspended since March, 1896. Seventy per cent of the revenue is derived from customs duties on imports at the port of Guayaquil. Although the National Convention of 1884 determined that the standing army should consist of but 1,600 men, the official statement for 1892 places the number actually in service at 3,341. The national guard consists of 95,329 men.

In 1900 the imports amounted to $6,715,589, and the exports to $7,709,611. In 1900 the chief articles of export were cocoa, valued at $5,350,290; India-rubber, $538,034; straw hats, $160,683; silver bullion and coin, $174,938; vegetable ivory, $700,396. The foreign commerce is chiefly with France, Great Britain, Germany, and the United States. Since 1890 explorations and surveys have shown that Ecuador is rich in gold along the Santiago river and in the province of Esmeraldas. Little mining has as yet been the result of these discoveries.

The roads of the country are mostly bridle-roads, although a few cart-roads have been established in the interior. Since 1884 much activity has been manifested in railroad-building, but, owing to the difficulties encountered, only 85 miles had been built in 1901. The length of telegraphs is about 1,242 miles, with about 60 telegraph stations. For its history, topography, climate, productions, political and social condition, and earlier statistics, see ECUADOR, Vol. VII, pp. 558–565.

ECZEMA. See SKIN DISEASES, Vol. XXII, pp 130–131.

EDBROOK, WILLOUGHBY J., an American architect; born in Deerfield, Illinois, Sept. 3, 1843. In 1860 he became an apprentice to his father, a contractor and builder, and devoted himself to the study of architecture. The following year he went into business for himself, and soon became prominent as an architect. He was city commissioner of buildings of Chicago, Illinois, and on April 13, 1891,

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became supervising architect of the United States Treasury. Among the buildings designed by him are the Tabor Grand Opera House, in Denver, Colorado, and Notre Dame University, at South Bend, Indiana. He died in Chicago, March 25, 1896.

EDDY, CLARENCE, musician, was born at Greenfield, Mass., on June 23, 1851, and studied music under Dudley Buck, Loeschorn, and August Haupt. Returning to America in 1871 he became a church organist in Chicago for many years, and also, in 1875, director of the Hershey School of Musical Art. As a concert organist he has given recitals at world's fairs in Chicago, Philadelphia, Paris, and Vienna, and also in other large cities throughout the world. He has written *The Church and Concert Organist*, *The Organ in Church*, and other works, and many pieces of music. W.F.J.

EDDY, HENRY TURNER, engineer and educator, was born at Stoughton, Mass., on June 9, 1844, and was graduated from Yale College in 1867 and from Sheffield Scientific School in 1868. After studying in Berlin and Paris he became successively instructor in engineering at Sheffield Scientific School, instructor in Latin and mathematics in the University of Tennessee, assistant professor in Cornell University, adjunct professor at Princeton, professor and dean in the University of Cincinnati, president of the Rose Polytechnic Institute, Terre Haute, Ind., and, in 1894, professor of engineering in the University of Minnesota. W.F.J.

EDDY, MARY BAKER, Discoverer and Founder of Christian Science, and author of its textbook, *Science and Health with Key to the Scriptures*, was born at Bow, near Concord, N. H., July 16, 1821; the youngest child of Mark Baker and Abigail Barnard Ambrose, the latter a daughter of Deacon Nathaniel Ambrose of Pembroke, N. H. Her ancestry is both English and Scotch, her great-grandfather on her father's side being John McNeil, of Edinburgh, and her paternal grandfather, Joseph Baker, was an Englishman who, with his wife, Marion McNeil, came to America and settled in New England prior to the Revolution. Mrs. Eddy's grandparents were related to General Henry Knox of the Revolutionary army, and to General John Macneil who participated with honor in the battle of Lundy's Lane, and who was conspicuous for bravery at the battle of Chippewa in 1814. She is also related through these grandparents to Captain John Lovewell of Dunstable, Mass. (now Nashua, N. H.), through whose services, 1722–25, the savages of northern New England were conquered and it became possible for the early settlers to establish themselves peacefully. For these services the town of Pembroke was granted to Captain Lovewell and his soldiers. Another ancestor, Captain Joseph Baker of Pembroke, was a member of the third Provincial Congress and one of the most prominent men of his section.

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MARY BAKER EDDY.

During Mrs. Eddy's childhood her parents removed to Tilton, N. H., and at an early age she became a member of the Congregational (Trinitarian) Church and continued in fellowship with this denomination until she established her own church. In her book, *Retrospection and Introspection*, she writes: "Before this step was taken, the doctrine of Unconditional Election, or Predestination, greatly troubled me; I was unwilling to be saved, if my brothers and sisters were to be numbered among those who were doomed to perpetual banishment from God. . . . The pastor was an old-school expounder of the strictest Presbyterian doctrine. . . . I was ready for his doleful questions, which I answered without a tremor, declaring that never could I unite with the Church, if assent to this doctrine was essential thereto. . . . To the astonishment of many, the good clergyman's heart also melted, and he received me into their communion, my protest along with me."

Of her early studies Mrs. Eddy writes: "At ten years of age I was as familiar with *Lindley Murray's Grammar* as with the *Westminster Catechism;* and the latter I had to repeat every Sunday. My favorite studies were natural philosophy, logic, and moral science. From my brother Albert [a graduate of Dartmouth College], I received lessons in the ancient tongues, Hebrew, Greek, and Latin" (*Retrospection and Introspection*). She describes her childhood home as one of open-handed hospitality, in which the clergy were especially welcomed.

In 1843 she was married at her father's home in Tilton, to Major George Washington Glover of Charleston, S. C., and after her marriage she resided for about a year in the South. In 1844, while Major Glover was at Wilmington, N. C., on business, he was attacked with yellow fever, and succumbed to the disease June 27 of that year. He was a Free Mason, being a member of St. Andrew's Lodge Number 10, and of Union Chapter Number 3 of Royal Arch Masons, and was buried at Wilmington by the Free Masons as shown by the records of St. John's Lodge Number 1, of that city. His widow was escorted to her father's home in New Hampshire. In 1877 she married Dr. Asa G. Eddy, of whom she says, he "was the first student to publicly announce himself a Christian Scientist, and place those symbolic words on his office sign.'

In February, 1866, "when apparently near the confines of mortal existence, standing already within the shadow of the death valley" (*Science and Health*, p. 108), Mrs. Eddy discovered Christian Science.

In 1875 Mrs. Eddy published her book, *Science and Health with Key to the Scriptures*. How this book was at first received is apparent from the following criticism put forth of its author: "She

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will have a short-lived popularity, only to pass into history as one of the mental curiosities of the Nineteenth Century." Referring to this criticism, and to the struggles of the author, Rev. James Henry Wiggin, who was not a Christian Scientist, but who was proofreader of the early editions of *Science and Health*, wrote in his work, *Christian Science and the Bible:* "Whatever is to be Mrs. Eddy's future reputation, time will show. Little cares she, if only through her work the Truth may be glorified. More than once, in her eagerness, she has reached her bottom dollar, but the interest of the world to hear her word has always filled her coffers anew. Within a few months she has made sacrifices from which most authors would have shrunk, to ensure the moral rightness of her book. Day after day flew by, and weeks lengthened into months; from every quarter came importunate missives of inquiry and mercantile reproach; hundreds of dollars were sunk in a bottomless sea of corrections; yet not till the authoress was satisfied that her duty was wholly done, would she allow printer and binder to send forth her book to the world." This statement the writer made out of his own personal and peculiar knowledge of the circumstances. In August, 1904, the sale of this book had reached 311,000.

In 1878 Mrs. Eddy was called by the clergyman and Church to preach in the Baptist Tabernacle, Boston, and during the period of her engagement the congregation increased rapidly, and many testified that they were healed by her preaching.

The first Christian Scientist Association was organized by Mrs. Eddy and six of her students, July 4, 1876, and in June, 1879, the first church of the denomination was organized by Mrs. Eddy and twenty-six students. Mrs. Eddy was called to the pastorate of this church, and in 1881 she was ordained. In 1881 she founded the Massachusetts Metaphysical College under a charter granted by the State, and in this college she personally taught over 4,000 students. In 1883 she established *The Christian Science Journal* and became its editor and publisher, but after it had become successfully established she gave it to the Church. In 1894 the edifice for The Mother Church of the denomination was built in Boston, on ground presented by Mrs. Eddy; and recently there has been erected and dedicated in Concord, N. H., a handsome granite structure costing $200,000, the gift of Mrs. Eddy to the Christian Scientists of her home city.

In 1889 Mrs. Eddy removed to Concord, where she has since resided within sight of her birthplace. She lives simply and unostentatiously at her home, Pleasant View, and devotes her entire time to the Christian Science movement. As the Leader of this movement, and as Pastor Emeritus of The First Church of Christ, Scientist, in Boston, she is one of the busiest women in the world and an indefatigable worker. The testimony of many thousands of persons is that they have been healed of sickness through the Science taught in her writings.

September, 1904. ARCHIBALD McLELLAN.

EDDY, RICHARD, clergyman, was born at Providence, R. I., on June 21, 1828, was a chaplain in the Civil War, has edited *The Universalist Quarterly Review* and *The Register*, and has long been a Universalist pastor. He is the author of many books, including several Universalist Church histories. W.F.J.

EDDYSTONE LIGHTHOUSE. See LIGHTHOUSE, Vol. XIV, pp. 620–621.

EDELWEISS, the popular name of *Leontopodium alpinum*, a species of *Compositæ* resembling the American Gnaphaliums, or "everlastings." It is a white, woolly herb, a native of the Alps, and cultivated in gardens. It has become a very popular plant with tourists among the Alps.

EDEN, two rivers. See CARLISLE, Vol. V, p. 95; and CUMBERLAND, Vol. VI, p. 615.

EDENTON, a town and county seat of Chowan County, North Carolina, in the northeastern part of the state. It lies at the head of Albemarle Sound and has important fisheries. It is reached by the Norfolk and Southern railroad, and had in 1900 a population of 3,046. W.F.J.

EDGAR, JAMES DAVID, statesman, was born in Canada on August 10, 1841, and was called to the bar in 1864. In 1872 he entered the Dominion Parliament, He was the author of the Canadian copyright law and has been speaker of the House of Commons. W.F.J.

EDGAR, a city of Clay County, Nebraska, 74 miles W.S.W. of Lincoln, on the Burlington and Missouri River and St. Joseph and Grand Island railroads. It has railroad repair-shops, a large canning establishment, pickling factory, a creamery, broom factory, spring-mattress factory, and also a large trade in the farm produce and stock of the surrounding country. Population 1900, 1,040.

EDGARTOWN, a quaint old town, port and county seat of Dukes County, Massachusetts (Martha's Vineyard Island). It is at the eastern end of the island, on Edgartown Harbor, and has considerable shipping and fishing industries. Its population in 1900 was 1,209. W.F.J.

EDGECUMBE. 1. A bay in the coast of Australia, lying within the province of Queensland, near lat. 20° S. and long. 148° E. It is sheltered on every side but the north, its eastern barrier terminating in Cape Gloucester. 2. A mountain in Alaska, marking the northwest point at the mouth of Norfolk Sound, which connects the metropolitan settlement of New Archangel, on the island of Sitka, with the open ocean. It rises from the water's edge an almost perfect cone, which, during nearly the whole year, it is capped with snow.

EDGEFIELD COURT HOUSE, a town and the county seat of Edgefield County, South Carolina, in the western part of the state. It is in a cotton growing country, is reached by the South Carolina railroad, and had in 1900 a population of 1,775. W.F.J.

EDGEHILL, an elevation near the village of Keinton, Warwickshire, England, where the first great battle of the Civil War was fought, on Sunday,

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Oct. 23, 1642, between the Royalist forces under Charles and the Parliamentarians under the Earl of Essex. The Roundheads were victorious, and after the battle 4,000 men lay slain at the foot of Edgehill, most of whom were Royalists.

EDGERTON, a city of Rock County, Wisconsin, on the southern border of the state. It lies on the Rock River, 25 miles southeast of Madison and 63 miles west of Milwaukee, and is reached by the Chicago, Milwaukee and St. Paul railroad. It is an important tobacco market. Its population was 2,192 in 1900. W.F.J.

EDGEWATER, a village of Richmond County (Staten Island), New York, now included within New York city. W.F.J.

EDHEM PASHA, a Turkish statesman; born in 1813 in Chios, sold as a slave in 1822, and sent in 1831 to Paris by Mahmud II. He studied 4 years at the Institute Barbet, and 4 years at the School of Mining. On his return he was appointed a colonel and chief of the Imperial Household. In 1876 he was ambassador to Berlin, and in 1877 succeeded Midhat Pasha in the office of a grand vizier. Having resigned in 1878, he was sent as ambassador to Venice where he stayed till 1883. From 1883–85 he was minister of the interior. He died March 21, 1893. G.A.S.

EDICT OF NANTES. See FRANCE, Vol. IX, pp. 497,498, 510.

EDINA, capital of Knox Co., Missouri, on the Fabius River, and on the Quincy, Omaha and Kansas City railroad, 45 miles W.N.W. of Quincy. It has a Catholic academy, a broom factory, a carriage factory, and a creamery. Pop., 1900, 1,605.

EDINBURG, a village of Erie Co., northwestern Pennsylvania, on the French Creek and on the New York, Lake Erie and Western railroad. It has a state normal school. Population, 1900, 691.

EDINBURGH, Indiana, a town of Johnson County, 30 miles S. of Indianapolis, on a branch of the Pittsburg, Cincinnati, Chicago & St. Louis R. R. It manufactures lumber, flour, starch and furniture. Population, 1900, 1,820. C.L.S.

EDINBURGH, capital of Scotland, and a university city. Pop., 1901, 316,479. See VII, p. 571.

EDINBURGH, ALFRED ALEXANDER WILLIAM ERNEST ALBERT, DUKE OF, and Duke of Saxe-Coburg-Gotha; born August 6, 1844, in Windsor Castle as the second son of Victoria, Queen of England. He was, in 1866, created Duke of Edinburgh and Duke of Ulster and Kent, and served as cadet on board several warships. He commanded the *Galathea* on a trip to Australia, where he was attacked by O'Farrell, an Irishman, and slightly wounded. From there he proceeded to India and East Asia. On January 23, 1874, he was married to Grand Duchess Marie of Russia (born October 17, 1853), daughter of Emperor Alexander II, of which union five children issued. He succeeded his uncle, Duke Ernest II of Saxe-Coburg-Gotha, who died without any issue on August 22, 1893, after his older brother, the present King Edward VII of England, had renounced his right of succession. He held in the Russian navy the rank of a chief of naval equipage in the Black Sea, and in the German that of a general of infantry. On his accession to the throne he gave up the position of a high admiral in the English navy and of a member of an English privy council. He died July 30, 1900, in the castle of Rosenau near Coburg. G.A.S.

EDINBURGH REVIEW. See PERIODICALS, Vol. XVIII, p. 547.

EDINBURGH, UNIVERSITY OF. See EDINBURGH, Vol. VII, p. 576; and UNIVERSITIES, Vol. XXIII, pp. 902, 910, 911.

EDISON, THOMAS ALVA, an American inventor and electrician; born in Milan, Ohio, February 11, 1847. At the age of twelve years, while living at Port Huron, Michigan, he became a newsboy on the Detroit and Port Huron branch line of the Grand Trunk railway. In 1862 he set in type and printed the *Grand Trunk Herald* which he sold with his other papers. The operations of the telegraph, which he constantly witnessed in the stations along the road, awakened his interest. Later a station master taught him telegraph operating and he traveled for several years over the United States and Canada acquiring great skill as a telegrapher. He removed to New York in 1871, and soon afterward became superintendent of the Gold and Stock Company, inventing the printing telegraph for gold and stock quotations. For the manufacture of this appliance he established a large workshop at Newark, New Jersey, and continued there until 1876, when he removed to Menlo Park. Among his principal inventions are his system of duplex telegraphy, which he subsequently developed into quadruplex and sextuplex transmissions; the carbon telephone transmitter, now used by nearly all the telephones throughout the world; the microtasimeter used for the detection of small variations in temperature; the acrophone, magaphone, the incandescent electric lamp; the kinetoscope, and a storage battery for street railway cars and automobiles. In 1878 he was made Chevalier of the Legion of Honor by the French Government and a commander of the Legion in 1889. W.M.C.

THOMAS ALVA EDISON.

EDISTO, a river and island of South Carolina. The river flows through the southwest part of the state, being formed near Branchville in Barnwell County, by the confluence of the North Edisto and the South Edisto, and entering the Atlantic by two arms, respectively named from the two confluents. Edisto also designates the island which separates those two arms. The stream is navigable for over one hundred miles, and its mouth is about twenty miles to the southwest of Charleston.

EDMONDS, FRANCIS W., painter; was born at Hudson, N. Y., on November 22, 1806, and be-

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came a bank clerk and cashier, and a member of a bank-note engraving company. He displayed much taste and talent for art, and practiced it with diligence during the intervals of business engagements, producing many creditable works. He was elected an associate of the National Academy in 1838, and in 1840 a member and trustee of the academy. His works dealt with a considerable variety of subjects, realistic and imaginative. He died on February 7, 1863. W.F.J.

EDMONDS, JOHN WORTH, an American jurist; born in Hudson, N. Y., March 13, 1799. He was a member of the New York Assembly in 1831, and of the State Senate and court of errors, 1832–35. In 1836–37 he was engaged on special missions for the Federal government among the Indians. In 1837 he resumed the practice of law in New York city. In 1843 he was appointed State prison inspector and inaugurated many reforms. In 1845 he became a State circuit judge, in 1847 a judge of the supreme court, and in 1852 a member of the court of appeals. In 1853 he retired from the bench and resumed practice. He was a convert to and an exponent of the doctrines of spiritualism and published *Spiritualism* (in two volumes) in 1853. He died in New York, April 5, 1874. E.E.T.

EDMONSTONE ISLAND, an outpost, as it were, of the delta of the Ganges, toward the Bay of Bengal, situated at the mouth of the Hoogly, the most westerly arm of the great river above mentioned, in lat. 21° 32′ N., and long. 88° 20′ E.

EDMONTON, Canada, a town of the Northwest Territory of Alberta, on the Saskatchewan River and the Canadian Pacific railroad, 175 miles N.E. of Calgary. It has a meteorological station telegraphically connected with Washington, D. C. and is a growing coal-mining and agricultural center. Pop., 1901, 2,626. C.L.S.

EDMONTON, a large village in the northeast of Middlesex, southeast England, near the Ken, seven miles N.N.E. of London. Population of parish 1901, 46,351. It contains many villas of London merchants, etc. Charles Lamb is buried in the churchyard here. Edmonton is connected with Cowper's humorous poem of *John Gilpin*.

GEORGE F. EDMUNDS.

EDMORE, a railroad junction and shipping-point in Montcalm County, east-central southern Michigan, 33 miles N. of Ionia. Population, 1900, 642.

EDMUNDS, GEORGE FRANKLIN, an American statesman; born in Richmond, Vt., Feb. 1, 1828. He began the practice of law in 1849 and removed to Burlington in 1851. He was a member of the Vermont legislature, 1854–55 and 1857–59, being speaker 1857–59; and State senator and president of the Senate *pro tem.*, 1861–62. He was appointed to the United States Senate as a Republican by the legislature, to fill the vacancy caused by the death of Solomon Foot, and by successive re-elections sat continuously therein from April 5, 1866, to Nov. 1, 1891, when he resigned, having been president *pro tem.* of the Senate during President Arthur's administration. He was a member of the Electoral Commission of 1877, and was the author of the act of 1882 for the suppression of polygamy in Utah (known as the Edmunds Act), and of the anti-trust law of 1890. After resigning his seat in Congress he removed to Philadelphia and engaged in the practice of law.

E.E.T.

EDOM, Country. See IDUMEA, Vol. XII, p. 737.

EDRED OR EADRED, KING. See ENGLAND, Vol. VIII, pp. 257, 258.

EDRIOPHTHALMIA. See CRUSTACEA, Vol. VI, pp. 582 et seq.

*EDUCATION IN THE UNITED STATES, HIGHER. The subject may be treated under three heads,—I. The period of college-planting, 1636–1776; II. The period of expansion, 1776–1865; III. The period of university development, 1865–96. In part, this division is artificial. The multiplication of colleges has continued until the present time, while the beginnings of university development must be sought before 1865. Still, as college expansion is not the characteristic feature of the third period, or university development of the second one, the division answers to the general facts of the case, and will serve a useful purpose.

I. THE PERIOD OF COLLEGE-PLANTING, 1636–1776. The history of higher education in the United States begins with the following order or enactment, made by the general court of Massachusetts, Sept. 8, 1636:

"The court agreed to give £400 toward a school or college, whereof £200 should be paid next year, and £200 when the work is finished, and the next court to appoint where, and what building."

At subsequent meetings of the court it was ordered that the school should be located at Newtown, the name of which was afterward changed to Cambridge, and that it should be called Harvard College. The name of the town was changed, as President Quincy has explained, as "a grateful tribute to the Transatlantic literary parent of many of the first emigrants, and indicative of the high destiny to which they intended the institution should aspire." It was called Harvard because the Rev. John Harvard, a dissenting clergyman of England, resident of Charlestown, who died in 1638, bequeathed one half of his whole property, and his entire library, to the college. The act creating a board of overseers was passed in 1642, but teaching began in 1638. This was an humble beginning, but it was made within ten years of the "great emigration" to the shores of Massachusetts Bay. An attempt was made to concentrate upon the college the support of all the New England colonies, thus making it not merely a Massachusetts, but a New England institution; but the plan did not, in the end, succeed.

Eight other colleges were founded, in seven differ-

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ent colonies, before the Revolutionary War: William and Mary, Virginia, 1693; Yale, Connecticut, 1701; Nassau Hall, now Princeton, New Jersey, 1746; Kings, now Columbia, New York, 1754; Philadelphia, now the University of Pennsylvania, 1755; Rhode Island, now Brown University, 1764; Queens, now Rutgers, New Jersey, 1770; Dartmouth, New Hampshire, 1769. Some of these colleges grew out of older schools, and some had their rise at places other than those with which they have now long been identified. "Some future poet, or mythologist," President Gilman observes, "may personify these as the nine colonial muses." These colleges all had a common character. This was not so much because the eight later ones copied Harvard, as because they all copied a common original. The founders were Englishmen by birth or descent, and had little knowledge of institutions of higher learning except those of England. The founders of Harvard, many of whom were bred at Oxford and Cambridge, called their institution a college and a university indifferently, which shows that their minds had been deeply impressed by both sides of those great seats of learning. Wisely, however, they modeled it after the English college, and not after the English university. Moreover, all other American colleges and universities for 200 years conformed in general to the same model.

With a single exception, these colleges were virtually church schools. The Congregationalists controlled Harvard, Yale and Dartmouth; the Episcopalians, William and Mary and Kings; the Presbyterians, Princeton; the Dutch Reformed, Queens; the Baptists, Rhode Island. Philadelphia alone was nonsectarian, but even that partook largely of the ecclesiastical character of the times. *Christo et Ecclesiæ* might have been the motto of any one of them, as well as of Harvard, with the possible exception of Philadelphia. Church influence is seen in the make-up of the faculties, in the destination of the students, in the studies and discipline, and in the spirit of the schools. The presidents, and probably a majority of the professors and tutors, were clergymen; while one half of the 531 graduates sent out by Harvard previous to the year 1707 became clergymen. In her first period, so much Latin as was sufficient to understand Tully, or any like classical author, and to make and speak true Latin in prose and verse, and so much Greek as was included in declining perfectly the paradigms of the Greek nouns and verbs, were required for admission to Harvard. The first year the studies were logic, physics, etymology, syntax, and practice on the principles of grammar; the second year, ethics, politics, prosody, and dialect practice of poesy and Chaldee; the third year, arithmetic, geometry, astronomy, exercises in style, composition, epitome, both in prose and verse, Hebrew and Syriac. Besides these studies, all the students were practiced throughout the course in the Bible and the catechetical divinity. History was taught in the winter and botany in the summer; rhetoric was taught by lectures every year, and declamations were required of the students once a month. Still more, the students were practiced twice a day in reading the Scriptures and giving an account of their proficiency and experience in practical and spiritual truths, accompanied by theoretical observations on the language or logic of the sacred writers. They were careful to attend to God's ordinances and be examined on their profiting, commonplacing sermons and reporting them publicly in the hall. "Such," says President Quincy, "were the principles of education established in the college under the authority of Dunster. Nor does it appear that they were materially changed during the whole of the seventeenth century." All things were done according to the academical custom in England. The government was rectorial, the instruction tutorial. The scholars were not permitted to use the vernacular language within the college limits on any pretext. The freshmen were servitors, or fags, to the whole college, out of study hours, to go on errands. Still, we must not lay too much stress on the ecclesiastical side of the early American colleges. In those days church and state were but different sides of the same society, and the conception of secular or neutral education had not yet dawned upon men's minds; certainly not in the American Colonies or in England. This explains why governments, as that of Massachusetts, contributed freely from the public treasury to establish and support what we can hardly regard otherwise than as denominational institutions. Furthermore, these colleges looked to furnishing able servants for the state, as well as learned and godly ministers for the church, and how well they performed both offices is shown by the ability of the public men whom they trained, particularly at the time of the Revolution, and by the strength of the American pulpit.

We have an official account of the course of study at Harvard in 1726, as follows:

"1. While the students are freshmen they commonly recite the grammars, and with them a recitation in Tully, Virgil and the Greek Testament, on Mondays, Tuesdays, Wednesdays and Thursdays, in the morning and forenoon; on Friday morning, Dugard's or Farnaby's Rhetoric, and on Saturday morning the Greek Catechism; and, towards the latter end of the year, they dispute on Ramus's Definitions, Mondays and Tuesdays, in the forenoon.

"2. The sophomores recite Burgersdicius's Logic, and a manuscript called New Logic, in the mornings and forenoons, and, towards the latter end of the year, Heereboord's Meletemate, and dispute, Mondays and Tuesdays, in the forenoon, continuing, also, to recite the classic authors, with logic and natural philosophy; on Saturday morning they recite Wollebius's divinity.

"3. The junior sophisters recite Heereboord's Meletemata, Mr. Morton's Physics, More's Ethics, Geography, Metaphysics, in the morning and forenoons; Wollebius on Saturday morning, and dispute, Mondays and Tuesdays, in the forenoons.

"4. The senior sophisters, besides arithmetic, recite Allsted's Geometry, Gassendus's Astronomy, in the morning; go over the arts towards the latter end of the year, Ames's Medulla on Saturdays, and dispute once a week." *

* *Wadsworth's Diary*, p. 27, in *History of Harvard University*, by Josiah Quincy, vol. 1, p. 441.

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"This extraordinary training in the ancient languages," says Professor Tyler, "led to forms of proficiency that have no parallel now in American colleges." He relates, further, that in 1649 some of the students at Harvard could with ease dextrously translate Hebrew and Chaldee into Greek. There was at the same institution, in 1678, an Indian student who wrote Latin and Greek poetry, and those arts continued a common accomplishment down to the Revolution, while the facile use of Latin for both conversation and oratory by Harvard and Yale scholars excited no remark. In the early history of several colleges much is heard of Christianizing the Indians. Dartmouth grew directly out of an attempt to accomplish that end; studies were prescribed for Indian students, that, in later opinion, reflected severely upon the good sense of those who prescribed them; but the results of the efforts, wherever made, were miserably disappointing. Still, the name of one Indian stands among the Harvard alumni.

So much space has been given to Harvard College because, in dealing with that institution, we are dealing with the highest type of American education. At some other colleges, the theological features and influence may have been less prominent, and even at Cambridge they yielded somewhat, as time wore on. It must be remembered that, in England contemporary liberal education was quite as theological as in America. Besides natural philosophy, no great stress was attached to modern studies. The demand for surveyors, particularly in Virginia, tended to emphasize mathematics. French was taught for a few months at Cambridge in 1735, and again for a brief period at the close of the Revolution, when the alliance with France tended to bring French arts and science, as well as Frenchmen, into the country. French is also found at William and Mary at the same time. Franklin made a gallant struggle for an English school in the institution at Philadelphia, but he was in advance of his time, and so failed, much to his mortification. German studies thrived at Philadelphia for a time, and then declined. No permanent provision for teaching modern languages and literatures was made at Cambridge until George Ticknor entered on the duties of the Smith chair in 1819, and no instruction was given there in German until the day of Charles Follen, the German exile, who taught his first class in 1825.

The foregoing is an outline view of higher education in the Colonies previous to the Revolution. What was done should not be estimated too lightly. Mr. Jefferson demanded of his correspondent, Mr. Bannister, in 1785, on his return from France, "Why send an American youth to Europe for education?" And then, after enumerating the objects of a useful American education, declared, "It is true that the habit of speaking the modern languages cannot be so well acquired in America; but every other article can be as well acquired at William and Mary College as at any place in Europe." Mr. Jefferson, it is to be observed, had made a particular study of contemporary education, not only on the Continent, but in England and Scotland. The remark just quoted was no doubt intended to apply mainly or only to undergraduate study. Mr. Jefferson admitted the inferiority of American education in medicine, but insisted that law could be studied as well in Virginia as in England. A recent historian of the Thirteen Colonies, H. C. Lodge, says, Harvard College, "at the period of the Revolution, probably afforded, in theology, philosophy and the classics, as good an education as could be obtained in Europe, for the professors were men of character and learning, and some of them eminent."

Previous to the Revolution it was very common for wealthy families in the Colonies to send their children, both sons and daughters, to Europe to be educated. This was especially the case in Maryland, Virginia and South Carolina. It is also to be observed, as marking the connection between the mother-country and the Colonies in that period, that considerable sums, and sometimes large sums, of money were obtained in England for American colleges just as has since been done in the old states of the East for the new ones of the West.

II. The Period of Expansion, 1776–1865. The Revolution stimulated the planting of colleges much more than it stimulated the extension of public schools. From the close of the war to the close of the century, new colleges were founded more rapidly than one a year; namely, St. Johns, Washington, and Frederick in Maryland; Dickinson, in Pennsylvania; Union, in New York; Hampden-Sydney and Lexington, now Washington and Lee, in Virginia; Georgetown, in the District of Columbia; the University of North Carolina and the University of Vermont; Bowdoin College, in Maine; Williams, in Massachusetts, and Middlebury, in Vermont. Nor was this all: higher education was at once carried beyond the Appalachian ranges and planted in the great valley of the West. When Tennessee was still a part of North Carolina, the legislature of that state passed an act incorporating the president and trustees of Davidson Academy, which, in time, became the University of Nashville. At one time this institution exerted a widespread influence in the Southwest; then it declined, and is now reviving again. Transylvania University, Lexington, Kentucky, chartered in 1798, was the first institution of higher learning in the West to open its doors to students. After a period of prosperity it, too, declined, and years ago ceased to exist.

It will be seen that state universities have already appeared among the colleges. It is a probable conjecture that they were prompted, in part at least, by the Congressional land grants for universities in Ohio, which, it was understood, would be repeated in the case of other public land states. In all, there were about thirty college foundations in the country in 1801, as compared with nine in 1776. Moreover, from that day to this the number has continued steadily to increase. The statistics, unfortunately, are in a confused state, partly owing to inattention to collecting them, partly to carelessness, and partly to the difficulties of the subject itself. The Census-Office first collected educational statistics in 1840. The following table sums up the results then obtained, by states, so far as colleges and universities are concerned:

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STATISTICS OF COLLEGES AND UNIVERSITIES IN THE UNITED STATES IN 1840.

STATE.	No. of Institutions.	No. of Students
Alabama	2	152
Arkansas	--	----
Connecticut	4	832
District of Columbia	2	224
Delaware	1	23
Florida	--	----
Georgia	11	622
Iowa	--	----
Indiana	4	322
Illinois	5	311
Kentucky	10	1,419
Louisiana	12	989
Maryland	12	813
Massachusetts	4	769
Maine	4	266
Michigan	5	158
Mississippi	7	454
Missouri	6	495
New Hampshire	2	433
New York	12	1,285
New Jersey	3	443
North Carolina	2	158
Ohio	18	1,717
Pennsylvania	20	2,034
Rhode Island	2	324
South Carolina	1	168
Tennessee	8	492
Virginia	13	1,097
Vermont	3	233
Wisconsin	--	----
Totals	173	16,233

In 1850 the Census-Office reported 234 colleges and universities; in 1860 it reported 467; and in 1870, as many as 579. Since 1870 no college statistics are found in the census reports. More discriminating inquiry has been made by the Commissioner of Education, who reported 337 colleges in 1869–70, and 484 in 1900–01. These numbers, however, do not include many so-called colleges contained in other tables. It is next to an impossibility to ascertain how many degree-conferring institutions there are in the country, and quite impossible to ascertain how many institutions there are bearing the name of "college" or "university." It is clear that a college-planting movement set in at the close of the Revolution, which has been sustained until the present time, and that this movement was marked by a distinct lowering of the old college ideal. For many years the former distinction between a college and a university was practically forgotten, and to a large extent it is overlooked to-day. The principal causes that have led to the constant multiplication of colleges appear to be these: 1. The territorial growth of the country; 2. The increase and wider dispersion of population; 3. The Congressional land grants to the states for universities and colleges of agriculture and mechanic arts; 4. Religious zeal and sectarian rivalry; 5. Local interests, sometimes embracing commercial interest; 6. The ambition of individuals to give their names as founders to institutions of learning; 7. Desire to commemorate the names of relatives; 8. The lowering of the college ideal. Attention should also be drawn to the impulse which the formation of the republic gave to the national life, and the augmentation of this impulse by the growth and prosperity of the country.

In general, the old type of study, instruction and discipline remained unchanged throughout this period. Greek, Latin and mathematics continued to be the principal studies. Studies were organized in prescribed courses, and the degree of A.B. was given to all graduates. A majority of the old institutions continued to hold their former leadership, but two or three fell behind new institutions. The differences in what passed for higher education were quite as marked as the differences of culture in the several regions or districts in which they were found. In this respect the statistics of 1840, showing the relative numbers of college students in different states, are very significant. One of the most important facts was the founding of the state universities, most of which grew out of the Congressional land grants. (See SCHOOLS, PUBLIC, IN THE UNITED STATES, in these Supplements.) The establishment of these institutions involved ultimately, if not at once, the assumption, by the states, of a definite position in the field of higher education, which carried with it state supervision and support, and so a distinct secular influence. Upon the whole, church influence considerably declined; still, the higher institutions, including the state universities, remained mainly in the hands of clergymen. When Josiah Quincy, a layman, was made president of Harvard in 1829, it was thought a clear invasion of clerical privilege.

How far the multiplication of colleges has been an evil is a question of judgment. It is common to hear scholars, especially those at the great seats of learning, lament this multiplication, with the consequent dispersion of funds, teaching-power and students. "How much better," they say, "it would have been if the funds, professors and students had been brought together at a few great institutions, as in Germany, France and England." These forget that, to a great extent, such a concentration never could have been effected, and that the policy of dispersion has tended very considerably to augment all the factors. No doubt there has been much waste; no doubt, owing to the increase of wealth, the elevation of the standard of living, and especially the greatly improved means of transportation, the time has come for more concentration, such, in fact, as we are now seeing: but there is a great deal of truth contained in the notable words of Mr. Bryce:

"The European observer conceives that his American friends may not duly realize the services which these small colleges perform in the rural districts of the country. They get hold of a multitude of poor men who might never resort to a distant place of education. They set learning in a visible form, plain, indeed, and humble, but dignified even in her humility, before the eyes of a rustic people, in whom the love for knowledge, naturally strong, might never break from the bud into the flower but for the care of some zealous gardener. They give the chance of rising in some intellectual walk of life to many a strong and earnest nature, who might otherwise have remained an artisan or storekeeper, and perhaps failed in those avocations. They light up, in many a country town, what is at first only a farthing rushlight, but which, when the town swells to a city, or when endowments flow in, or when some able teacher is placed in charge, becomes a lamp of glowing flame, which may finally throw its rays

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over the whole state in which it stands. In some of these Western colleges one finds to-day men of great ability and great attainments; one finds students who are receiving an education quite as thorough, though not always as wide, as the best Eastern universities can give. I do not at all deny that the time for more concentration has come, and that restrictions on the powers of granting degrees would be useful. But one who recalls the history of the West during the last fifty years, and bears in mind the tremendous rush of ability and energy towards a purely material development which has marked its people, will feel that this uncontrolled freedom of teaching, this multiplication of small institutions, have done for the country a work which a few state-regulated universities might have failed to do. The higher learning is in no danger. The greatest universities of the East, as well as one or two in the West, are already beginning to rival the ancient universities of Europe. They will soon have far greater funds at their command with which to move towards the same ideal that Germany sets before herself; and they have already what is better than funds—an ardor and industry among teachers which equals that displayed fifty years ago in Germany by the foremost men of the generation, which raised the German schools to their glorious pre-eminence."

III. The Period of University Development, 1865–96. Reforms in higher education in the United States were pioneered by three distinguished men: Thomas Jefferson, George Ticknor and Francis Wayland.

Thomas Jefferson, who early interested himself in the subject of education, caused some reforms to be made in William and Mary College about the close of the Revolution. When in Europe, as minister of the United States to France, he studied the subject in its general bearings, and returned home filled with new ideas and new enthusiasm. After his retirement from the Presidency, he matured a plan of state education for Virginia, that, in 1817, he thus outlined in a letter to George Ticknor:

"I am now entirely absorbed in endeavors to effect the establishment of a general system of education in my native state on the triple basis,—1. Of elementary schools which shall give to the children of every citizen, gratis, competent instruction in reading, writing, common arithmetic and general geography; 2. Collegiate institutions for ancient and modern languages, for higher instruction in arithmetic, geography and history, placing, for these purposes, a college within a day's ride of every inhabitant of the state, and adding a provision for the full education, at the public expense, of select subjects from among the children of the poor, who shall have exhibited at the elementary schools the most prominent indications of aptness, of judgment and correct disposition; 3. A university in which all the branches of science deemed useful at this day shall be taught in their highest degree. This would probably require 11 or 12 professors, for most of whom we shall be obliged to apply to Europe, and most likely to Edinburgh, because of the greater advantage the students will receive from communications made in their native language."

While this grand programme failed, Jefferson still lived to become the founder of the University of Virginia, which opened its doors to students in 1825. The fundamental idea of this institution was the organization of separate schools, each with its own instructors, in which a degree was conferred, calling the recipient a "graduate" of this school, and without reference to other schools, and sometimes, but not always, carrying with it a title, as doctor of medicine, bachelor of law, etc. Accordingly, the University has been described as "a collection of schools, each devoted to a special subject, but under a common government." The plan involved the abolition of a prescribed curriculum and of the class system, and the recognition of specialization and election of studies, as far as the resources of the University permitted. At the South, the University of Virginia has exerted a powerful influence; but at the North its influence has been little felt. Originally there were seven schools in the University; the number has now greatly increased.

In 1819 George Ticknor entered upon the duties of the chairs of the French and Spanish languages and belles-lettres at Harvard College. He had spent the preceding four years in European study and travel, and returned home thoroughly familiar with the German universities. He soon began to agitate reforms at Harvard, and, mainly owing to his influence, some changes were resolved upon in 1825. Ticknor contended that the colleges of the United States had long been considered merely places for obtaining a degree of bachelor of arts; that recitations were mere examinations, while study and teaching were extremely superficial; that the class system prevented those who wished to investigate from doing so, since the class must be kept together and be hurried from teacher to teacher and from subject to subject. He wrote: "We have now learnt that as many years are passed in our schools and colleges and professional preparation as are passed in the same way and for the same purpose in the best schools in Europe, while it is perfectly apparent that nothing like the same results are obtained; so that we have only to choose whether the reproach shall rest on the talents of our young men, or on the instruction and discipline of our institutions for teaching them." For himself, he did not hesitate to place it on the schools, by no means omitting the colleges. The changes ordained in 1825 are thus described: "The division of the whole institution into departments, with the right of a limited choice of studies; the separation of the members of the class for their exercises according to their proficiency, so that each division might be carried forward as rapidly as was consistent with thoroughness, every man having a right to make progress according to his industry and capacity; and the opening of the college to those who wished to pursue special studies without taking a degree." But the professors, only one of whom besides Mr. Ticknor, Edward Everett, had studied in Europe, were committed to the old hard-and-fast college scheme, and so in a few years the reform, save alone as it affected Mr. Ticknor's work, was for the time abandoned. When Ticknor resigned his professorship in 1835, he assigned as one reason, that he had abandoned all hope of further change in the college. The present president of Harvard University has called Ticknor a "reformer fifty years in advance of his time." The radical changes which have been effected at Harvard within the last quarter of a century justify his forecast.

The third reformer is President Wayland of Brown University, who published his *Thoughts on the Present Collegiate System in the United States* in 1842. He recommended changes in the character of governing boards and in the mode of appointing instructors. He contended that professors should be appointed

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by competition; that their tenures and salaries should depend upon their labors and success, and that means should be provided for their removal from their chairs if they proved incompetent or unfaithful. But his most radical ideas related to the course of instruction. He held that,—1. The standard of admission to college should be raised; 2. The instruction in the college should be made more thorough, even at the cost of limiting the number of studies, or of the extension of the period of residence to five or six years; 3. That the college should be developed into a university. He suggested the addition of the degree of bachelor of science, or of literature to the old A.B. degree. Dr. Wayland desired more freedom and scope for both students and teachers; he did not believe in time-limits, but in fixing the standard of scholarship, and then taking time enough to work up to it. In 1850 Dr. Wayland made his celebrated *Report to the Corporation of Brown University on Changes in the System of Collegiate Education*, in which he developed his ideas more in detail. The key-note of the report was freedom. "The various courses should be so arranged that, in so far as it is practicable, every student might study what he chose, all that he chose, and nothing but what he chose. The faculty, however, at the request of a parent or guardian, should have authority to assign to any student such courses as they might deem for his advantage." An immediate effort to carry out some of these ideas at Brown University was made; but the force of this effort did not survive Dr. Wayland's retirement from the presidency in 1855.

Just what were the relations between these three educational reformers, it is hard to say. It is well known, however, that Jefferson and Ticknor were personal friends, and corresponded, and it is to be presumed that each one learned something from the other. Dr. Wayland also visited the University of Virginia.

From the year 1825 onward there was, as can now be clearly seen, looking backward, a slow progressive movement in higher education, taking the country as a whole. The University of Virginia never fell back from the advance ground that it first assumed. The poet-professor Longfellow, who had studied abroad, succeeded to Ticknor's chair at Harvard College, and continued the work on the same lines. Moreover, with an occasional backset, as during the administration of Dr. Sparks, Harvard, as a whole, moved slowly in the right direction until the inauguration of President Eliot in 1869. Dr. Eliot was an apostle of the new education, and immediately entered on that policy of change which has so thoroughly renovated Harvard University. In his report for 1883–84 he announced the extension of the elective system to the freshman year, which he styled "the practical completion" of a development which began sixty years before. This extension left as the sole prescribed studies in the college, one year of rhetoric, English composition, German or French, and one year of physics or chemistry. Save alone the English composition, these requirements have since been abolished. These innovations have been strongly resisted both inside and outside of the college, but they have apparently become permanent in themselves, and have certainly exerted a great influence upon the country.

In the mean time a new movement was preparing in the West. From the return of Everett and Ticknor to Harvard, laden with the spoil of German learning, American students, in slowly increasing numbers, went to the German universities to study, and returned home more or less Germanized in both scholarship and educational ideals. Previous to 1850, about fifty such students studied at Göttingen, and as many more at Berlin. Many of these men became professors in American colleges and universities. At the same time, German ideas were reaching the public mind, through the medium of reports, pamphlets, lectures, and the like. The American educational renaissance, to which many causes contributed, began about 1835. In 1831 M. Victor Cousin made his celebrated *Report on the State of Public Instruction in Prussia* to the French Minister of Education, and four years later a translation of this report was published in New York. A copy of this document, either in the original or in English, made its way to the forests of Michigan, and, falling into right hands, shaped the foundations of the educational system of that young state. The constitution of 1835 recognized the so-called "Prussian ideas"; viz., three grades of public instruction, created, maintained and supervised by the state. The University of Michigan dates from 1837—the year that the state came into the Union. At first, so great is the force of tradition, the University was organized and conducted on the old-fashioned college lines; but with the coming of Dr. Henry P. Tappan as president in 1852, there entered into it a new potency, which in course of time changed it into a thoroughly modern institution of learning, the influence of which has been widely and strongly felt. The University of Michigan has been the type to which all the really vigorous and subsequent state universities have conformed more or less closely. Reference has once been made to the state universities as introducing a secular factor into the higher education. This fact, together with the possession of comparatively large resources, has given these institutions an influence in many of the Western states that has been very powerful, if not controlling.

The Civil War gave education of all kinds a tremendous impetus. The states became more liberal and enterprising than before, private individuals more public-spirited. For the last thirty years it has been no uncommon thing for a single year to register an addition to the private educational benefactions of the country of ten million dollars. Several new and prominent institutions owe their origin wholly to private initiative, or to joint private and public initiative. Mention may be made of Cornell University, which opened its doors in 1868; Johns Hopkins, 1867; Vanderbilt, 1875; Leland Stanford, Junior, 1891; and Chicago University, 1892. All these institutions, and many more beside them, have been organized on modern lines, some of them *very* modern. Meanwhile, many old institutions have extended and strengthened their work, as Dartmouth College, Yale College, now Yale University, Columbia College, now Columbia University, the Univer-

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sity of Pennsylvania, and Princeton College, which has recently become a university. The endowments and incomes devoted to higher education have grown wonderfully. In 1842 President Wayland spoke of the great amount of money enlisted in higher education in New England, asserting that it amounted to $1,500,000,—a sum, be it remarked, that at present would not pay the annual expenses of the two foremost New England institutions of learning.

The general development need not be followed further; but it is important to set down the distinctive features of current higher education in the United States: 1. Freedom; elective studies; 2. The wide expansion of curricula; 3. The growth of faculties; 4. Laboratory methods of instruction; 5. The use of the lecture method; 6. The employment of the seminary, which stands for research on the one side, as the laboratory does on the other; 7. Graduate study, leading to the higher degrees; 8. The differentiation of degrees, as A.B., Ph.B., B.S., and B.L.; 9. Freedom in respect to discipline, the old proctorial method having been very generally abandoned; 10. The growing conviction that a university, at least, is primarily a place for study and teaching, and not for the formation of moral or religious character; 11. The decline of the sectarian spirit, involving often the decay of ecclesiastical ideas and influence (although these ideals and influence are still strong in many denominational schools).

Two or three topics should receive something more than mention. One is the growing participation of women in the higher education. Although it is little more than fifty years since the contention for such education began, the battle is already fully won. Women are admitted to the advantages of the higher training and culture in three ways: Colleges for women, as Wellesley, Smith, and Vassar; co-educational institutions, as Oberlin College (which was the first college to open its doors to women); and the state universities and "annexes," or colleges for women, affiliated with old institutions, as Ann Radcliffe College at Cambridge, and Barnard College at New York. Of the professors and teachers of college and graduate students in the 484 colleges and universities, about 7,346 were male and 857 female; of the students 62,642 were male and 20,576 female. Of colleges for women there were 141, with 2,441 professors and teachers (697 male and 1,744 female), and the students numbered 23,365. There were also 43 schools of technology, 154 of theology, 96 law, 151 medical, 54 dental, 53 pharmaceutical, and 13 veterinary colleges.

A second topic is the multiplication of schools for teaching science and technical studies, and the elevation of their standard of work. Sometimes these schools are integral parts of larger institutions, as the Lawrence and Sheffield schools at Cambridge and New Haven; sometimes they are wholly independent, as the Massachusetts Institute of Technology. Different institutions have quite different ideals. The agricultural colleges are doing a good work for agriculture, but experience proves that they do not educate many farmers.

The last topic is professional education. Under the old *régime* the candidate for the ministry, after taking his A.B. degree at college (which was, as we have seen, a semi-theological institution), pursued his theological training in some minister's study; while lawyers and doctors obtained nearly all their professional training, the first in lawyers' offices, the second in doctors' offices. In these particulars, ideals and methods have almost wholly changed; the best work in the learned professions is now done in professional schools. There were professors of divinity in the old colleges, but the first theological school was established in connection with Rutgers College, in 1784. Andover dates from 1807, Princeton 1811, Harvard 1817, Union 1836. In 1892–93 there were 142 schools of theology in the country, with 7,836 students and 1,502 graduates. George Wythe is the first professor of law of whom we read (William and Mary College, 1779). The first law school was founded at Litchfield, Connecticut, in 1782. The Harvard school dates from 1817. In 1833 there were six law schools, with 150 students. In 1892–93 there were 63 such schools, with 6,776 students and 2,400 graduates. The first medical school in the United States was founded in Philadelphia, in connection with the university, in 1765. The Harvard school dates from 1783. In 1892–93 the Commissioner of Education published the names of 246 schools of medicine, dentistry, pharmacy, and for nurses and veterinarians, with 28,900 students and 7,232 graduates. Beyond the learned professions this account need not go.

See also SCHOOLS, in these supplements.

B. A. HINSDALE.

EDWARD VII., King of Great Britain and its colonies, Emperor of India (formerly known as Albert Edward, Prince of Wales), son of the late Queen Victoria and Prince Albert of Saxe-Coburg and Gotha, was born Nov. 9, 1841, married March 10, 1863, Princess Alexandra, eldest daughter of King Christian IX., of Denmark, succeeded to the Crown on the death of his mother, Jan. 22, 1901. Since his father's death, in 1863, Edward VII., as heir-apparent to the throne, has been actively before the public, has figured at innumerable court and civic functions at home and abroad, has travelled extensively, and been unwearied in his representative work as heir to the throne, and next to his now deceased mother the most prominent member of the royal family. Edward VII. is a man of resource, tact, and judgment, and is much beloved by all ranks of his people. He is uncle to Emperor William of Germany and to the present Tsar of Russia: he is also brother-in-law to George I., reigning King of Greece. His eldest surviving son, George Frederick, Duke of Cornwall and York, was in Nov. 1901 created Prince of Wales, and is now the heir-apparent.

EDWARDS, AMELIA BLANDFORD, an English writer of fiction, and Egyptologist, was born in London in 1831, and died at Weston-super-Mare, Somersetshire, April 15, 1892. She was the daughter of a peninsular officer, and cousin of M. B. Betham-Edwards, the novelist. Her taste for art and literature was evidenced from an early age, and in 1853 she

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began to be known to the public as a contributor to the press. Though best known as a novelist and traveler, she wrote a number of educational works, chiefly abridgments of English and French history, besides a volume of ballads, and also contributed largely to the magazines. The following are Miss Edwards's principal novels: *My Brother's Wife* (1855); *Hand and Glove* (1859); *Barbara's History* (1864); *Half a Million of Money; Debenham's Vow* (1870); *In the Days of My Youth* (1873); *Lord Brackenbury* (1875); and *Miss Carew* (1865), a collection of short tales. The latter years of her life she devoted chiefly to travel, the first record of which, dealing with the Dolomite region, in the southern Tyrol, was published in 1873, under the title of *Untrodden Peaks and Unfrequented Valleys*. This was followed, in 1877, by *A Thousand Miles Up the Nile*, giving an account of the remarkable discoveries made at Abu-Simbel (forty miles below the second cataract), together with a ground plan of the temple which Miss Edwards's party excavated; and other interesting archæological matter illustrated by her pen and pencil. The later fruit of the author's interest in Egyptian exploration, a fund for which she founded in London in 1883, is a work entitled *Pharaohs, Fellahs and Explorers* (1891), besides a number of contributions on Egyptian archæology to the magazines and reviews. During the winter of 1889–90 she lectured on her favorite topic in the United States, and received from Columbia College, New York, the honorary degree of doctor of philosophy. In 1878 she compiled a volume of selections from the English poets and prose-writers for the Tauchnitz Library. Previous to her death she founded a chair of Egyptology at Oxford, and made an excellent translation of Professor Maspero's *Manual* (for students and travelers) *of Egyptian Archæology*, a guide to the study of antiquities in Egypt.

AMELIA B. EDWARDS.

EDWARDS, Bela Bates, an American author; born in Southampton, Mass., July 4, 1802. He graduated at Amherst College in 1824 and entered the Andover Seminary in 1825. In 1828 he was appointed assistant secretary of the American Educational Society, and performed the duties of the office until 1833. From 1828 to 1842 he edited the *American Quarterly Register*, and in 1833 established the *American Quarterly Observer*, afterward united with Robinson's *Biblical Repository*, which he edited from 1835 to 1838. From 1844 to 1852 he edited the *Bibliotheca Sacra*. In 1837 he was appointed professor of Hebrew at Andover Seminary, and in 1848 assumed the chair of Biblical literature. He died in Athens, Ga., April 20, 1852. E.E.T.

EDWARDS, George Wharton, artist and author, was born at Fair Haven, Conn., in 1859, and was educated in art in Boston, Antwerp, and Paris. He is a member of the American Water Color Society, the National Art Society, the National Sculpture Society, and many other artistic and literary organizations. He has written *Thumbnail Sketches*, *The Rivalries of Long and Short Codiac*, *Break o' Day*, and other works, and has illustrated many books.

W.F.J.

EDWARDS, Henry Stillwell, an American journalist and writer; born in Macon, Georgia, April 23, 1855. Upon the completion of his elementary education, he studied law and was admitted to the bar of Georgia. He did not continue long in that profession, however, but soon turned to journalism. He joined the staff of the Macon *Daily Telegraph*, and within a few years became its editor. He soon attracted the attention of the reading public by his stories of Southern negro life, published in the *Century* and other periodicals. Among these stories were *Two Runaways; Ole Miss an' Sweetheart;* and *De Valley an' de Shadder*. In 1895 he was awarded the $10,000 prize, offered by the Chicago *Record* for the best "mystery story," for his story, *Sons and Fathers*. This story established his growing reputation, and caused critics to class him among the leading writers.

EDWARDS, Jonathan, an American theologian; born in Northampton, Mass., May 26, 1745. Brought up among the Indians of Stockbridge, Mass., he became intimately acquainted with their tongue, and at 10 years of age he was sent to live among the Six Nations, that he might add a knowledge of their language and so fit himself for missionary work, a scheme which events frustrated. He graduated at Princeton in 1765; studied divinity with Dr. Bellamy, and was licensed as a preacher in 1766. For two years he was a tutor at Princeton, and in 1769 he was ordained pastor of White Haven, Conn., a charge which he held until 1795. In 1796 he was settled as pastor at Colebrook, Conn. In May, 1799, he was elected president of Union College, but held that office for only two years, dying in Schenectady, N. Y., Aug. 1, 1801.

E.E.T.

EDWARDS, Justin, an American clergyman; born in Westhampton, Mass., April 25, 1787. He graduated at Williams College in 1810; settled in the ministry at Andover in 1812; removed thence to the Salem Street Church, Boston, in 1828; and in 1829 became secretary of the American Temperance Society, in which position he spent seven years. After this he was for six years president of the Andover Theological Seminary, and then for seven years was engaged in promoting Sabbath observance. Four years more were spent in preparing a brief commentary on all the New and part of the Old Testament, for the American Tract Society, on which work he was engaged at the time of his death. He was the author of *Temperance Documents*, *The Sabbath Manual*, etc. He died at Virginia Springs, Va., July 23, 1853. E.E.T.

EDWARDS, Landon Braeme, physician, was

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born in Virginia on September 20, 1845, and was educated at Randolph-Macon College, the Medical College of Virginia, the University of Virginia, and New York University (Medical College). He founded in 1874 and has since edited the Virginia *Medical Monthly* (since 1896 *Semi-Monthly*). He was a lecturer at the Medical College of Virginia in 1874–77, and since 1893 has been a professor at the University College of Medicine at Richmond. He was a delegate to international medical congresses in 1887, 1893, and 1900, and is connected with various professional organizations.

W.F.J.

EDWARDS, MATILDA BARBARA. See BETHAM-EDWARDS, MATILDA BARBARA, in these Supplements.

EDWARDS, NINIAN, an American jurist and public man; born in Montgomery County, Md., March 17, 1775. He graduated at Dickinson College, studied law, moved to Kentucky, and was admitted to the bar. He served in the State legislature, was judge of the circuit court, chief justice of the supreme court; governor of the Territory of Illinois, 1809–18; United States senator from Illinois, 1818–24; was appointed minister to Mexico, 1824, but was recalled to answer charges; and again governor of Illinois, 1826–31. He died at Belleville, Ill., July 20, 1833. E.E.T.

EDWARDS, NINIAN WIRT, lawyer, was born at Frankfort, Ky., on April 15, 1809, but was soon taken to Illinois and spent his life there. He was graduated from Transylvania University in 1833, was admitted to the bar, and in 1834 was elected to the Illinois legislature, and served in that body most of the time until 1853. He was the author of the free school law of Illinois, and in 1853–57 was superintendent of public instruction under it. During the war he was United States commissary of subsistence in Illinois, but thereafter held no public office. He married a sister of Mrs. Abraham Lincoln, and thus was brought into an intimate association with the great President. He wrote *The Life and Times of Ninian Edwards and History of Illinois*. He died on August 16, 1889. W.F.J.

EDWARDS, OLIVER, soldier and manufacturer, was born at Springfield, Mass., in 1835, and became interested in manufacturing pursuits. He entered the U. S. volunteer army in the Civil War and served with distinguished gallantry. He was the hero of the "Bloody Angle" at Spottsylvania, where he held his ground against incessant attacks of a superior force for twenty-four hours, was in the Wilderness, served with Sheridan in the Shenandoah, took Ewell and Custis Lee prisoners at Sailor's Creek, and received the surrender of Richmond on April 3, 1865. He was made brigadier-general of volunteers in May, 1865, and was honorably mustered out of the service in January, 1866. Thereafter he returned to manufacturing and mercantile pursuits, and was the inventor of several valuable devices. W.F.J.

EDWARDSVILLE, a city and the county seat of Madison County, Illinois, in the southwestern part of the state. It is reached by the Toledo, St. Louis and Kansas City, the Wabash and other railroads, has some industries and had in 1900 a population of 4,157. W.F.J.

EDWARDSVILLE, a borough of Luzerne County, Pennsylvania, in the east-central part of the state, near Wilkesbarre and the Susquehanna River, and in the anthracite coal region. Its population in 1900 was 5,165. W.F.J.

EEL, the name of several North American rivers, chief of which are: (1) a tributary of the White River, Indiana, which it joins at Point Comfort, Greene County; (2) a river of California which rises in the Coast Range and after a course of 160 miles enters the Pacific, north of Cape Mendocino. C.L.S.

EFFERVESCING POWDERS. See TARTARIC ACID, Vol. XXIII, p. 75.

EFFINGHAM, a city and the county seat of Effingham County, Illinois, in the south-central part of the state. It has large brick yards and is reached by the Illinois Central, the Wabash, the Indiana and Illinois Southern and the Terre Haute and Indianapolis railroads. Its population in 1900 was 3,774. W.F.J.

EFT OR EVET. See TRITON, Vol. XXIII, p. 614, note.

EGAN, MAURICE FRANCIS, an American author and journalist; born in Philadelphia, Pennsylvania, May 24, 1852. He was graduated from La Salle College in 1871 and from Georgetown College, where in 1878 he was appointed professor of English literature. He then studied law and finally entered journalism, becoming editor of *McGee's Illustrated Weekly*. He then traveled for two years as a newspaper correspondent in the southwestern states and in Mexico, upon his return becoming editor of the *Catholic Review*. In 1881 he was editor of the *Freeman's Journal*. He became known at this time as a frequent contributor of verse and prose tales to the magazines and periodicals. He also wrote a number of articles for Appleton's *Encyclopedia*. He was subsequently called to the University of Notre Dame in Indiana, as professor of English literature, and was then appointed professor of English language and literature at the Catholic University of America at Washington. His published works include *That Girl of Mine*, and several other anonymous novels (1879); *Preludes*, a collection of his poems that had appeared in various magazines (1880); *Songs and Sonnets* (London, 1885); *The Theatre and Christian Parents* (1885); *Stories of Duty* (1885); *A Garden of Roses* (1886); *The Life Around Us*, a collection of tales with a strong religious tendency (1886); *The Success of Patrick Esmond* (1888); *The Vocation of Edward Conway* (1889); *The Best Literature of the World* (1900); *A Gentleman*, a volume on social ethics (1892); *Jack Chumleigh*, a romance (1892); *What to Read* (1893); *A Marriage of Reason* (1893); *The Flower of the Flock* (1894); *The Watson Girl*, and other works.

W.M.C.

EGAN, PIERCE, author, son of the elder au-

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thor of that name who wrote Boxiana and was immortalized by Thackeray, was born in London in 1814, studied art, and was for some time a newspaper illustrator. He is best remembered by his novels, which were published as serials in *Reynold's Miscellany* and the *London Journal*, and of which *The Flower of the Flock; Lady Maude*, and *Waits: A Christmas Story* are the best known. He died in 1880. W.F.J.

EGERIA, the name of the nymph or Camena, from whom, according to the legend, King Numa received the ritual of public worship which he established in Rome. The grove where Numa met the goddess to receive her instructions was dedicated by him to the Camenæ. See NUMA POMPILIUS, Vol. XVII, p. 628.

EGG OR EIGG, an island 12 miles west of Inverness-shire, in the Sea of the Hebrides, 8 miles S.W. of the south point of Skye. It is 4½ miles long, 2½ broad. It consists chiefly of trap, which in the north alternates with sandstone and limestone, the latter rocks containing Oölitic fossils, carbonized wood and coal. Lat. 56° 54′ N., long. 6° 9′ W.

EGGA, Africa, a town of British Nigeria, on the west bank of the Niger River at the great bend southward to the Gulf of Guinea, opposite Bida. It is a trading center extending for two miles along the river and has considerable native manufactures of indigo-dyed cotton cloth, which are extensively sold throughout interior Africa, commerce being facilitated by canoe traders who navigate the tributaries of the Niger and the main stream from its mouth. Pop., 15,000. C.L.S.

EGG–APPARATUS, in botany, a name applied to the group of (usually three) cells found in the micropylar end of the embryo-sac (*macrospore*) of flowering plants, one of which is the *oösphere*, or female gamete, awaiting the approach of the pollen-tube with the male gamete; the other two are the *synergidæ*, naked cells, somewhat resembling the oösphere and probably to be regarded as modified oöspheres, but serving some purpose in the process of fertilization. The oösphere usually is placed more centrally and deeper in the embryo-sac than are the synergidæ. The fertilized oösphere gives rise to the embryo, and after fertilization the synergidæ more or less slowly disappear. See figure under EMBRYO-SAC, in these Supplements.

EGG–BIRD (*Sterna fuliginosa*), a bird of the gull family, sometimes called the "sooty tern." These birds are numerous on the coast of Florida and the West Indies. The eggs of this tern were formerly an important article of commerce. The name is applied, also, to many other sea-birds whose eggs are collected for use as food. See TERN, Vol. XXIII, p. 206.

EGG CROP, in the United States. See AGRICULTURE, in these Supplements.

EGGER, ÉMILE, a French philologist; was born in Paris, July, 1813; became in 1840 assistant professor, and in 1855, professor of Greek literature at the University of Paris, and in 1873 member of the Supreme Council for Public Instruction. He died at Royat, Aug. 31, 1885. He wrote *Essai sur L'Histoire de la Littérature chez les Grécs* (1850); *L'Hellénism en France* (1869); *Histoire de Livre* (1880); *La Littérature Gréque* (1890). G.A.S.

EGGLESTON, EDWARD, author, was born at Vevay, Indiana, on December 10, 1837. He entered the Methodist ministry in 1857, and afterward was editorially connected with *The Little Corporal*, *The National Sunday School Teacher*, *The Independent*, and *Hearth and Home*. In 1874–79 he was pastor of a Congregational Church in Brooklyn, New York. His first popular work was *The Hoosier Schoolmaster*, which was first published as a serial and afterward ran through several editions as a book, and attained wide circulation. He wrote a number of books descriptive of life and social conditions in southern Indiana, such as *The Circuit Rider*, *Roxy*, *The Mystery of Metropolisville*, *The Graysons*, *The Faith Doctor*, *Duffels*, and others, and also many works dealing with American history in a popular style. He contributed occasionally to periodical literature and appeared upon the lecture platform. He made his home for a number of years late in life at Lake George, New York, and died there on September 2, 1902. W.F.J.

EDWARD EGGLESTON.

EGGLESTON, GEORGE CARY, journalist and author, brother of Edward Eggleston (q. v.), was born at Vevay, Indiana, on November 26, 1839, and was educated at Indiana Asbury University and Richmond College, Virginia. He served in the Confederate army during the Civil War, and then became a journalist in New York City. He has been connected with the *Evening Post* as literary editor, with *Hearth and Home* as editor, with the *Commercial Advertiser* as editor, and with the *World* since 1889 as editorial writer. He has edited *Haydn's Dictionary of Dates*. W.F.J.

EGG–PLANT. See HORTICULTURE, Vol. XII, p. 294.

EGG–SHELL CHINA. See CERAMIC ART, in these Supplements.

EGHAM, England, a village and parish of Surrey, 3 miles E. of Windsor, on the Thames, noted for the site of Runnymede, where King John signed Magna Charta in 1215. It is also the seat of Cooper's Hill College, and the Royal Holloway College for Women. C.L.S.

EGILSSON, SVEINBJÖRN, an Icelandic philologist; born at Innri-Njardvik, Iceland, February 24, 1791. From 1814–19 he studied at the University of Copenhagen, and became, in 1846, rector of the Latin school at Reykjavik. He died on August 17, 1852. He was a thorough connoisseur of the Old Norse sagas and of their often obscure language. His chief work is *Lexicon Poëticum Antiquæ Linguæ Septentrionalis* (1854–60). G.A.S.

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EGYPT. For the geography, climate, productions, history, and early statistics, see EGYPT, Vol. VII, pp. 607–683 The historical record there given closed with 1877, at which time Ismail I. was Khedive. In June, 1879, he was deposed by his suzerain, the Sultan of Turkey, at the instance of the Western Powers. Prince Tewfik, his eldest son, was proclaimed in his stead. Tewfik died Jan. 7, 1892, and was succeeded by his son, Abbas Hilmi. In 1880 the finances of Egypt, by an agreement of the European Powers, were placed in the hands of a commission composed of representatives of Great Britain, France, and Egypt, one from each. This commission drafted a plan of liquidation of the Egyptian debt and of the revenue collection. Since 1883 a British official representative has been kept by the Khedive as his personal financial adviser, whose consent is necessary before any financial regulations can be passed. In 1883 the system of government was changed so as to provide for a legislative council of thirty members, a consultative body merely; and a general assembly, a partly representative body, without legislative powers, but with power to veto certain taxes. The council meets once a month, the assembly every two years. The Khedive has a cabinet composed of six ministers: of the interior, finance, justice, war, public works, public instruction, and foreign affairs. The interior government consists of six governorships of larger cities, and fourteen provinces, or mudiriehs.

A standing army of about 18,000 men is maintained under the command of a British officer, who has the title of Sirdar. Great Britain has over 5,500 soldiers stationed in Egypt. In 1898 there were about 10,000 schools, with 17,000 teachers, and 228,000 pupils. The government maintains nine schools for higher education in the professions. According to the census of 1897, the population was 9,734,405, as against 6,817,265 in 1882, an increase of over 45 per cent. In Jan., 1898, the debt was about $505,000,000. The revenue in 1897 was about $55,000,000, and the expenditure about $53,000,000. There were, in 1898, 1,166 miles of railways belonging to the state, and 72 miles privately owned; also 2,269 miles of telegraphs.

Egypt has had almost constant trouble since 1880. First, in 1881–82, the rebellion under Arabi Pasha caused the bombardment of the forts of Alexandria by the British. Then, in 1883, the Mahdi gathered the Dervishes of the Sudan and began a bloody war, of which the culminating act was the murder of GENERAL CHARLES G. GORDON (q. v., XXVII, pp. 125–127), at Khartum. British interference stopped the rebel advance and held Wady Halfa as the advanced post of Egyptian territory. In March, 1896, the Khalifa threatened Egypt, and steps to crush him were taken by the British government. Trouble arose among the European Powers over the question of the payment of the expenses of the war by Egypt; but Great Britain persisted in the military operations. Other opposition was developed against Great Britain by the French, who thought the expedition against the Khalifa was a movement in aid of the Italians in their struggle with the Negus, Menelek of Abyssinia, or that its real aim was to establish British control over the entire Egyptian Sudan.

The Egyptian Sirdar, General Sir H. H. Kitchener, was made commander-in-chief of the expeditionary force, numbering 12,000 men, all native Egyptian troops except 1,200 British regulars. Before the end of March the black troops were on the march toward the southern frontier. By the middle of April the advance had reached Assuan. On the 15th a force of 1,500 natives, under Colonel Lloyd, left Suakim for the Horasab hills. Halting at Teroi wells, the native cavalry, sent out to reconnoiter, were attacked in the bush by 200 Dervish horsemen. The Egyptians kept the Dervishes at bay all night, repulsing four attacks.

Two sections of the aëronautic corps were dispatched from Aldershot, this being the first attempt to employ balloons in active service with British troops. Toward the end of May a brigade of Indian troops sailed from Bombay for Suakim.

On June 7, 1896, the Egyptian troops inflicted a severe defeat on the Dervishes at Ferkeh, about 20 miles south of Akasheh; and on June 8 Suarda fell into the hands of the Egyptian force under Major Murdoch. These operations proved that the Egyptian troops, once among the poorest in the world, could be thoroughly relied upon, under British officers, in operations against the Dervishes.

An easy advance was made on Dongola, Sept. 20, 1896. The route lay along the Nile, the gunboats covering the left flank, and the cavalry and the camel corps the right flank. The Dervishes abandoned their outposts as the advance column came in sight; the cavalry pursued whatever bodies of Dervishes came in sight, while the gunboats did great execution; and Dongola was occupied Sept. 22–23, 1896. In 1897 the Anglo-Egyptian troops captured Abu-Hamed after severe fighting (Aug. 7) and Berber (Sept. 7–13); and in 1898 they routed a Dervish army of 16,000 men on the Atbara (April 8), and totally defeated the Khalifa's army of 50,000 men at Omdurman, and occupied that city (Sept. 2), thereby virtually completing the reconquest of the Egyptian Sudan. See also KITCHENER, Vol. XXVII, p. 505.

England now practically governs the Sudan, the administration of the country (south of the 22nd parallel of latitude) being by a Governor-General appointed by the Khedive with the assent of Great Britain. The English officer, Col. Sir R. Wingate, K. C. M. G., was appointed administrator to succeed Lord Kitchener, in 1899, and is known officially as the Sirdar. It is to this official, in the reconstructed Sudan, that the native sheiks now look for protection and good government. He has at his command a considerable number of British troops, besides those in garrison at Cairo. Lord Cromer, "the maker of Modern Egypt," continues to be responsible for the financial administration of the Khedivial State, dependent on Turkey. He is the British diplomatic agent at Cairo and Consul-General. Since the Dervish revolt the commerce of the Sudan, together with

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safe traffic, has been assured. Khartum is now in railway and telegraphic communication with Cairo. The irrigation of the desert region goes successfully on, water being artificially forced from the Suez Canal, by side canals, over many thousand acres. The great Nile dam at Assuan, a wonderful engineering feat, will raise the waters of the Nile, it is expected, about fifty feet, and hence be of great service in irrigating the adjacent lands. The financial return for the investment incurred is expected in time to be enormous. Traffic on the Suez Canal continues to increase at a most gratifying pace. Much advantage is also now expected to follow the recent agreement between France and England, in defining the respective limits of the two powers in the Valley of the Upper Nile.

EGYPTIAN ARCHITECTURE. See ARCHITECTURE, Vol. II, pp. 336, 343.

EGYPTIAN LANGUAGE AND LITERATURE. See Vol. VII, p. 625.

EGYPTOLOGY, the study of the archæology of Egypt, including the history from the beginning, and every relic or monument that will in any way throw light upon the early life of the people of that once powerful state. The exploration and study of Egypt has been active for about a hundred years. Nothing of importance was discovered until 1799, when Boussard, one of Bonaparte's artillery captains, discovered the now famous Rosetta stone. On this stone was a proclamation, written in Greek, demotic and hieroglyphics. The translation of the first two readings led to the ultimate deciphering of the third, and through it access was had to the numerous writings on the monuments of Egypt. This gave an impulse to the exploration which year by year has laid open the Egyptian beginnings. Many important discoveries have been made, and the museums of Europe and the United States have been enriched greatly. Since 1883 the exploration of the ancient temples and tombs has been conducted under the auspices of the Egypt Exploration Fund Society. This society is organized for the purpose of historical investigation in Egypt, conducted in a scientific manner, with the object of solving some of the important questions in regard to the history of the sojourn and exodus of the Israelites, and the early sources of Greek art. The antiquities found are divided between the National Museum of Egypt, the British Museum, the Boston Museum of Fine Arts, and others. Annual volumes are published, giving the results of each season's work, with maps and plates. An archæological survey of Egypt is being conducted by the society, which, when completed, will furnish a map, photograph, copy, and plan of all of the most important sites, sculptures, paintings and inscriptions in the valley of the Nile, between Cairo and Assuan.

EHNINGER, JOHN WHETTON, artist, was born in New York City on July 22, 1827, and was educated at Columbia College and in Paris. His works, both in oils and in black and white, were favorably received in both Europe and America. They included illustrations for Longfellow's *Courtship of Miles Standish*, Hood's *Bridge of Sighs*, and some of Washington Irving's tales. He painted an impressive scene of *Christ Healing the Sick*, but his most popular works were those depicting New England country life. He died on January 22, 1889. W.F.J.

EHRENBERG, CHRISTIAN GOTTFRIED, a German naturalist and traveler, born April 19, 1795, at Delitzsch. From 1820–26 he traveled in Egypt and the neighboring countries. On his return he became extraordinary professor of medicine, and in 1827, member of the academy. In 1829 he accompanied Alexander von Humboldt on his journey to the Altai Mountains, and was made, in 1839, ordinary professor, and in 1842 permanent secretary of the academy, which posts he held to the time of his death, June 27, 1876. Among his works are *Symbolæ Physicæ* (1828–34); *Organization, Systemathik und Geographisches Verhältniss der Infusions-Tierchen* (1830); *Die Korallentiere des Roten Meers* (1834); *Mikrogeologie* (1854). See FORAMINIFERA, Vol. IX, pp. 340–41. G.A.S.

EHRENFELD, a busy town of western Prussia, two miles W. of Cologne by rail; manufactures glassware, railway fittings, chemicals and bricks; it has also flour-mills and machine-shops. Population, 18,243.

EICHBERG, JULIUS, a German-American composer; born in Düsseldorf, June 13, 1824. He studied at Brussels and Geneva and after being professor in the Conservatoire at Geneva, he removed to New York in 1857. In 1859 he went to Boston, where he was director of the orchestra at the Boston Museum until 1865. In 1867 he established the Boston Conservatory of Music. Among his operas are *The Doctor of Alcantara* (1862); *The Rose of Tyrol* (1863); *The Two Cadis* (1863), and *A Night in Rome* (1864). He died in Boston, January 19, 1893. W.M.C.

EICHLER, AUGUST WILHELM, a German botanist; born at Neukirchen, Curhesse, April 22, 1839; became in 1871 professor of botany and director of the botanical gardens at Gratz, in 1873 professor at Kiel, in 1878 at Berlin and director of the Berlin Botanical Museum. He wrote numerous monographies on families of plants; *Blüten-Diagramme* (2 vols. 1874–78); *Syllabus der Vorlesungen über Specielle und Medizinicsh-Pharmazeutische Botanik*. He died in Berlin March 21, 1887. G.A.S.

EICHWALD, KARL EDWARD, a Russian naturalist; born at Mitau, July 15, 1795. He studied physics and medicine at Berlin, and became professor of comparative anatomy at Kasan in 1823; at Wilna in 1827, and at Petersburg in 1837. In 1825 he traveled from the Caucasus to Persia, from 1829–45 in Russia, and in 1846 in southern Europe and northern Africa. He died in Petersburg Nov. 10, 1876. He wrote *Zoölogia Speciale* (1829–31); *Lethæa Russica ou Paléonthologie de la Russe* (1853–69); *Die Urwelt Russlands* (1840–47). G.A.S.

EIDER, RIVER. See SCHLESWIG-HOLSTEIN, Vol. XXI, p. 432.

EIDOLOSCOPE, a machine, on the same general

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principle as the kinetoscope, for exhibiting a series of instantaneous photographs in such a manner that they appear to the eye in the form of a continuous panorama. The main point of difference between the two is in the manner in which the film containing the pictures is moved across the field of view. In the kinetoscope a continuous band of film fifty feet long is employed, and this is looped over a series of pulleys. In the eidoloscope the film is one long strip, each end of which is attached to its spool, and as the pictures are being exhibited, the strip of film unwinds from one spool to the other. In the method first employed in the operation of this machine, there was an irregularity in the presentation of the pictures, due to the fact that the varying sizes of the two spools at different stages of the pictured scene, when one might be almost full and the other almost empty, resulted in different speeds for the film as it passed light and lens. The inventor of the eidoloscope then devised an automatic appliance for making this progress absolutely regular, and protected it from imitators. This feature is regarded as a point of superiority over other devices intended to accomplish a similar purpose. Among the pictures exhibited by this machine is one of a more comprehensive and ambitious character than has previously been attempted—that of the drill engaged in by Troop A of the National Guard of New York state, at Van Courtland Park, New York, May 23, 1896.

C. H. COCHRANE.

EIDOSCOPE, an apparatus devised by Woodville Latham, similar to the kineto-phonograph, and used to display, upon a screen, life-size pictures made from continuous photographs, so that the pictures displayed reproduce the motions of the persons who performed when the photographs were originally taken. It is used for exhibition purposes, and displays a white and black picture, of fair legibility, though slightly marred by the trembling of the apparatus, incident to the rapid stopping and starting of the strip bearing the pictures. It was exhibited in several of the larger cities of the United States in 1895 and 1896.

EIFEL PLATEAU, a barren and bleak plateau of Rhenish-Prussia, located between the rivers Rhine, Moselle and Roer, and showing extensive traces of volcanic activity. Its surface, which ranges at an average altitude of fifteen hundred to two thousand feet, is for the most part broadly undulating, and diversified by crater-like depressions and volcanic peaks and ridges, while toward its edges it is seamed by deep, wooded, rocky ravines. Its highest, and at the same time most inhospitable, parts are in the west and northwest, whence it falls away gradually to the Rhine on the east and to the Moselle on the south. The central portion of the plateau is crossed by a range of basaltic summits, the loftiest in the Eifel system, including the Hohe Acht (2,494 feet), Nurberg (2,255) and Kellberg (2,211). The ridges of the northwest are connected by the Hohe Venn with the Ardennes. Geologically, the basement of the plateau belongs to the Lower Graywacke of the Devonian formation, with eruptions of Eifel limestone, parts of which are rich in fossils. Above this are deposited, with tolerable regularity, in a horizontal position, strata of Triassic age, containing considerable quantities of metallic ores, especially zinc and lead. The Eifel was for a long period the scene of volcanic activity; zones and islands of basalt are frequent, as, also, eruptive masses of basaltic lavas, with tufa and pumice. With the exception of the vine and fruit trees on the east and south edges of the plateau, and a little agriculture (up to 1,700 feet), the Eifel is uncultivated, its rocky soil being too poor, and its climate too raw and bleak, for anything to grow, but heather. See GEOLOGY, Vol. X, pp. 302, 303; and PRUSSIA, Vol. XX, p. 25.

EIFFEL, GUSTAVE, a French engineer; born in Dijon, France, Dec. 15, 1832. He studied at the Paris Central School of Arts and Manufactures, and first attracted general attention by the construction of the Bordeaux bridge, in which was used, for the first time extensively, the compressed-air method of sinking foundation-cylinders. He afterward erected the Garabit viaduct, the grand vestibule and principal façade of the Paris Exposition of 1878, the framework for Bartholdi's Liberty Statue, and many other works of engineering skill. The one work, however, which has made him known throughout the civilized world is the Eiffel Tower of the Paris Exposition of 1889, the greatest engineering feat attempted in modern times. This tower was the result of experiments undertaken to prove the greatest limit to which metallic piers in viaducts could be safely pushed. The tower is 984 feet high; at the height of 896 feet it is 33 feet in diameter; total weight of iron used in construction, 7,300 tons. A system of elevators carries persons to the top; and the whole structure is capped by an immense lantern. In recognition of his genius in the erection of this tower, M. Eiffel was made an officer of the Legion of Honor. He tarnished his reputation somewhat by his connection with the Panama scandal of 1893. He was then convicted of misappropriating funds of the canal company, and was sentenced to fine and imprisonment.

GUSTAVE EIFFEL.

EIKON BASILIKE. See CHARLES I, Vol. V, p. 353.

EILETHYIA, a town of Egypt. See EGYPT, Vol. VII, pp. 638, 678.

EIMEO. See TAHITI, Vol. XXIII, p. 27.

EISENERZ, Austria, a town of Styria, on a mountain tributary of the Enns River, connecting by rail with Gratz about 50 miles to the S.E., and with the Enns Valley 10 miles N.W. The name signifying "Iron Ore" is derived from the Erzberg "Ore Mountain" rising north of the town to an altitude of 2,800 feet, its summit crowned by a colossal iron cross, 25 feet high, erected in 1823 under the direction of Archduke John. It is a

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peak of the Eisenerzer Alps, and is almost a solid mass of iron carbonate, which has been quarried, mining being unnecessary, since the Roman period before the Christian era. The amount annually produced is about 15,000 tons. Pop., 3,000.

C.L.S.

EISENLOHR, AUGUST, a German Egyptologist; born in Mannheim, Oct. 6, 1832. He studied theology, also natural science, and chemistry. About 1865 he became interested in the study of Egyptian hieroglyphics, and in 1869 became instructor in Egyptology at the University of Heidelberg, and in 1872 professor. Being sent by the Grand Duke of Baden to Egypt, he ascended the Nile to the second cataract, and returned through Palestine, Syria and Asia Minor. He has made valuable translations of papyri belonging to the British Museum; among them, *The Political Condition of Egypt Before the Reign of Rameses III* (1873) and *The Mathematics of Ancient Egypt* (1877).

EKATERINOGRAD OR YEKATERINOGRAD, a town and fortress in the south of Russia, in the government of Caucasus, situated on the left bank of the Terek, in lat. 40° 43′ N., and long. 44° 3′ E. It is an important military post of the Cossacks. Prince Potemkin founded it in 1777.

EKATERINOSLAV, Russia, the capital of a southern government, 600 miles by rail S.W. of Moscow, on the Dnieper. It is a manufacturing town with a large trade. Population, 50,000.

C.L.S.

ELÆAGNACEÆ, the oleaster family (from Gr., *elaia*, an olive, and *agnos*, a chaste tree), ornamental largish-growing trees, or shrubs, of easy culture, thriving in an open soil, natives of Siberia, Nepaul, southern Europe and North America. The *Elæagnus hortensis* grows from 16 to 20 feet high, has hoary willow-like leaves, and small yellow flowers which perfume the air for a considerable distance. The berries, known as "Trebizond dates," are dried by the Arabs and made into cakes for food. W.R.B.

ELÆIS, a genus of tropical palms, the principal being *Elæis guineensis*, a wing-leaved, low-growing palm, seldom exceeding 20 feet in height. From its fruit is obtained the palm oil of commerce. The greatest quantities come from Ashantee and Dahomey, where the supply is inexhaustible. W.R.B.

ELÆOCARPUS, a genus of *Tiliaceæ*, mostly East Indian trees. The fruits of some are eaten, and the deeply wrinkled stones, often called "olive-nuts," are made into beads for necklaces and bracelets in India.

ELÆOCOCCA, a genus of *Euphorbiaceæ*, or spurge worts, a large order of trees, shrubs and herbaceous plants, often abounding in acrid milk. A very large number are poisonous, the noxious principle residing in the milky secretion. Many are important for medicinal properties.

W.R.B.

ELÆODENDRON, a genus of trees of the family *Celastraceæ*, having a five-parted calyx, five petals, a five-angled disk, five stamens, the ovary immersed in the disk, and a drupaceous fruit. *Elæodendron glaucum*, a native of Ceylon and southern India, is sometimes called the Ceylon tea-tree, because its leaves resemble those of the tea-shrub. The timber of *Elæodendron croceum*, called saffronwood in Cape Colony, is much used there in building and cabinet-making; it is fine-grained, hard, and tough. The fruit of *Elæodendron kubu*, another South African species, is edible. That of *Elæodendron argan* yields an oil similar to olive-oil, much used by the Moors.

ELAGABALUS. See HELIOGABALUS, Vol. XI.

ELANET (*Elanus*), a genus of birds of the family *Falconidæ* and subfamily kites, often known as the black-winged kites. Species are found in the warmer parts of both hemispheres. See KITE, Vol. XIV.

ELAPS. See SNAKES, Vol. XXII, pp. 207, 208.

ELASMOBRANCHS, a name applied by many zoölogists to the group of vertebrates which includes the sharks and skates. The name refers to the plate-like gills, and is synonymous with Selachians and Chondropterygians, used by some authors.

ELASTIC CURVE. If an elastic beam, supported at each end, be subjected to a force that produces bending, the upper fibers of the material are in a state of compression, and the lower ones in a state of tension. There must then be a layer between, which is neither compressed nor extended; this is called the *neutral axis* or *surface*, and the curve representing it is called the *elastic curve*.

ELASTIC LIMIT. See ELASTICITY, Vol. VII, pp. 691–695; and STRENGTH OF MATERIALS, in these Supplements.

ELASTIC TISSUE, in anatomy, same as *Yellow Fibrous Tissue*. It has great elasticity.

ELATERIDÆ, a Linnæan genus of coleopterous insects, now divided into many genera, and forming the family *Elateridæ*. The head is in almost all cases inserted deeply into the thorax; a strong spine on the under part of the thorax, at its base, fits into a groove. They are generally found upon the flowers and leaves of plants, which are their food. See COLEOPTERA, Vol. VI, p. 120.

ELATH. See AKABAH, GULF OF, Vol. I, p. 385.

ELBASAN, town, Albania, Turkey; makes copper and iron wares; seat of a Greek bishop. Pop. 15,000.

ELBERTON, a town, capital of Elbert Co., Ga.; has a college and public library, and manfactures cotton goods, fertilizers, and cottonseed oil. Large granite quarries are found here. Pop. 1900, 3,834.

ELBURZ MOUNTAINS, in Persia, S. of the Caspian Sea; highest peak, Demavend, 19,400 feet.

EL CANEY, a picturesque old town in Santiago de Cuba province, Cuba, about three miles northeast of Santiago de Cuba, by whose wealthier citizens it is used as a suburban place of residence. Population of commune about 9,000. During the Spanish-American War it was, on July 1, 1898, after a desperate conflict, captured by the American troops under General Shafter, the three brigades engaged in the assault being commanded respectively by Brigadier-General Adna R. Chaffee, Colonel Miles, and General Ludlow. On July 2 the Spaniards attempted unsuccessfully to retake the town. During the two days the Americans lost several hundred in killed and wounded; but the Spaniards also lost heavily, including about 2,000 prisoners.

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ELCESAITES OR ELKESAITES, a Jewish sect of the second century, founded by a Jew, Elxai, hence their name. The doctrines held by the sect were in part Christian and part Gnostic. They were called Ebionites by Epiphanius, and lived, in the time of that writer, in the Dead Sea district. To them Jesus was merely a prophet, whose teaching had been completed by a new revelation and a succeeding prophet. Hippolytus tells of a book possessed by this sect, which, to them, was sacred, and was supposed by them to have fallen from heaven. The same author ascribes their name to their calling themselves *El kesi* (hidden power).

ELCHO, FRANCIS WEMYSS CHARTERIS DOUGLAS. See WEMYSS, in these Supplements.

EL DAKKEL, DAKHEL OR DAKHELA. See OASES, Vol. XVII, p. 715.

ELDORA, a town and the county seat of Hardin County, Iowa, in the central part of the state. It is the seat of a reform school and of mills and other manufacturing establishments. It is reached by the Chicago, Iowa and Dakota and the Iowa Central railroads. Its population was 2,233 in 1900. W.F.J.

ELDORADO, a city and the county seat of Butler County, Kansas, in the southeastern part of that state. It contains mills, machine shops, and other industrial establishments, and is 28 miles east by north from Wichita on the Walnut River, and on the Atchison, Topeka and Santa Fé and the Missouri Pacific railroads. Its population in 1900 was 3,466. W.F.J.

ELDORADO SPRINGS, a popular health-resort of Cedar County, southwestern Missouri. It is a rapidly growing town, its popularity being due to the presence of several springs, whose waters are chalybeate. Population 1900, 2,137.

ELDRED, a borough of McKean County, Pennsylvania, in the western part of the "northern tier." It is on the edge of the oil region, and is an important railroad center. Its population in 1900 was 963. W.F.J.

ELEA OR VELIA, a Greek town, founded by the Phocæans, about 543 B.C., in Lucania, between Pæstum and Buxentum. Possessed of a good harbor, it became a place of some importance in Cicero's time, and is known as the seat of the Eleatic school of philosophy. A famous temple of Ceres was located here.

ELECTION, in law, is the act of choosing between two or more legal rights or remedies. Thus when a party to a contract has the right to pay a sum of money, or deliver a definite amount of property, in fulfillment of his part of the contract, he may choose which alternative he will adopt. After his election has been made, he must abide by it. One thus having the right of election must make his choice in proper time, and must choose one of the alternatives in the entire, and will not be permitted to adopt a part of each. A widow who is a beneficiary under her deceased husband's will, if the will undertakes to dispose of or in any manner limit her dower interest in his estate, must elect to take the interest conveyed to her by the will in lieu of her dower, or must renounce the will and take her dower. An election is frequently necessary when the law provides more than one means of redress for an injury, or more than one means of punishment for a crime. Thus when a new remedy is created by statute without abolishing the remedy at common law, the plaintiff may elect which remedy he wishes to pursue. When two or more distinct remedies are provided by law for the redress of an injury, the plaintiff usually is required to elect which he will adopt, and thereafter is precluded from the use of the others.

ELECTION LAWS. In the United States, the state legislatures have jurisdiction to enact laws governing the manner in which elections shall be held, and the qualification of voters, subject to certain constitutional restrictions. Congress has the power, however, to fix the time at which the election of Federal officers shall be held, and the constitution of the United States provides that the President and Vice-President shall be elected by electors appointed by the different states, in such manner as the state legislatures may determine. In most of the states any male citizen of the age of twenty-one years, who has been a resident of the state, county and election precinct for the period required by law, except idiots and those who are under sentence of imprisonment in the penitentiary, are entitled to vote. In some states paupers, also, are deprived of the right of suffrage. In some states, in recent years, the right of suffrage has been extended to women to a limited extent, in such matters as school elections, and frequently on questions of local improvement. In a few states the full right of suffrage is accorded to women. Most states have registration laws, requiring voters to register their names and addresses with officers who are appointed for the purpose of keeping registration lists, and who hold sessions at the voting-places on certain days fixed by the statute, generally two or three weeks prior to the day of election. The right to vote comes from the state, and is a state gift. Naturalization (q.v., in these Supplements) is a Federal right, and is a gift of the Union, not of any one state. In nearly one half of the Union, aliens (who have declared intentions) vote and have the right to vote equally with naturalized or native-born citizens. In the other half only actual citizens may vote. The Federal naturalization laws apply to the whole Union alike, and provide that no alien may be naturalized until after five years' residence. Even after five years' residence and due naturalization he is not entitled to vote unless the laws of the state confer the privilege upon him. What is commonly known as the Australian Ballot Law (See BALLOT SYSTEM, AUSTRALIAN, in these Supplements) has been adopted in a more or less modified form in many of the states.

Following is a table showing the qualification of voters in the various states. Those marked with a star have the Australian ballot law in a more or less modified form. See also BALLOT, Vol. III, p. 249; and ELECTIONS, Vol. VIII, p. 4.

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QUALIFICATIONS OF VOTERS IN THE SEVERAL STATES.

States.	Requirements as to Citizenship.	Previous Residence Required.				Persons Excluded from Suffrage
		In State.	In County.	In Town.	In Precinct.	
Alabama*	Citizen of the United States, or alien who has declared his intention to become a citizen.	1 year	3 mos.	.....	30 days	Convicted of treason, or other crime punishable by imprisonment, unless restored to rights by governor, and idiots or insane persons.
Arizona*	Citizen of United States, Mexicans under Quintero treaty, and aliens who have declared intention to become citizens.	6 mos.	10 days	.....	10 days	Idiots, insane, and persons convicted of any infamous crime.
Arkansas*	Citizen of United States, and aliens who have declared intention to become citizens. Voter must be able to show poll-tax receipt.	1 year	6 mos.	.....	1 mo.	Idiots, insane, and those convicted of felony, until pardoned.
California*	Citizen by nativity, naturalization or treaty of Queretaro. Naturalization must be 90 days before election day.	1 year	90 days	.....	30 days	Chinese, insane, embezzlers of public moneys, and those convicted of infamous crimes.
Colorado*	Citizen, or alien who has declared intention to become citizen 4 months before election day. Women may vote at all elections, under same restrictions as men.	6 mos.	90 days	.....	10 days§	Persons under guardianship, non compos mentis insane, or confined in a public prison
Connecticut*	Citizen of United States who can read constitution or statutes in English and who has good moral character. Women may vote at school elections.	1 year	.....	6 mos.	.....	Persons convicted of any offense for which infamous punishment is inflicted, unless restored to rights by general assembly.
Delaware*	Citizen of the age of 21 years. Any one more than 22 years of age must show that he has paid county tax the preceding year.	1 year	1 mo.	.....	.....	Idiots, insane persons, paupers and felons.
Florida†	Citizen of United States who has paid capitation tax 2 years, if he has resided that long in the state.	1 year	6 mos.	....	.....	Persons insane, under guardianship, convicted of felony or infamous crimes, or guilty of betting on elections, or dueling.
Georgia	Citizen of United States.	1 year	6 mos.	.....	.....	Idiots, persons insane, or convicted of crime punishable by imprisonment, unless pardoned.
Idaho*	Citizen of United States. Women may vote at school elections.	6 mos.	30 days	.....	.....	Persons under guardianship, insane, convicted of infamous crime, unless restored to civil rights, Indians not taxed, polygamists and Chinese.
Illinois*	Citizen of United States. Women may vote at school elections.	1 year	90 days	30 days	30 days	Convicted of crime punishable by imprisonment in penitentiary, until pardoned and restored to rights.
Indiana*	Citizen of United States, or alien who has declared intention to become citizen, and resided 1 year in United States and 6 months in state.	6 mos.	.....	60 days	30 days	Persons convicted of felony or misdemeanor, during the period of imprisonment.
Iowa*	Citizen of United States.	6 mos.	60 days	.....	.....	Idiots, insane persons and those convicted of infamous crimes.
Kansas*	Citizen of United States, or alien who has declared intention to become citizen. Women may vote at school elections.	6 mos.	.....	.....	30 days	Idiots, insane persons, convicts, rebels, public embezzlers, unless restored to civil rights.
Kentucky*	Citizen of United States. Women may vote for school trustees under certain limitations.	1 year	6 mos.	.....	60 days	Idiots, insane persons, and those convicted of treason, felony, election bribery, etc., unless pardoned.
Louisiana	Citizen of United States, or alien who has declared intention to become citizen.	1 year	6 mos.	.....	30 days	Idiots, insane persons, and those convicted of crime punishable by imprisonment in the penitentiary.
Maine*	Citizen of United States who can read the constitution in English.	3 mos.	3 mos.	3 mos.	.....	Paupers, persons under guardianship and Indians not taxed.
Maryland*	Citizen of United States.	.....	6 mos.	.....	.....	Persons under guardianship, lunatics, and those over 21 years of age who are convicted of infamous crimes, unless pardoned.
Massachusetts*	Citizen who can read constitution in English, write, and who has paid tax within 2 years. Women can vote for school committeemen.	1 year	.....	6 mos.	30 days	Paupers (except honorably discharged United States soldiers and sailors) and persons under guardianship.
Michigan*	Citizen, or an inhabitant who has declared intention to become citizen 6 months before election. Women may vote at school, village and city elections.	3 mos.	.....	10 days	10 days	Duelists and accessaries.
Minnesota*	Citizen of United States and civilized Indians. Women may vote at school elections. §	6 mos.	.....	.....	30 days	Persons convicted of treason or felony, unless restored to civil rights, and persons under guardianship, or insane.
Mississippi*	Citizen of United States who can read or understand constitution, and who has paid all his taxes for 2 years and can show receipt therefor.	2 years	1 year	.....	1 year	Insane persons, Indians not taxed, felons, persons who have not paid all taxes assessed against them in last two years.
Missouri*	Citizen of United States, or alien who has declared intention to become citizen not less than 1 year nor more than 5 years before offering his vote.	1 year	60 days	60 days	.....	Paupers, convicted criminals, unless pardoned, and felons and violators of suffrage laws convicted a second time.
Montana*	Citizen of United States. Women may vote at school elections, and, when tax-payers, on questions submitted to vote of tax-payers.	1 year	30 days	.....	.....	Insane persons, felons not pardoned, and inhabitants of Indian or military reserves.
Nebraska*	Citizen of United States or alien who has declared intention to become citizen 30 days prior to day of election. Women can vote at school elections, under certain limitations.	6 mos.	40 days	.....	10 days	Idiots, insane persons, and those convicted of treason or felony, unless restored to civil rights.
Nevada*	Citizen of United States.	6 mos.	30 days	.....	.....	Idiots, insane persons, and those convicted of treason or felony, unless restored to civil rights; Mormons.
New Hampshire*	Inhabitant, native or naturalized. Women may vote for school trustees.	6 mos.	.....	6 mos.	.....	Paupers (except honorably discharged United States soldiers and sailors) and persons excused from paying taxes at their own request.
New Jersey*	Citizen of United States. Women may hold office of school trustee, but are not entitled to vote.	1 year	5 mos.	.....	.....	Idiots, insane persons, and those convicted of crimes (unless pardoned) for which the constitution, when adopted, excluded them from being witnesses.
New Mexico	Citizen of United States.	6 mos.	3 mos.	.....	30 days	
New York*	Citizen who shall have been such for 10 days prior to election. Women may vote for school officers.	1 year	4 mos.	.....	30 days	Convicted of bribery or any infamous crime, unless pardoned; those who bet on any election at which they offer to vote, election bribers and those who accept such bribes.
North Carolina	Citizen of United States.	1 year	90 days	.....	.....	Idiots, lunatics and those convicted of felony or other infamous crime, unless restored to civil rights.

* Australian ballot, or some modified form thereof. † Secret ballot, but not resembling the Australian system.
§ By statute of 1895 a foreign-born resident must be a naturalized citizen, and resident in the state for 5 years, before he can vote.

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QUALIFICATIONS OF VOTERS IN THE SEVERAL STATES—*Continued.*

States.	Requirement as to Citizenship.	Previous Residence Required.				Persons Excluded from Suffrage.
		In State.	In County	In Town.	In Precinct.	
North Dakota*	Citizen of United States, aliens who have declared intention to become citizens, and civilized Indians. Women may vote for school directors.	1 year	6 mos.	.....	90 days	Persons non compos mentis and felons, unless restored to civil rights.
Ohio*	Citizen of United States. Women may vote at school elections.	1 year	30 days	.....	20 days	Idiots, insane persons and felons, unless restored to civil rights.
Oklahoma*	Citizen of United States, native or naturalized, and civilized Indians not members of any tribe. Women may vote at school elections.	6 mos.	.....	.....	.....	Persons convicted of bribery or felony, unless restored to civil rights.
Oregon*	Citizen of United States, or alien who has declared intention to become citizen 1 year preceding election. Women who pay taxes may vote at school elections.	6 mos.	.....	.....	.....	Idiots, insane persons, Chinese and those convicted of crimes punishable by imprisonment in penitentiary.
Pennsylvania*	Citizen of United States at least 1 month prior to election, and, if 22 years old, must have paid tax within 2 years, or if once having been a voter in the state, upon coming back into state 6 months.	1 year	.....	.....	2 mos.	Non-taxpayers and those convicted of election bribery
Rhode Island*	Citizen of United States. Must have property of $134 assessed valuation to vote on tax questions. If has real estate of such value in the town, need reside in state only 1 year to vote.	2 years	.....	6 mos.	.....	Paupers, lunatics, persons non compos mentis or under guardianship, and those convicted of bribery or infamous crime, unless restored to civil rights.
South Carolina	Citizen of United States.	1 year	60 days	.....	.....	Paupers, insane persons, and those convicted of treason, murder or other infamous crime, or of dueling.
South Dakota*	Citizen of United States, or alien who has declared intention to become citizen. Women can vote at school elections. Voter must have resided 1 year in United States.	6 mos.	30 days	.....	10 days	Idiots, persons insane or under guardianship, and those convicted of felony or treason, unless restored to civil rights.
Tennessee*	Citizen of United States who has paid poll tax. Receipt must be produced, to entitle one to vote.	1 year	6 mos.	.....	.....	Persons convicted of bribery or other infamous crime, unless restored to civil rights.
Texas†	Citizen of United States, or alien who has declared intention to become citizen.	1 year	6 mos.	.....	.....	Idiots, lunatics, paupers supported by county, and those convicted of felony
Utah†	Citizen of United States who has been such for 60 days. Women are accorded full right to vote under same qualifications as men.	1 year	4 mos.	.....	60 days	Idiots, insane persons, and those convicted of treason, or crime against elective franchise, unless restored to civil rights.
Vermont*	Citizen of United States. Women may vote at school elections Voter must have taken freeman's oath, and must be of good behavior.	1 year	.....	3 mos.	.....	Felons, unless restored to civil rights, and deserters from United States military or naval service during war, unless pardoned.
Virginia*	Citizen of United States.	1 year	3 mos.	.....	30 days	Idiots, lunatics, and those convicted of election bribery, embezzlement of public funds, treason, felony, petty larceny, duelists and abettors, unless disability removed by legislature
Washington*	Citizen of United States. Women may vote at school elections.	1 year	90 days	30 days	30 days	Idiots, insane persons, Indians not taxed, and those convicted of infamous crime, unless restored to civil rights.
West Virginia*	Citizen of the state.	1 year	60 days	.....	.....	Paupers, persons of unsound mind, and those convicted of treason, felony or election bribery.
Wisconsin*	Citizen of United States, or aliens who have declared intention to become citizens, and civilized Indians not members of any tribe. Women may vote at school elections.	1 year	.....	.....	10 days	Persons insane or under guardianship, and those convicted of treason or felony, unless restored to civil rights.
Wyoming*	Citizen of United States or alien who has declared intention to become citizen. Women are accorded full right of suffrage.	6 mos.	30 days	.....	.....	Idiots, persons insane or under guardianship, and felons convicted in the state, unless pardoned. Those who bet on elections may not vote at election upon which bet is made.

* Australian ballot, or some modified form thereof.

† Secret ballot, but not resembling the Australian system.

ELECTORAL COMMISSION, a special commission appointed by act of the United States Congress, approved Jan. 29, 1877, for the purpose of determining the electoral votes of the States of Florida, Louisiana, and South Carolina, and of one vote of the state of Oregon, in the Presidential election of November, 1876. See UNITED STATES, Vol. XXIII, p. 823.

ELECTORAL CROWN, or, more properly, CAP, was a scarlet cap, turned up with ermine, which was worn by the electors of the German Empire. It was closed with a demi circle of gold, covered with pearls, and on the top was a globe with a cross on it, also of gold.

ELECTORS, in general, those having the right, power or privilege of electing, being by law qualified to take part in an election. Specifically, the term is used of the Princes of Germany, who, formerly, were entitled to elect the Emperor. As to these, see PRINCE, Vol. XIX, p. 758. The more modern and general use of the term is to describe the members of the electoral college of the United States. On the Presidential election day, instead of voting directly for the President and Vice-President, the qualified electors of each state vote for as many electors as their state has Senators and Representatives in Congress. The electors thus chosen constitute the electoral college. These meet in their respective states on the second Monday of the January following the election day, and vote by ballot for President and Vice-President. Three lists of the persons voted for, and the number of votes received by each, are certified to by all the electors and sealed. One list is deposited with the United States district court judge of the district in which the electors meet; the other two are sent to the President of the United States Senate, one by mail and one by messenger. On the second Wednesday of February the lists from the several states are opened by the president of the Senate, in the presence of the two Houses of Congress, and the votes are counted. The candidates receiving the highest number of votes are declared to be duly elected. A movement has been started by some of the more recent political parties to abolish the

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electoral college, and to elect all officers by direct vote. Under the present system it is possible for a candidate to receive a majority of the popular vote and yet be unsuccessful.

ELECTRA, the sister of Orestes. See ORESTES, Vol. XVII, p. 851.

ELECTRICAL BRAKE. See BRAKE, in these Supplements.

ELECTRICAL FISHES. See EEL, Vol. VII, p. 601; RAY, Vol. XX, p. 312.

ELECTRICAL POTENTIAL. See ELECTRICITY, § 23, in these Supplements.

ELECTRICAL RAILWAYS. See TROLLEY RAILWAYS; and RAILROADS, in these Supplements.

ELECTRICAL UNITS. See ELECTRICITY, § 110, in these Supplements.

ELECTRICAL WELDING. See WELDING BY ELECTRICITY, in these Supplements.

ELECTRIC AND DIELECTRIC. See ELECTRICITY, § 7, in these Supplements.

ELECTRIC BUOYS. See BUOYS, in these Supplements.

ELECTRIC CARS. See CAR-CONSTRUCTION, in these Supplements.

ELECTRIC CURRENTS. See ELECTRICITY, § 38, in these Supplements.

ELECTRIC DISCHARGE. See ELECTRICITY, § 14, in these Supplements.

ELECTRIC FIELD. See ELECTRICITY, §§ 8, 9, 16, in these Supplements.

ELECTRIC FURNACE. See CHEMISTRY, in these Supplements.

ELECTRIC HEATERS. See FURNACES, in these Supplements.

ELECTRIC INTENSITY. See ELECTRICITY, § 20, 21, in these Supplements.

*ELECTRICITY. Although an exhaustive treatise on this subject is to be found in Vol. VIII, pp. 4–99, the advances in theory and application since 1880 require further narration. At the same time, advantage has been taken of the opportunity to present the subject in a way more intelligible to the unspecialized mind in the following article.

I. ELECTROSTATICS.
II. CURRENT ELECTRICITY.
III. ELECTROMAGNETISM.
IV. ELECTROMAGNETIC INDUCTION.

I. ELECTROSTATICS.

§ 1. DEFINITION. In the study of the phenomena of radiant light and heat we are compelled to assume the existence of a medium pervading all space, and which is called the ether. Its structure is assumed to be continuous, as compared with ordinary matter; its density cannot be measured directly, but can be shown to be so small as not to interfere with the motion of bodies through it. Its function, in the case of the above phenomena, is solely that of a medium capable of being thrown into a state of vibration by vibrating molecules, of transmitting these vibrations throughout its substance, in the form of transverse waves, and of causing vibration of the molecules upon which these waves happen to fall, that is to say, the transmission of molecular energy across space by means of waves.

To satisfactorily explain electrical phenomena, it is necessary to assume the existence of a substance similar to the ether in its properties, but associated with matter in an entirely different manner. To this substance is given the name of electricity.

It is not unlikely, but highly probable, as Faraday suggests, that the ether should have other uses than simply the conveyance of radiation. Many of the leading physicists believe the ether and electricity to be the same thing. If they are not identical, there is certainly an intimate relation between them, which is shown by Maxwell in the development of his electro-magnetic theory of light. However, whether electricity and the ether be the same or not, we may safely assume, for the present, that electricity is neither energy nor matter, in the common sense, but a peculiar and distinct form of matter; that it is indestructible; that it can be moved from one place to another, energy being expended in moving it. It can be associated, or connected, with ordinary matter in a manner which is not clearly understood, and changes in its normal relationship to matter give rise to electrical phenomena.

The reason why electrical phenomena remained so long obscure can only be explained by the fact that they do not occur naturally as often as the phenomena of heat and light, and that there is no electrical sense corresponding to the sense of sight and touch. The laws concerned in electrical phenomena are now quite well understood, and evidence confirming the above assumptions in regard to the nature of electricity is rapidly being produced.

§ 2. ELECTRIFICATION. If a stick of sealing-wax is rubbed with a well-dried piece of flannel, it is found to possess a new property; namely, that of attracting light particles of paper, pith, dust, and like substances. It is found, also, that after the particles come in contact with the sealing-wax, they are then repelled. This may be shown more strikingly by suspending a gilded pith-ball by a fine silk thread long enough to permit the ball to move freely. The pith-ball is first attracted, and then repelled after contact with the wax; moreover, if we present the flannel to another pith-ball similarly suspended, exactly the same phenomena is observed. *Both* the wax and flannel, by being brought in contact, have acquired this new property, and are said to be *electrified*, or *charged with electricity*.

An enormous number of substances are now known to exhibit this phenomenon, but from about 600 B.C. to A.D. 1600, amber and jet were thought to be the only substances capable of being electrified. Thus the oldest electrical phenomenon known to science is an exceedingly interesting and important one, as it involves the fundamental principles of electrostatics, and may be regarded as the typical phenomenon to which, in one form or another, it will frequently be necessary to refer. We may picture to ourselves what

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takes place when the wax and flannel are brought in contact, by supposing that electricity passes from one to the other, thus leaving each substance changed as to its normal amount of electricity; one would have too little, and the other too much: the deficit in the one case would exactly equal the excess in the other. Furthermore, the bodies, being now in different conditions, ought to exhibit different properties; but thus far they have behaved exactly alike when brought near the suspended pith-ball.

Electrification is not to be confused with electricity. Electrification always involves a change in the normal amount or condition of the electricity a body contains; the change requires the expenditure of energy for its production, and energy is given out when the electricity reverts to its normal condition. In the same sense that heat is not matter, but the energy which matter contains because of the motion of its molecules, so electrification is not electricity, but the energy electricity possesses by virtue of its displacement.

§ 3. Two Kinds of Electrification. If two suspended pith-balls, A and B, are touched by the electrified sealing-wax, they are found not only to be repelled by the wax, but repel each other The two pith-balls must be in like condition, for they have been similarly treated. If another pair, C and D, are brought in contact with the flannel with which the wax was rubbed, they, also, are repelled by the flannel, and repel each other; but if the flannel be brought near the first pair, they are attracted by it, and the second pair is found to be attracted by the wax. Furthermore, either of the balls, A and B, are attracted by C and D; hence the wax and flannel are found to have different properties, as before predicted. To return to the illustration used, the one which has too much repels a body in the same condition, and attracts one in the opposite state; also, the one with too little repels a body in the same condition, and attracts the other. No matter what substances are brought in contact, if electrification be produced it is found to be one of these two kinds. The terms *positive* and *negative*, as used in connection with electrified bodies, are conventional terms to denote which of the two states a body is in. If glass is rubbed with silk, the glass, and all other bodies which behave like it when electrified, is said to be in a state of *positive electrification*, while the silk and other bodies similarly electrified are in a state of *negative electrification*. It must be borne in mind that the terms *positive* and *negative* refer to *electrification*, and not to *electricity*.

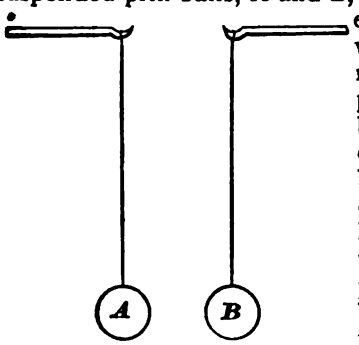

Fig. 1.

§ 4. Other Sources of Electrification. Friction is not the only way electrification is produced: chemical action, percussion, physiological action, and other disturbances in the condition of matter, also bring about disturbances in the electric condition of the body. It is quite possible that these cases may all be ultimately reduced to that of contact.

Electrification is also produced by induction—a process to be explained later, and which we shall see is really a redistribution of electrification which has been produced in some other way.

§ 5. Both Kinds of Electrification Always Produced. Perhaps the most important fact or principle in electrostatics is, that whenever electrification is produced, *both* kinds appear simultaneously—one on the substance rubbed and the other on the rubber; furthermore, they appear in *exactly equal amounts*, which may be shown in a number of ways.

§ 6. Insulators and Conductors. If, in § 3, the balls, A and B, after being in contact with the electrified wax, are touched with a rod of glass or hard rubber, no change in the effect is noticed; when the balls are brought near each other, they still repel. But if A and B are touched with a metal wire held in the hand, they no longer repel. Thus the balls lose their charge when touched with the metal, but do not in the case of the glass or hard rubber. It is customary, then, to divide bodies into two classes, as follows: Those which, when placed in contact with a charged body, cause a loss or redistribution of the electrification, and those which do not. The former are called *conductors*, and the latter *insulators*. To the first class belong the metals, solutions of salts and acids; metals heading the list as the best conductors. In the second class are found dry air, silk, glass, hard rubber, paraffine, sulphur, fats, oils, and resin.

§ 7. Electric and Dielectric. When a conducting body is entirely surrounded by an insulator, it is spoken of as an insulated conductor, and the insulating material is usually referred to as the dielectric. The term *electric* was formerly used to denote a conducting material, but the term is now obsolete.

§ 8. Electric Field. Let A and B (Fig. 2) be two surfaces which become electrified when brought in contact. The charges developed, being of opposite kind, attract each other; therefore work must be done in order to separate the surfaces, and the medium between the surfaces is left in a peculiar state of stress. A charge of electrification placed anywhere in the region between the surfaces experiences a force urging it toward one surface or the other, depending upon its kind. This region (or field of force) is called the *electric field of force*, or simply *electric field*.

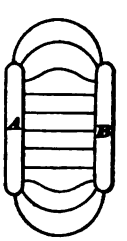

Fig. 2.

§ 9. Representation of the Electric Field by Lines and Tubes of Force. It is convenient to represent the electric field by lines of force. These begin at the positively charged surface, and end on the surface negatively charged; they never

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cross, and their direction at every point is that of the electric force at that point. The stress in the medium represented by those lines acts as a tension along the lines, and is the force which draws the two surfaces together. There is also, in the medium, a pressure at right angles to the lines; hence the lines tend to *shorten* and *separate*.

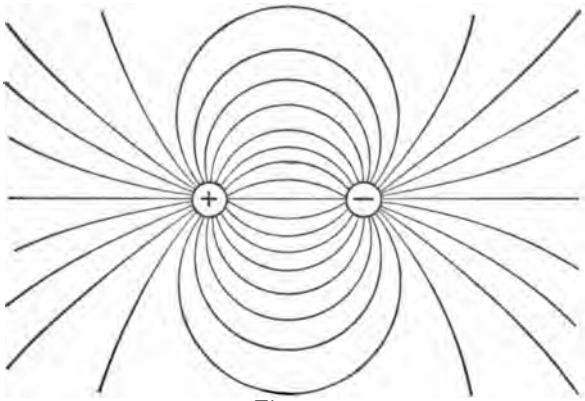

Fig. 3.

Fig. 3 shows the field between two equally and oppositely charged spheres, mapped out by lines of force.

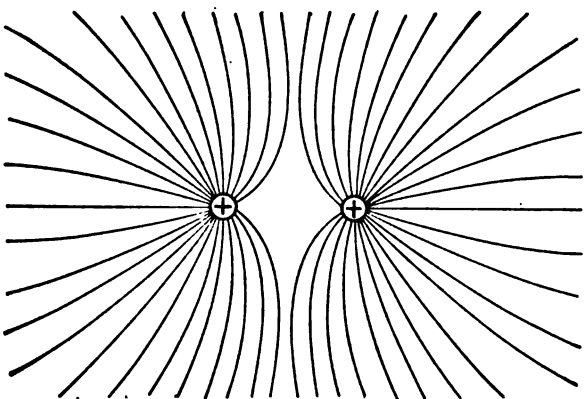

Fig. 4.

Fig. 4 represents the field between two equal positive charges; in this case the lines of force do not pass from one to the other, but travel off to an infinite distance.

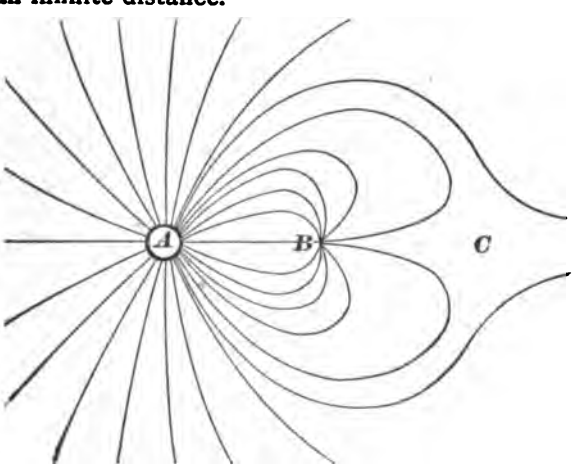

Fig. 5.

Fig. 5 shows the lines of force when a positive charge equal to 4 at A, and negative charge of—1 at B, are used. A being numerically stronger than B, lines starting from A will not fall on B, but pass off to infinite distance.

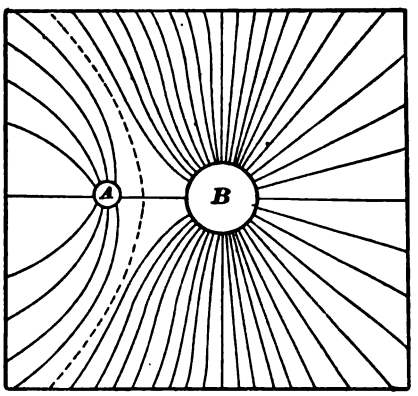

Fig. 6.

Fig. 6 shows the field of force due to a charge 1 at A, and a like charge 4 at B.

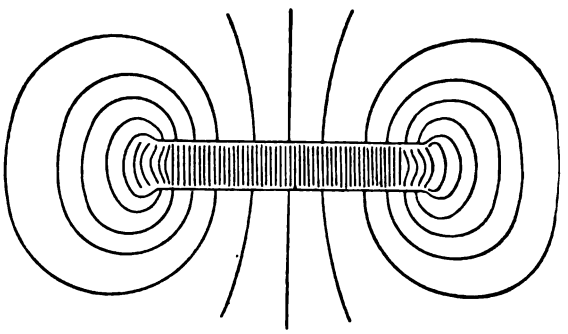

Fig. 7.

Fig. 7 shows the field of force between two parallel planes. At the edges its lines of force curve out. Some pass from the back of one plane to the back of the other.

§ 9a. TUBES OF FORCE. Imagine a small plane surface placed in an electric field perpendicular to the lines of force at that point.

We may consider all the lines of force which pass through the boundary of the small plane as forming a tube of force which starts from the surface of the positive charge and ends at the negative.

Since the sides of the tube are lines of force, the cross-section of a tube of force at any point must be proportional to the electric intensity at that point.

We may imagine each tube as inclosing one unit of positive electrification at the origin and a unit of negative electrification at the end. These tubes are in a state of tension along the lines of force and a state of pressure at right angles to the line.

Faraday introduced this method of representing the force in the electric field, and solved, by means of it, many of the problems in electrification without the aid of mathematical analyses.

§ 10. CONDUCTORS AND NON-CONDUCTORS FURTHER DEFINED. It is evident from the way in

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which the electric field is produced (§ 8) that the lines of electric force cannot exist in a conductor; therefore a conductor may be further defined as a substance which cannot sustain electrostatic stress, and which permits the flow of electricity through it when such stress is applied. On the other hand, when electrostatic stress is applied to a dielectric, something of the nature of a displacement of electricity takes place all along the line, causing, as it were, an equal amount to appear on the opposite surface. This displacement is proportional to the stress applied, and disappears when the stress is removed.

§ 11. A CHARGE, OR CHARGED CONDUCTOR. It is well to keep in mind all that is included in the term *charged conductor;* namely, one of two equal and opposite charges separated by a *dielectric* in a *state of stress*, or as it is called, an *electric field.* There is no such thing as a single charge; its equal and opposite is somewhere on the earth or surrounding conductors. The intensity of the field at any point varies with the distance between the conductors, their shape, and the dielectric which separates them. When we speak of a single isolated charge, it is understood that the opposite is at a great distance from it. In the case of the two spheres (§ 9, Fig. 3), if one of them be removed to a great distance, the field of force about the other can be represented by Fig. 8; the lines of force are radial and equally distributed about the surface.

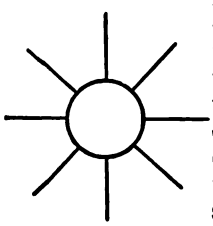

Fig. 8.

§ 12. ELECTRIFICATION BY INDUCTION, OR INFLUENCE. It is found that when an insulated conductor is introduced into the field about a charged conductor it becomes electrified with equal quantities of positive and negative electrification; further, if it then be connected with earth, the charge, which is like that on the original charged body, disappears, while that which is opposite in sign, remains. The conductor is then said to be charged by *induction*; but as the term *induction* has other uses, the term *influence* is sometimes preferred.

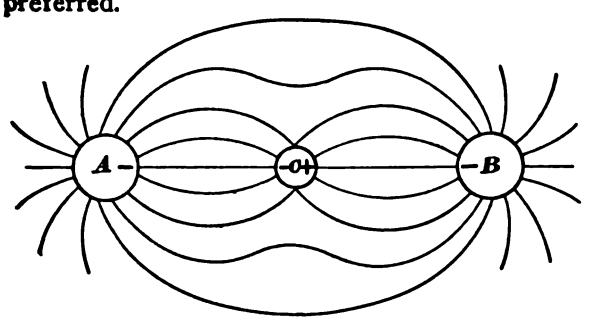

Fig. 9.

Let A be the positively charged conductor (Fig. 9.), and let B represent the equal and opposite charge which, we have seen, always exists somewhere When the conductor C is introduced into the field, some of the lines of force are divided, since they cannot exist in a conductor. We have lines ending on the side of C nearest A, and an equal number beginning on the side opposite to A, hence the side opposite A is charged positively, and the side near A is charged negatively, and, moreover, the charges are equal. Now, if the body C moves toward A until it touches A, the lines between A and C no longer exist, and some of the lines which were before on A are now on C, or, as we say, the body C has been charged by conduction; i. e., has taken from A a part of its charge. But if the body C is taken, instead, toward B, the equal and opposite charge, and touches it, C shares with B the lines which are on it, or, what amounts to the same thing, we may connect C with B by means of a conducting wire; the surface of C then becomes electrically a part of the surface of B, and, being the part nearest A, will receive most of the lines of force. If, now, the connection between B and C is broken, we have the charge which was originally on B divided between B and C, the part on C depending upon its nearness to A when the contact was broken; hence we see that a charge given by induction is a charge by conduction, as in the first case, except that a part of the equal and opposite charge is given up to the conductor, C.

§ 12a THE ELECTROPHORUS. The electrophorus is an instrument for the production of electrification by induction, or influence. It consists essentially of a resinous cake, A, a conducting lid, B, with its insulating handle, C (Fig. 9a). The cake is electrified on its upper surface by beating it with a cat's skin (or other convenient substance), which electrifies it negatively, as above, at (1), (Fig. 9a). The charge on the cat's skin finds it way to the earth, or neighboring conductor. The lid, when placed near the cake, is electrically between the charge on the cake and the equal and opposite charge; hence it intercepts most of the lines, and is charged both positively and negatively, as shown at (2). The lid is now connected with the earth by touching it with the finger; hence the surface of the lid becomes a part of the earth's surface, and the equal and opposite charge is now nearly all on the lid; if

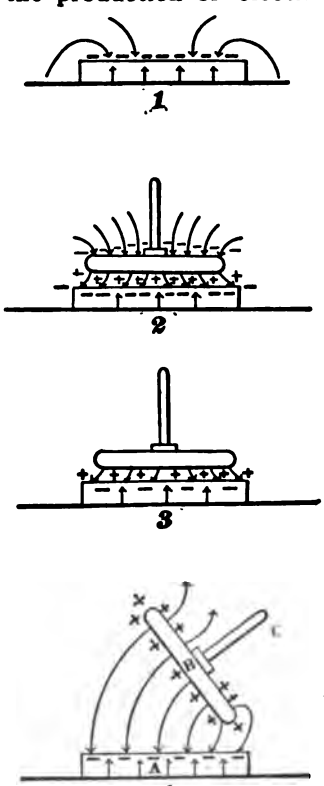

Fig. 9a.

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the connection between the lid and the earth is broken, the lid may be removed and its charge used to do work in charging other conductors, etc. In actual use the lid is placed on the surface, but as the cake is a non-conductor, and the lid touches it only at a few points, it is electrically "near" the cake.

It is evident that the process can be repeated as often as we choose, but the electrification is produced only by the expenditure of energy.

Influence or static machines, as they are called, are but mechanical devices for performing automatically the processes described in connection with the electrophorus, thus producing a constant supply of electrification at the expense of the mechanical work necessary to operate the machine against electrical attraction.

§ 12b. The WIMSHURST INFLUENCE-MACHINE. Fig. 9b shows the Wimshurst machine; it is perhaps the simplest and most effective machine of this class, and an explanation of its action will

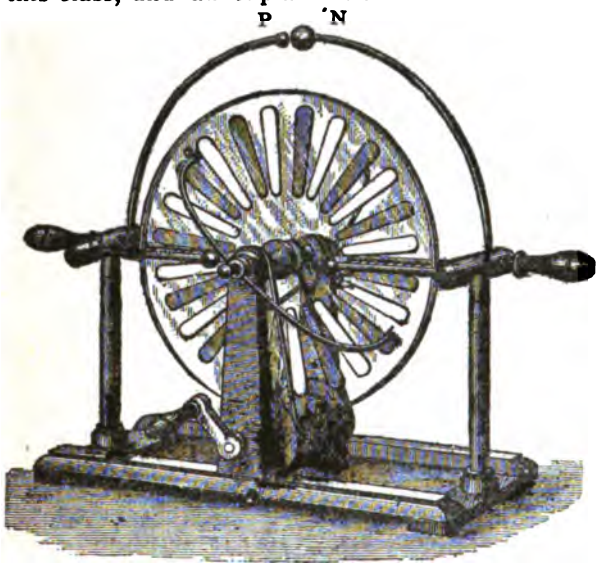

Fig. 9b.

suffice for all. The two glass plates rotate in opposite directions, and have attached to their outer surfaces segments of tin foil, as shown in the figure. The action of the machine can best

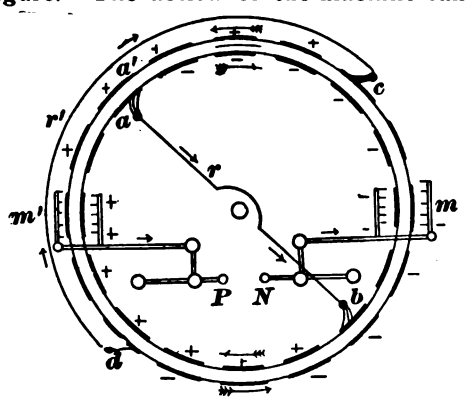

Fig. 9c.

be understood by reference to Fig. 9c, where the disks are shown as cylinders, in order that both may be seen at once. Suppose a segment, a, on the back plate, to have a slight positive charge; as the first segment a passes a', a is acted on by induction, and receives a slight negative charge, the equal positive charge appearing on b, which is connected with a, at the moment, by the brushes and connector r.

These charges are carried forward until they are opposite c and d, which at this moment are connected by the brushes and connector, r', of the rear plate; c and d will then receive, by induction, positive and negative charges, and these, passing onward, act on the front segments, under a and b. The charges on all the sections will thus be built up by a reciprocal action, the front sections on the upper half carrying negative charges from left to right, and the back sections carrying positive charges from right to left. The sections on the lower part of the plate, are passing through a similar, but inverse, set of operations; hence the negative charges are carried by both plates to the collector, m, which is connected with the terminal N, and positive charges are carried to m' in connection with the other terminal, P. P and N become highly charged, the air between them ceases to resist the stress, and a discharge takes place across the gap. The terminals may be connected with any body which it is desired to charge; as, for example, a Leyden jar. The small initial charge necessary to start the action is probably acquired by the friction of the plates and air. It is evident that if P and N be supplied with electrification from another source, the machine would work backward as a motor.

§ 13. UNIT-CHARGE. Unit-charge of electricity is defined as that charge such that two bodies having this charge repel each other with unit force (one dyne) when separated by unit distance. The dielectric is taken as air, and the dimensions of the bodies are assumed to be small, as compared with unit distance.

§ 14. THE ELECTRIC DISCHARGE. We have seen that every electric charge is essentially of two equal and opposite charges separated by a dielectric which is in a state of stress. We have assumed that the cause of this state of the bodies and dielectric is, first, the unequal distribution of the electricity which the bodies naturally contain; and second, their separation. Let A and B (Fig. 10) represent the two equal and oppositely charged conductors; then, if A and B are brought in contact, the electrification disappears, and the bodies are said to be discharged. Instead of bringing them in contact, we connect them with a conducting wire, and the same effect is observed. The bodies A and B and the dielectric return to their normal condition, provided A and B are not the two substances which, when in contact, produced the unequal distribution; for in that case the return to the normal condition would be opposed by the very thing which caused the unequal distribution. In

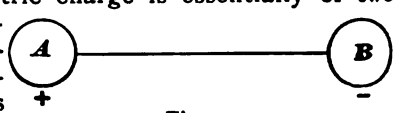

Fig. 10.

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case the stress in the dielectric becomes too great, it gives way, and acts for the moment as a conductor, thus allowing the two charges to reunite. This form of the discharge is usually accompanied by a sharp report and a spark, due to the heat generated in the dielectric along the path of the discharge. It is usually spoken of as the electric spark, or, better, a disruptive discharge, in order to distinguish it from the ordinary discharge through a conductor.

§ 15. SURFACE DENSITY. If the electrification on the surface of a charged conductor is uniformly distributed over the surface, the amount of electrification per unit area is called the surface density. If the distribution is not uniform, then the surface density at any point is the amount that would be on unit area if it had a uniform distribution equal to that at the point.

§ 16. INTENSITY OF THE ELECTRIC FIELD. If a small body charged with unit positive electricity is placed at any point in an electric field, the force which it experiences is the measure of the electric intensity at the point.

§ 17. FORCE BETWEEN CHARGED BODIES. Coulomb demonstrated, experimentally, by means of the torsion balance, that the force between two charged bodies, which are small as compared with the distance between them, is proportional to the product of the charges, and inversely proportional to the distance between them; hence it follows from the definition of unit charge that the force between two small charged bodies in air is $\frac{q\,q'}{r^2}$, q and q′ being the charges on the bodies, and r the distance between them. If q and q′ are both positive, or both negative, the expression is positive, but if they are unlike in sign, it is negative; hence the positive sign denotes repulsion, and the negative attraction.

§ 18. TOTAL NORMAL INDUCTION OVER A SURFACE. If an imaginary surface be placed anywhere in an electric field, we may suppose it to be completely divided up into elementary surfaces so small that the electric intensity at any point in an element may be regarded as constant.

If the intensity at a point in each element be resolved along the outward-drawn normal to the surface at the point, and each element be multiplied by its normal intensity, the sum of all these products is defined as the *total normal induction* over the surface.

§ 19. GAUSS'S THEOREM. A few of the more important cases of electrical intensity will be considered and solved by the aid of Gauss's theorem, which may be stated as follows: *The total normal induction over any closed surface drawn in the electric field is equal to 4π times the total charge of electricity inside the surface.*

To demonstrate the theorem when the field is due to a single charged body, let O (Fig. 11) be the body, the dimensions of which are small as compared with the distance to the surface, and q the charge on the body. Let A, B, C, D be one of the elementary surfaces. Through O, with unit radius, describe a sphere, and denote, by a, the portion of this surface included between the lines drawn from O to A, B, C and D. Draw another sphere through A, with O A as a radius, and let a' be the portion of this surface included between the same

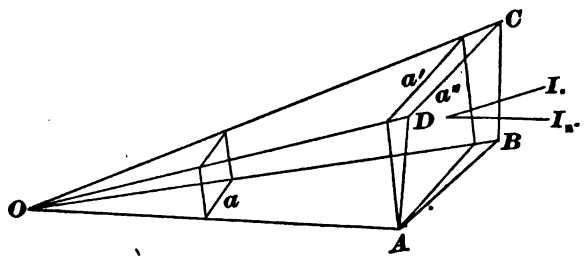

Fig. 11.

lines. Then a and a', being portions of spheres having the same center, and subtending the same solid angle, are to each other as the squares of their radii; hence $a : a' :: 1^2 : \overline{OA}^2$, or $a = \frac{a'}{\overline{OA}^2}$; the intensity at any point on a'' is $\frac{q}{\overline{OA}^2}$, the induction over the element a'' is $a'' \frac{q}{\overline{OA}^2}$. Let α be the angle between the planes a' and a'', which is equal to that between the normals I and I_n, then the induction normal to a' is $a'' \frac{q}{\overline{OA}^2} \cos\alpha = a' \frac{q}{\overline{OA}^2} = q\alpha$, since $a'' \cos\alpha = a'$ and $\alpha = \frac{a'}{\overline{OA}^2}$; that is to say, the portion of the normal induction due to the element a'' is equal to q multiplied by the area on the unit sphere subtended by the same solid angle; and the normal induction over the whole surface is equal to q, multiplied by the area subtended by the surface on the sphere of unit radius and center at O. The normal inductions on any finite portion of the surface will be the sum of the inductions on the elements into which the portion of the surface is supposed to be divided, which is q times the area cut from the sphere of unit radius and center at O, by a cone having the boundary of the surface as its base and the vertex at O. *Case 1.* Let O be inside a closed surface. The normal induction over the surface is q multiplied by the whole surface of the sphere having unit radius and center at O. The area of the unit sphere being 4π, the total induction over the whole surface, due to the charge q inside of it, becomes $4\pi q$. *Case 2.* Let O be outside the closed surface. An elementary cone, with vertex at O.

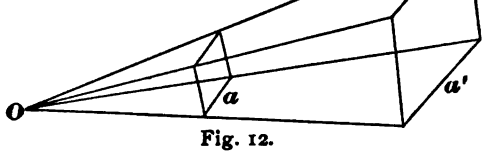

Fig. 12.

cuts from the closed surface the two areas a and a' (Fig. 12). The normal induction over a' is equal to that over a, since each is equal to

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q times the area cut from unit sphere by the same cone. The component of the induction on a' is in a direction away from the surface, while that on a is toward the surface; hence they will have opposite signs; and since the whole surface can be divided up into pairs of elementary surfaces, the surfaces of each pair neutralizing each other, the total normal induction for the closed surface will be o.

If the electric field be due to any other distribution of electrification, we may regard it as due to several small charges, q_1, q_2, q_3, . . . etc. If N is the normal induction due to all the charges, q_1, q_2, q_3, etc., and N_1, N_2, N_3, . . . etc., the induction on an element of the surface by q, q_1, q_2, etc., then $N=N_1+N_2+N_3+\ldots$ etc.; if a is the area of an element of the surface, $\Sigma Na=\Sigma N_1 a+\Sigma N_2 a+\Sigma N_3 a$, . . . etc.; that is, the total normal induction over the surface due to the field is equal to the sum of the normal inductions due to the several small charges to which the field is supposed to be due. But since the normal induction over a closed surface due to a charge inside it is 4π times the charge, and o, if the charge is outside the surface it follows that the sum of the inductions over the surface due to the several charges is 4π times that part of the total charge which is inside the closed surface over which the normal induction is taken.

§ 20. Cases of Electric Intensity. The following cases, solved by Gauss's theorem, are very important:

(*a*) *Electric intensity at a point outside a uniformly charged sphere.* Let P (Fig. 13) be the point and O the center of the sphere. Through P draw a sphere with the center at O. Since the sphere is uniformly electrified, the direction of the force at P will be along O P; and it will have the same value at any point on the sphere with radius OP. Call this value f. Since at all points on this surface the normal force is f, the total normal induction over the spherical surface is f multiplied by the surface of the sphere, which is $f(4\pi\times\overline{OP}^2)$; but by Gauss's theorem this is equal to 4π times the total charge inside the surface. Let q be the total charge; then $f\times 4\pi\overline{OP}^2=4\pi q$ and $f=\frac{q}{\overline{OP}^2}$. Hence the charge may be considered as concentrated at the center of the sphere O, so far as the intensity at P is concerned. Had we known that the charge on O exerts the same force at P as if it were concentrated at the point O, the expression for the intensity at P could have been written out directly from the law of inverse squares.

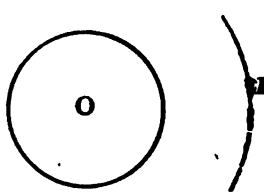

Fig. 13.

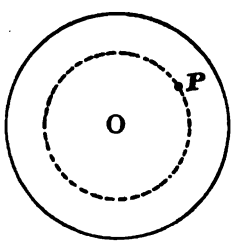

Fig. 14.

(*b*) *Electric intensity at a point inside a uniformly charged spherical shell.* Let P (Fig. 14) be the point inside the shell, and f the electric intensity at the point. Through P draw a spherical surface with center at O. Since the charge is symmetrical about this surface, f, the normal intensity will be the same at all points on the surface, and the total normal induction will be $f(4\pi\times\overline{OP}^2)$, which, by Gauss's theorem, is 4π times the charge inside the spherical surface passing through P. There is no charge inside the surface; hence $f(4\pi\times\overline{OP}^2)=0$; therefore $f=0$. There is then no electric intensity at a point inside the uniformly electrified shell.

(*c*) *Electric intensity at a point outside of an infinitely long circular cylinder uniformly charged.* Through P (Fig. 15) describe a cylinder having the same axis as the charged cylinder. Cut a right section from each cylinder by two planes at unit distance apart. Since the electrified cylinder is infinitely long and symmetrical about its axis, the intensity at any point outside the charged cylinder will be along the radius through the point, and will be the same for all points at the same distance from the charged surface.

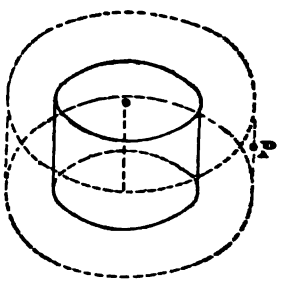

Fig. 15.

The intensity at any point on the plane ends of the cylinder through P will be in the plane of the ends; hence the normal induction on these two ends will be o, and the total normal induction will be that on the curved portion of the section only. Let f be the intensity at the point P, then the total normal induction is $f(2\pi r)$, r being the distance of P from the axis, and the length of the section unity. Let q be the charge per unit length on the electrified cylinder; then by Gauss's theorem the total normal induction over the unit section is $4\pi q$; therefore $f(2\pi r)=4\pi q$, and $f=\frac{2q}{r}$; hence it is seen that the electric intensity varies inversely as the distance from the axis of the cylinder. It can also be shown that the electric intensity at any point inside the charged cylinder is o.

(*a*) *Electric intensity at a point due to an infinite plane uniformly electrified.*

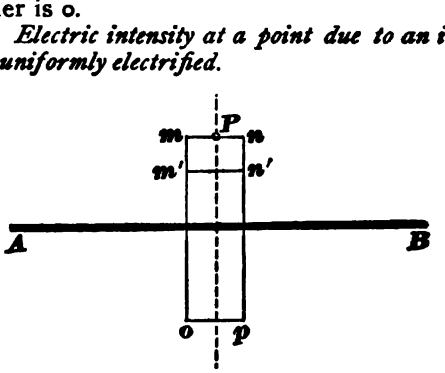

Fig. 16.

Let A B (Fig. 16) be a portion of the plane, and P the point. It is evident that the intensity will

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be normal to the plane, and the same for all points equally distant from the plane. Through the point P draw a line perpendicular to the surface, and take this as the axis of a right cylinder, m, n, o, p, extending equal distances above and below the plane, the point P lying in the upper base of the cylinder. The electric intensity is everywhere parallel to the axis of the cylinder; hence there is no normal component over the curved surface. The total normal intensity is therefore due to the plane ends of the cylinder. Let f be the intensity at any point in the field, and a the area of either base of the cylinder; the total normal induction over the upper and lower bases is $2af$, as the normal intensity is along the outward-drawn normal to each end. Let q be the quantity of electrification per unit area of the plane; then from Gauss's theorem the total normal induction over the cylinder is $4\pi qa = 2fa$; therefore, $f = 2\pi q$. Consider a section cut from the cylinder by a plane, parallel to one of the bases, as at $m'n'$. Let f′ be the electric intensity at any point on this section; then the total normal induction over the portion of the cylinder cut off by the plane $m'n'$ is $fa - f'a'$; but since there is no charge inside this portion of the cylinder, $fa - f'a' = 0$, or $f = f'$; an interesting result, since it follows that the intensity at any point is independent of its distance from the plane.

§ 21. Electric Intensity at the Surface of a Charged Conductor. Let f be the electric intensity at a point, P (Fig. 17), very near to the surface of the charged conductor, O. Consider a small area about P, and through the boundary of the area draw a small right cylinder with its elements perpendicular to the charged surface, and its bases, a and b, parallel to the tangent plane at P. Since the surface of the conductor is an equipotential surface (see § 26), the electric intensity is normal to the surface. The total normal induction over the surface of the cylinder is $f \times b$, where f is the intensity at the point P and b, the area of the base. Since the intensity is parallel to the elements of the cylinder, and the base a is inside the charged conductor, the base b is the only portion of the surface of the cylinder which contributes anything to the normal induction. The amount of electrification inside the small cylinder is δb, where δ is the surface density.

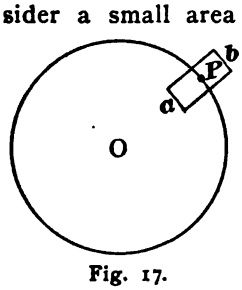

Fig. 17.

By Gauss's theorem, $f\,b = 4\pi\delta b$ or $f = 4\pi\delta$; hence the electric intensity at a point near the surface of a charged conductor is equal to 4π times the surface density at the point, and is at right angles to the surface. This is known as Coulomb's law.

The expression $4\pi\delta$ requires modification in case the conductor is surrounded by any other dielectric than air.

§ 22. Force on Unit Area of a Charged Conductor. Let P (Fig. 18) be a point on the surface. P_1 and P_2 are points very near the surface, and $a\,b$ the small area surrounding P. Let f be the normal electric intensity just outside the surface at P, which may be considered as made up of two parts; f_1 that part due to the electrification on the small area around P; and f_2 the part due to the rest of the electrification; then $f = f_1 + f_2$. Since P_1 and P_2 are close together, the electric intensities at these points, due to the electrification on the parts of the surface other than the small area, may be considered equal; that is to say, the intensities at both points, not due to the electrification on the small area, may be taken as f_2, and is along the outward-drawn normal for each point. The electric intensity at P_1 and P_2, due to the small area, will be the same in magnitude, but opposite in direction, the points being situated on opposite sides of the small area. The total intensity at P_2 is $f_2 - f_1$, which is equal to 0, since the point is inside an equipotential surface inclosing no charge. Since

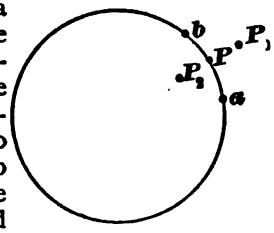

Fig. 18.

$$f_2 - f_1 = 0$$
$$f_1 = f_2$$
and as $$f = f_1 + f_2$$
$$f_1 = f_2 = \tfrac{1}{2}f$$

Let a be the area of the small surface around P, and δ the surface density of the electrification; then $a\delta$ is the charge on the small surface. The normal intensity at the point P, due to the rest of the electrification, is f_2; hence the normal force on the surface is $f_2 a\delta = \frac{1}{2}fa\delta$. If F is the mechanical force acting normally on unit area, Fa is the mechanical force on the small section. Then

$$Fa = \tfrac{1}{2}fa\delta$$
and $$F = \tfrac{1}{2}f\delta$$

By Coulomb's law (§ 21), $f = 4\pi\delta$

and $$\delta = \frac{f}{4\pi}$$

then $$F = \frac{f^2}{8\pi} = 2\pi\delta^2$$

when the dielectric surrounding the charged body is air.

If the electric intensity at the surface of a charged conductor exceeds a certain limit, electrification on each small area is repelled by the rest of the charge with such force that the air ceases to insulate.

§ 23. Electrical Potential. In §§ 16, 18, 19, 20, 21 and 22, we have been considering the force exerted upon unit positive charge when placed at a point in the electric field. There is, however, another equally important quantity involved, namely, the energy required to place the unit charge at the point, or, what is the same thing, the work, that could be done by the unit charge were the electric force allowed to move the unit charge from the point.

Let O (Fig. 19) be a sphere upon which there is

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a charge +Q. Since the electric field about the sphere extends to an infinite distance (§ 11), the potential at the point P may be defined as *the*

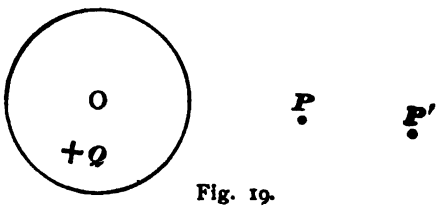

Fig. 19.

work required to bring unit positive charge from an infinite distance to the point, which, of course, is equal to all the work the positive unit could do if the force of repulsion were allowed to move it as far as it could; that is to say, where the electric intensity is zero, or at an infinite distance from O.

In electrostatics it is to be understood that when the term *potential* is used it is an abbreviation of the term *potential energy*. Also, since we have both attraction and repulsion, the work required to bring the unit-charge to the point may be either positive or negative. It is customary to take the sign of the potential the same as the charge to which the potential is due; if —Q is the charge upon the sphere O, the potential at the point P is negative.

§ 24. Point of Zero Potential. At a place infinitely distant from all electrified bodies the electric intensity becomes zero, and hence the potential is zero at that place. A charge given to the earth is practically removed to an infinite distance, since the charge, while distributed on the surface of the earth, may be considered as concentrated at its center so far as attraction is concerned; hence the surface of the earth is usually spoken of as at zero potential.

§ 25. Difference of Potential between Two Points. The difference of potential between two points is the work done in carrying the unit positive charge from one point to the other. The amount of work done in taking the unit charge from one point to the other is independent of the path traversed, which may be shown as follows: Let P and P′ (Fig. 20) be the two points, and suppose that it requires more work to carry the unit charge from P′ to P along the path *a′* than along the path *a*. By the principle of the conservation of energy, the work the charge is capable of doing in passing from P to P′ over either path is equal to the work done upon the charge when it is taken from P′ to P by the same path. If the supposition is correct, the charge could be taken to P by way of the path *a* and returned by the path *a′*; hence a greater amount of energy would be derived from the charge than was used to take the charge from P′ to P; a result which is impossible, as the system is left exactly the same as at the start.

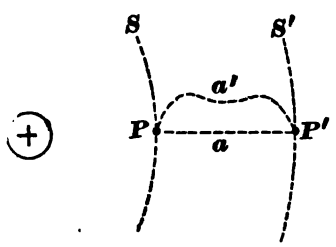

Fig. 20.

§ 26. Equipotential Surfaces. A surface drawn in the electric field, such that the potential at every point in the surface is the same, is called an equipotential surface. It is evident that at every point on an equipotential surface the direction of the electric intensity is perpendicular to the surface; for if not, then it may be resolved into two components, one of which is tangent to the surface, and the unit charge would require the expenditure of energy to move it along the surface, which is contrary to the definition of an equipotential surface.

The surface of a conductor placed in an electric field must be an equipotential surface; if not, then, as before, the tangential component of the electric intensity at any point would cause a flow of electricity along the surface of the conductor.

The electric intensity at a point inside of an equipotential surface which does not inclose a charge must be zero; for if the potential inside of the surface varies, then there will be other equipotential surfaces inside the given surface. Consider one very near the given surface, and let P be a point on the inner surface, and P′ the point where the normal to the inner surface at P cuts the given surface. If the potential at P is greater than that at P′, the intensity is everywhere outward along the normal to the outer surface,—a fact which implies a positive charge inside the surface, since by Gauss's theorem the normal induction over a closed surface is proportional to the charge inside the surface. If the potential at the inner surface is less than at the given surface, it can be shown, as before, that this implies a negative charge inside the surface,—either case of which is contrary to the hypothesis.

It follows from the above that no charge can reside on the inner surface of a hollow conductor. This very important fact may be proven by direct experiment in several different ways, one of which is by means of a hollow conductor with a small opening, as shown in Fig. 21. A small insulated conductor is inserted through this opening and brought in contact with the interior surface, but upon withdrawal shows no electrification.

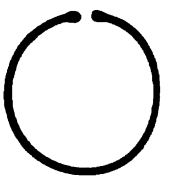

Fig. 21.

Faraday built for himself a room 12 feet each way, and completely covered it with tinfoil, and insulated it from other conductors. This large hollow conductor he charged with his most powerful machine, but no effect was observed upon the most delicate instrument when taken into the interior.

Whenever it is desired to screen an object from electrical action it is surrounded by a conducting surface.

§ 27. Potential Due to a Charged Sphere. Let q be the charge on the sphere having its center at O (Fig. 22). If the charge on O is positive, the unit positive charge, when repelled by the field

Fig. 22.

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from a point, P, to an infinite distance, requires the expenditure of energy by the field equal in amount to that required to bring the positive unit from an infinite distance to the point, which, by definition, is the potential at the point P. Let O P be the line through O and P extended to an infinite distance. $P_1, P_2, P_3, \ldots$ etc., are points on $\overline{O\ P}$ very close together.

The intensity at P is $\frac{q}{\overline{OP}^2}$ and that at P_1 is $\frac{q}{\overline{OP_1}^2}$.

Since the distance between P and P_1 is small, the intensity at all points between P and P_1 may be taken as the geometrical mean between the values at P and P_1 or $\frac{q}{OP \times OP_1}$. The work done when the unit charge passes from P to P_1 is the product of the mean force into the space, which is

$$\frac{q}{OP \times OP_1} \times PP_1$$

$$= \frac{q}{OP \times OP_1}(OP - OP)$$

$$\frac{q}{OP} - \frac{q}{OP_1}.$$

The work done in passing from P to P_2 and P_2 to P_3 is

$$\frac{q}{OP_1} - \frac{q}{OP_2}$$

and $$\frac{q}{OP_2} - \frac{q}{OP_3}$$

The sum of these is $\frac{q}{OP} - \frac{q}{OP_3}$; which is, by definition, the difference of potential between the two points P and P_3, which are at a finite distance apart. If the second point be taken at an infinite distance from P, $\frac{q}{OP_3}$ becomes equal to o; hence the potential at the point P is $\frac{q}{OP}$.

§ 28. Potential of a Charged Conductor. Since the surface of a charged conductor is an equipotential surface, the potential at any point in the surface is usually spoken of as the *potential of the conductor*. In the case of a sphere uniformly charged, since the charge may be considered as concentrated at its center, the potential at the surface becomes $\frac{Q}{R}$, where Q is the total quantity of electrification on the sphere and R its radius. Or we may consider the charge Q as made up of a number of very small charges, q, evenly distributed over the surface of the sphere; then the potential at the center due to each of these elementary charges, q, is $\frac{q}{R}$. The total potential at the center will then be $\frac{1}{R}\Sigma q = \frac{Q}{R}$, where Σ denotes that the quantities, q, are all to be added. Since the potential is constant for all points inside the sphere, the value at the center must be also that at the surface.

§ 29. Energy Expended in Charging a Conductor. If a charge, Q, is brought from a great distance, or from the earth, which is at zero potential, to a conductor having a potential V, the work done is QV, but in charging a conductor the potential is zero at the beginning of the process and V at the end. The mean potential is $\frac{1}{2}$V, and the work done is therefore $W = \frac{1}{2}QV$.

§ 30. Capacity of a Conductor. The capacity of a conductor is numerically equal to the charge which must be given to it in order to raise its potential from zero to unity.

Whenever the term *capacity of a conductor* is used, it is understood to be at a great distance from other conductors, as its capacity is affected by the presence of conductors in the neighborhood.

§ 31. Capacity of a Sphere. Let R be the radius of a sphere, Q its charge, and V its potential. The potential V at the surface of the sphere has been shown to be (§ 28) $V = \frac{q}{R}$; hence if V is equal to unity, R = q = C, by definition, or the capacity of a sphere is numerically equal to its radius.

A conductor that requires one unit of electrification to raise its potential from zero to one would be said to have unit-capacity. A sphere of unit radius would evidently possess unit capacity. A sphere of n centimeters radius would require n units of electrification in order to raise its potential by unity. It is very difficult to calculate the capacity of conductors, other than the most simple forms.

§ 32. Capacity of Two Concentric Spheres. Let S and S′ (Fig. 23) be two concentric spheres with radii R and R′. The outer sphere, S′, is connected to earth, while the inner one, S, is maintained at a constant potential.

Let q be the charge on the inner sphere, and —q the equal and opposite charge on the inner surface of the outer sphere; that is to say, the two equal and opposite charges of which every charge is composed are now brought close together, and the field between them confined to the space between the two spheres. Since the field is confined to the space between the two spheres, the only work that can be done by moving unit-charge about in the field is that done in carrying unit-charge from the inner sphere, S, to the outer one, S′, and this work must be due to the charge q on the inner sphere, since the electric intensity at any point inside the outer sphere due to the charge —q is o. Furthermore, the charge on the inner sphere may be considered as concentrated at its center; therefore the work done is the difference in potential between the two points, distant R and R′ from the center, O, which is equal to $\frac{q}{R} - \frac{q}{R'} = V$; then $q = \frac{RR'}{R' - R}.V$.

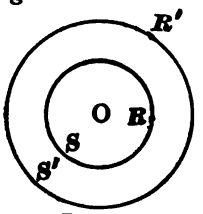

Fig. 23.

If V is made unity, $\frac{RR'}{R' - R}$ is, by definition, the ca-

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pacity of the two spheres. When R is nearly equal to R′ it will be noticed that the quantity $\frac{RR'}{R'-R}$ becomes very large; hence such an arrangement is usually called a condenser.

If we suppose the outer sphere to consist of two hollow hemispheres, and that they are separated and removed to an infinite distance with their negative charge, the charge on S must remain $q = \frac{RR'}{R'-R}V$. Dividing the equation by R, we have $\frac{q}{R} = \frac{R'}{R'-R}V$. Now, $\frac{q}{R}$ is the value of the potential of the inner sphere when alone; i.e., when the opposite charge is at an infinite distance. Hence the removal of the opposite charge to an infinite distance has raised the potential from V to $\frac{R'}{R'-R}V$, which is large if (R′ — R) is small. This affords a beautiful illustration of the fact that potential, after all, is due to electrical separation, and that the charged condenser may be taken as a type of all charges; namely, two equal and opposite charges separated by a dielectric in a state of stress.

Small differences of potential may be magnified in this way: For example, the potential difference between the terminals of a battery-cell is small, but if the two terminals be connected with two plates which are close together, the plates become charged and have the same difference of potential as the cell; but if the connection be broken, and one of the plates removed, the potential of the other becomes greatly increased. Volta made use of this principle to increase the potential difference due to a cell, in order that he might observe it by instruments which were only suited for higher potentials.

§ 33. Case of Two Parallel Plates. Let the plates be very large, as compared with the distance between them. In this case the field of force between the plates is uniform, and the electric intensity is at right angles to the plate (§ 21). Let f be the intensity of the field between the plates. Then the work done when unit-charge passes from one plate to the other is ft, where t is the distance between the plates; hence V = ft. Let δ be the surface density on one plate and $-\delta$ that on the other. Then by Coulomb's law, $f = 4\pi\delta$; therefore $V = 4\pi\delta t$ and $\delta = \frac{V}{4\pi t}$. If V is equal to unity, δ, the quantity of electrification on unit-area, becomes numerically equal to the capacity per unit-area. For an area, A, the capacity is $\frac{A}{4\pi t}$.

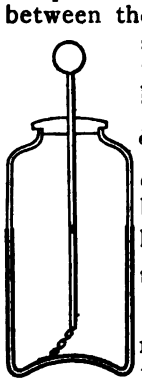

Fig. 24.

§ 34. Condensers. The most common form of condenser is the Leyden jar, shown in Fig. 24. It consists of a glass jar coated inside and out to one half or two thirds its height with a conductor, usually tinfoil. It is charged by connecting the inner coating to any source of electrification by means of the knob and chain which are in electrical connection with the inner coating. The outer coating is connected with the earth by being held in the hand while charging, or with a metal conductor.

If A is the area of the tinfoil, t the thickness of the glass, the capacity of the condenser (air as a dielectric) would be approximately that of two parallel plates (§ 33) having the same area, or $\frac{A}{4\pi t}$; but as glass is used, the formula must be changed to $K\frac{A}{4\pi t}$, in which K is a factor depending on the nature of the dielectric. (See § 36.) Condensers to be used as standards of capacity and for purposes of measurement are made from a large number of sheets of tinfoil built up with mica or paraffined paper between each sheet. The alternate sheets are connected together at each end, thus forming practically two large sheets of tinfoil separated from each other by a thin layer of dielectric.

§ 35. Condensers in Parallel and Series. If several condensers, as, for example, Leyden jars, have their inside coatings connected by one wire and the outside coatings by another, they are said to be connected up in parallel. (See Fig. 25.) The result is one condenser with plates equal in size to the sum of the plate-areas of the several jars. Hence the capacity of the new arrangement is the sum of the several capacities.

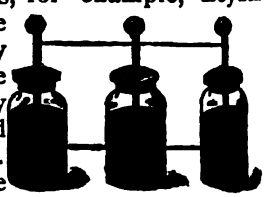

Fig. 25.

If the several condensers be connected, as shown in Fig. 26, they are said to be connected in series, or cascade. The condensers are insulated, and the outside of one connected with the inside of the next, etc. Since the condensers are equal and insulated, the charge on the outside of the first is equal and opposite in sign to that on the inside of the next, and so on; the charges on the jars are equal. Let the capacities of the condensers be C_1, C_2, C_3, etc., Q is the charge on any jar, and let the potentials be V_1, V_2, V_3, etc.; then $V_1 = \frac{Q}{C_1}$, $V_2 = \frac{Q}{C_2}$, $V_3 = \frac{Q}{C_3}$. The difference of potential between the inside of the first and the outside of the last jar is

Fig. 26.

$$V = V_1 + V_2 + V_3 \cdots$$
$$= Q\left(\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots\right)$$
$$Q = \frac{V}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots}$$

Let C be the capacity of the compound condenser; then $Q = CV$; hence $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots$

Therefore the capacity of the compound con-

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denser is less than that of any of its constituents.

§ 36. Specific Inductive Capacity. Since the medium between the two charges of a condenser is in a state of stress, it is quite natural to suppose that the capacity of the condenser depends upon the nature of the medium between the plates. Faraday was the first to show that the medium held such an important part in all cases of electric charge; he took two condensers exactly alike as to their conducting surfaces, but so arranged that he could change the dielectric medium in one of them. When air was the dielectric, the two condensers had the same capacity; for when he charged one of them and connected it in parallel with the others, they were found to have the same charge; that is, the original charge was divided equally between them. But when sulphur was substituted for the air in one of the condensers, and both were connected as before, he found that the charge in the one with the sulphur was three or four times that in the one having air as the dielectric. This property of the dielectric is called its *specific inductive capacity*, or the *dielectric constant;* and the value of the specific inductive capacity of any dielectric is the ratio of the capacity of a condenser when this substance is used as the dielectric to the capacity of the same condenser when air is used.

It was the discovery of this property of the dielectric that led Faraday to the belief that the action of one electrified body on another is due, not to action at a distance, but to the dielectric between them. The importance of this discovery cannot be overestimated, as it furnished us with the only reasonable explanation to many, if not all, electrical phenomena.

Fig. 27 shows the effect of introducing a sphere of paraffine into an electric field in which air is

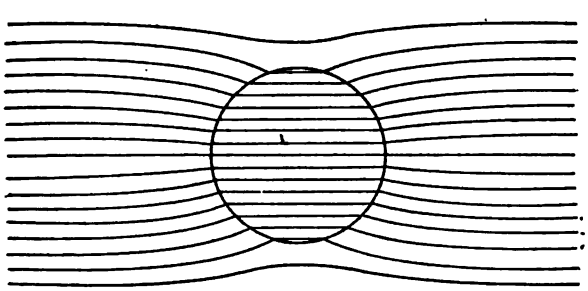

Fig. 27.

the medium. The paraffine, having a greater specific inductive capacity, causes the lines of force to concentrate through it. A *conducting* substance has infinitely great specific inductive capacity.

The table given below contains the value of the specific inductive capacities of the substances commonly used as dielectrics, air being taken as unity:

Solid paraffine	2.29	Flint glass	6.72
Paraffine oil	1.92	Dense flint glass	7.37
Ebonite	3.15	Turpentine	2.23
Sulphur	3.97	Distilled water	76.00
Mica	6.64	Alcohol	26.00

It has been found that if the field is rapidly changing, the specific inductive capacity is smaller. Take, for example, the case of a condenser, the charge of which is made to rapidly vary in potential from V to —V; the specific inductive capacity of the dielectric is less than when the change takes place slowly.

A few values of the specific inductive capacity for rapidly alternating fields are given below:

Ebonite	2.284	Shellac	2.747
Paraffine, solid	1.994	Glass (plate)	5.86

The specific inductive capacity of gases varies with the pressure, the difference between its value, for any gas, and unity being directly proportional to the pressure, except for very low pressure.

The values given below are taken at atmospheric pressure; that of air at the same pressure is taken as unity:

Hydrogen	.99967	Carbonic oxide	1.0001
Carbonic acid	1.00035	Olefiant gas	1.00072

§ 37. Effect of the Dielectric on the Intensity of the Field. Take the case of two parallel plate-condensers, A and B (Fig. 28), alike in all respects except

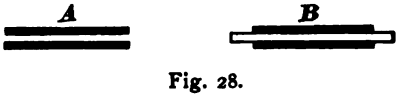

Fig. 28.

the dielectric, which is air for the condenser, A, and a substance of specific inductive capacity, K, is between the plates of B. Let the charge per unit-area in the two condensers be the same; then, since the capacity of B is K times that of A, the potential difference between the plates of B is only $\frac{1}{K}$ of that of A. But in both condensers the field of force between the plates is uniform, and is the rate at which the potential varies per unit-length. Since the distance between the plates is the same for each, the electric intensity between the plates of A is to that between the plates of B as the difference of potential between the plates of A is to that of B; that is to say, the electric intensity in A is K times that in B.

The electric intensity between two parallel plates in air is (§ 33) $f = 4\pi\delta$. Hence for a medium whose specific inductive capacity is K, we have $f = \frac{4\pi\delta}{K}$, which is Coulomb's equation generalized to apply in the case of any dielectric.

II. Current Electricity.

§ 38. Electric Currents. If in § 14 the two bodies could be charged as fast as the discharge takes place through the conducting-wire, there would be in the wire a steady flow of electricity. The wire and dielectric is essentially a charged conductor, with this exception. In the case of a charged conductor the potential is the same at all points of the surface, while the potential at the surface of the wire bearing the current gradually falls from V to —V. Furthermore, in order to keep up the conditions that we have supposed, it would be necessary to continually supply A with electricity from somewhere, which

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would cause a deficit at the place from which it is taken and an accumulation at some other place. It is evident that this could not go on indefinitely, for the accumulated quantity would eventually overcome all obstacles and find its way to the place of deficit. Hence it follows that, in order to maintain a continuous current of electricity, it is necessary to provide, first, a continuous difference of potential, and second, a closed conducting-circuit. The first condition we may obtain by any of the several ways of producing electrification; as, for example, contact, induction, chemical action or electromagnetic induction, and the second by making the circuit continuous and of a conducting material. As there are no perfect conductors, any substance we may use will oppose, to a more or less extent, the flow of electricity along it, or, what is the same thing, will require the expenditure of energy in order to maintain a current, and the electrical energy which disappears appears as heat.

To sum up, we have the following quantities ever present in the case of continuous electric current, connected with each other by simple laws, which are of the utmost importance:

1. The continuous difference of potential or electromotive force.

2. The resistance of the closed conducting circuit, or that of any one of its parts.

3. The strength of the current which is produced.

4. The energy expended in the circuit, or any of its parts.

5. The field of force about the wire.

§ 39. Continuous Potential Difference. Take the case of a simple voltaic cell, as shown in Fig. 29, consisting of two conducting-plates immersed in an acid which acts upon one or both of them. Suppose that the wire, R, is not present, the plates A and B become charged either by contact with the acid or by the conversion of chemical energy into electrical energy, or both. Each plate in contact with the acid is charged to a definite potential, depending upon the material of the plate and the liquid. (See Primary Cells, in these Supplements.) In this case the zinc is charged to a higher potential than the copper. If, now, the plates be connected by the wire, R, we have but to consider two plates, as the charged bodies A and B of Fig. 10; the liquid corresponds to the connecting wire in the same figure, and the wire, R, is the return-path, the whole making up a complete circuit, which may be taken as a typical circuit. The liquid is necessarily a conductor, and conducts in a manner peculiar to liquids; it is called an *electrolyte*. (See Electrolysis, in these Supplements.)

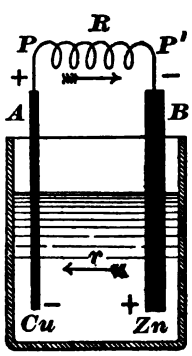

Fig. 29.

§ 40. Electromotive Force. The work done by the electric forces when unit-charge is propelled from P to P′ is called the electromotive force between the points, and briefly written E.M.F. The work done when the unit-charge is carried completely around the circuit is called the electromotive force of the cell, and is equal to the difference of potential between the plates before the wire, R, was added.

§ 41. Strength of Current. If the difference of potential of the plates (Fig. 29) is kept constant, the current through the wire, R, is constant, provided the resistance of the wire does not change. Furthermore, the quantity of electricity that passes through any cross-section of the circuit in the same time, as P for example, must be constant; if not, there would be an accumulation of electricity at some point in the circuit. The quantity that passes any section in unit time is called the intensity of the current.

§ 42. Relation between E.M.F., Intensity of Current and Resistance. Let E be the electromotive force between the points P and P′ (Fig. 29), I the strength of current and R the resistance of the conductor between P and P′. The relation between these three quantities is given by the expression $I = \frac{E}{R}$, which is known as Ohm's law.

§ 43. Energy Expended by the Current in Overcoming Resistance. As before, let E be the electromotive force between P and P′ (Fig. 29), I the intensity of current, and R the resistance of the wire between these points. By definition, E is the work done on unit-charge in carrying it from P to P′; and as I is the number of units passing between the points in unit-time, EI is the total work done between these points. From Ohm's law, $E = RI$; hence the work per second is $EI = RI^2$. This energy, which disappears as electrical energy, appears as heat, which, in most cases, is a loss; but whenever it is desired to produce light or heat by means of the current, this forms the useful part of the energy.

The product, $EI = I^2R$, is a number of work-units; hence if the heat generated is measured, we obtain a value of the mechanical equivalent of heat; for, by the principle of conservation of energy, the amount of energy that appears in the form of heat must be equal to that which disappeared as electrical energy.

§ 44. Conductivity. If R is the resistance of a conducting wire, then $\frac{1}{R}$ is defined as its conductivity.

It is often necessary to refer to the resistance and conductivity of a *substance*, rather than a definite portion of it. The resistance of a *substance* is termed its *specific resistance*, and is defined as the resistance of a conductor of the material having unit-length and unit cross-section; i.e., a unit cube. The conductivity is the reciprocal of the specific resistance.

The following table gives the specific resistance and relative conductivity of the more common substances; also the resistance of a wire or column of the substance one meter long and one square millimeter in cross-section.

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TABLE OF SPECIFIC RESISTANCES.

Substance.	Specific Resistance *(microhms of 1 c.m.cube)	Resistance (ohms) of meter-length, 1 sq. mm. Section.	†Relative Conductivity.
Metals at 0° C.			
Copper (annealed)	1.570	.0157	100.
Copper (hard)	1.603	.0160	98.1
Silver (annealed)	1.492	.0149	105.
Silver (hard)	1.620	.0162	98.
Gold	2.077	.0208	76.
Aluminium (annealed)	2.889	.0289	54.
Platinum	8.982	.0898	17.
Iron (pure)	9.638	.0964	16.
Iron (telegraph wire)	15.	.15	10.
Lead	19.63	.1963	8.3
Mercury	94.34	.9434	1.6
Selenium	6×10^{10}		1 / 4000000000
Carbon (graphite)	2,400 to 42,000		1 / 2500
Carbon (arc light)	About 4,000		
Alloys.			
German silver (Cu60, Zn26, Ni14)	20.76	.2076	7.6
Platinum silver (Pt67, Ag33.)	2.4	.024	6.5
Platinoid (Cu59, Zn25.5, Ni14, W55)	32.5	.325	4.8
Manganin (Cu84, Ni12, Mn3.5)	47.5	.475	3.3
Liquids at 18° C.			
Pure water	26.5×10^{8}		Less than one millionth part.
Dilute H_2SO_4, 5%	486×10^{4}		
Dilute H_2SO_4, 30%	137×10^{4}		
Dilute H_2SO_4, 80%	918×10^{4}		
Dilute $ZnSO_4$, 24%	214×10^{5}		
Dilute HNO_3, 30%	129×10^{4}		
Insulators.			
Glass at 20° C.	91×10^{18}		Less than one billionth.
Glass at 200° C.	22.7×10^{12}		
Gutta percha, 24° C.	4.5×10^{20}		

* A microhm = one millionth of an ohm.
† Copper is taken as 100.

§ 45. Resistance of Conductors in Series. AB, BC and CD are three or more conducting-

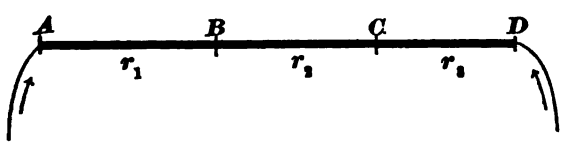

Fig. 30.

wires (Fig. 30) connected end to end, or in series, and forming a part of an electric circuit. Let r_1, r_2 and r_3 be the three resistances, and V_A, V_B, V_C and V_D be the potentials at the points A, B, C and D; then, since the current i is everywhere the same, we have, by Ohm's law,

$$V_A - V_B = r_1 i$$
$$V_B - V_C = r_2 i$$
$$V_C - V_D = r_3 i$$

Adding the three equations, we get

$$V_A - V_D = (r_1 + r_2 + r_3) i.$$

Let R be the resistance between A and D; then, by Ohm's law, $V_A - V_D = Ri$, or $R = r_1 + r_2 + r_3$. Hence the resistance of two or more conductors, placed in series, is the sum of the several resistances.

§ 46. Resistance of Conductors Placed in Parallel. Let r_1, r_2 and r_3 (Fig. 31) be the resistance of the three conductors connecting A and B. Let R be the resistance of a single conductor, which, if introduced between A and B, instead of r_1, r_2 and r_3, would offer the same resistance as the three wires when placed side by side, or in parallel.

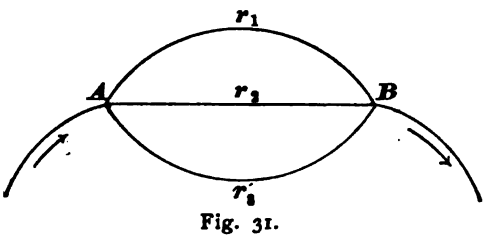

Fig. 31.

Since the current flowing would be the same for the single wire, or the three in parallel, the conductivity of the single wire must be the same as the single conductor which can replace them; hence $\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$.

§ 47. Field of Force about a Conductor in Which a Current Is Flowing. Let A and B (Fig.

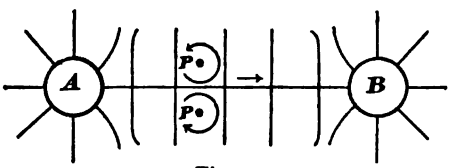

Fig. 32.

32) be two positively charged conductors connected by a wire. The surface of the conductors and the wire forms an equipotential surface, the electric intensity at all points on the surface being normal to the surface, as shown in Fig. 32. Suppose that a part of the electrification on B should be instantly removed or neutralized, the potential of B is lowered and the surface of the system is not an equipotential surface. The electricity on A moves toward B until equilibrium is again established and the surface is once more an equipotential surface. During the movement of electricity we can picture the lines of force as moving along the wire, but remaining perpendicular to its surface. This onward movement of the stress represented by the movement of lines of force gives to the field of force about the wire entirely new properties. Consider a small amount of electricity in the dielectric at P. We can readily picture the small quantity of electricity as being thrown into a state of rotation by the onward movement of the lines of force; the electricity at all points equally distant from P, and in a plane perpendicular to the wire, would be in the same condition; this would give rise to circular filaments of whirls about the wire, each one of which might be represented by an ordinary smoke-ring; this condition of the field would last as long as electricity flows from A to B, or as long as it carries a current. Whether this be true or not, the field about a wire bearing a current possesses the property of acting upon magnets, and therefore it is called an *electromagnetic field* of force. This field of force is exactly the same as that about a magnet. If a sheet of paper be pierced with a hole in the center, and a conductor passed through the hole, as in Fig. 33, the field of force about the wire, when it carries a current, may be mapped out by fine wire-iron fil-

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ings sprinkled on the paper. When the paper is gently tapped, the filings, which may be considered as small magnets, arrange themselves in circles, concentric with the wire. A magnet-pole placed at P (Fig. 33) would be moved around the circle through P in a direction depending on the kind of pole and the direction of the current.

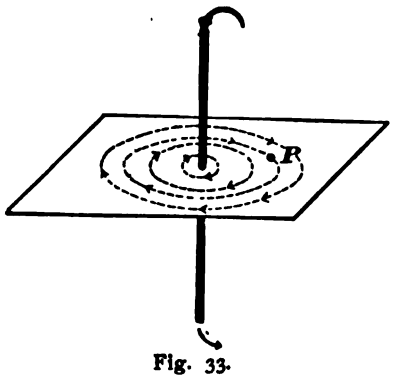

Fig. 33.

§ 47a. DIRECTIONS AND INTENSITY OF THE ELECTROMAGNETIC FIELD. The direction of the force at any point in an electro-magnetic field is defined as the direction in which a north-seeking magnet-pole tends to move when placed at that point. The direction of the force can readily be found when the direction of the current is known, by remembering the following simple analogy: Suppose an ordinary watch to be pierced by a hole through its center, and perpendicular to its face; imagine the wire to pass through this hole so that the current will enter the face of the watch, and leave at the back. The direction in which the north-seeking pole would move around the wire is the same as that in which the hands of the watch move.

The intensity of the electro-magnetic field at any point is defined as the force in dynes exerted upon unit positive pole when placed at the point. Unit pole is a small magnet-pole of such a strength that it will repel a like pole with unit force (one dyne) when placed at unit distance (1 c.m.) from it.

§ 48. REPRESENTATION OF THE ELECTROMAGNETIC FIELD BY LINES OF FORCE. Fig. 34 shows

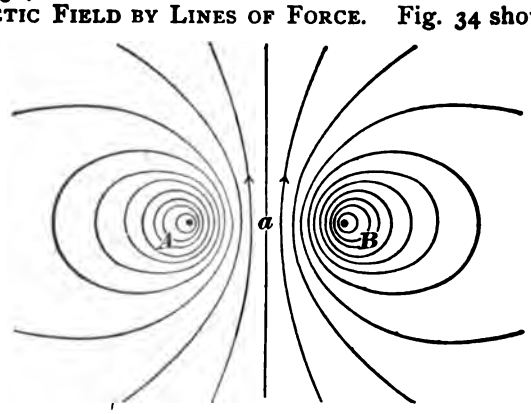

Fig. 34.

the lines of force in the field about a circular ring bearing a current. The plane of the paper is perpendicular to the plane of the ring, and passes through its center; the current passes down at A and up at B.

§ 49. INTENSITY OF THE FIELD AT THE CENTER OF A CIRCLE. The intensity of the magnetic field at any point is directly proportional to the strength of the current producing the field, and the length of the conductor, if very short as compared with the distance of the point from the conductor, and inversely proportional to the square of the distance of the element of current from the point.

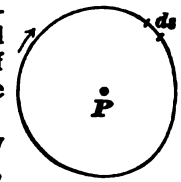

Fig. 35.

In Fig. 35 let I be the intensity of current flowing in the circle, and P a point at the center; ds is a small length of the conductor, and d its distance from the point. Then the intensity of the magnetic field at P is $f = \frac{KIds}{d^2}$ where K is a constant depending upon the unit current used. If P is at the center of the circle, the intensity at this point will be

$$f = \frac{KI\Sigma ds}{r^2}$$

$$\Sigma ds = 2\pi r$$

$$\text{hence} \qquad f = \frac{KI \cdot 2\pi r}{r^2} = \frac{KI \cdot 2\pi}{r}$$

If the current be defined as in the next article, K is unity, and $f = \frac{2\pi I}{r}$.

§ 50. UNIT CURRENT. The magnetic field about a conductor in which a current is flowing enables us to select a definite current to use as a unit or standard current.

If the conductor, Fig. 35, is a circle of unit-radius, and the current flowing is such that each unit length of the conductor exerts unit force on unit magnet-pole placed at the center, the current is said to be of unit strength. If the force at the center due to unit length of the conductor is unity, that due to the whole circumference is 2π. If the current is not unity, but I, and the radius, any radius, r, the electromagnetic intensity at the center is $f = \frac{2\pi rI}{r^2}$ or $\frac{2\pi I}{r}$. Hence K in the preceding article is unity, if the above unit of current is chosen.

§ 51. GALVANOMETERS. The action of the electromagnetic field upon a magnet, or the mutual action between two such fields, serve as a basis for current measurement.

Let *ab* (Fig. 36) be a circle bearing a current I; SN is a small magnet suspended at the center of the circle, and short as compared with the diameter of the circle. Imagine the plane of the circle as vertical and placed to coincide with the vertical plane through the magnet when there is no current through the circle, or coil as it is usually called.

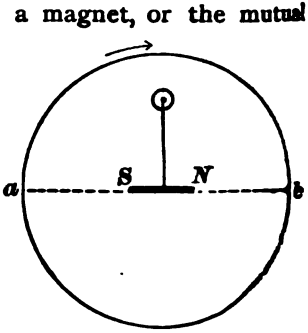

FIG. 36.

The magnet is suspended from the point O by a light fiber which is without torsion as nearly as possible, and hangs nearly north and south when

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there is no force acting on it, other than that due to the earth's magnetism. If a current is sent through the wire from south to north along the upper side of the coil, the north pole of the needle will be urged to the west and the south pole to the east.

Let NS (Fig. 37) be the position of the needle before deflection and N′S′ that after. The intensity of the magnetic field at any point due to the earth's magnetism is expressed in the same manner as the field due to a current; i.e., by the force exerted upon unit-pole placed at the point. Furthermore, it is only that component of the earth's field lying in the horizontal plane which can act to bring the needle back to its initial position when deflected. If the pole-strength of the needle is not unity, but m, then the force acting on each pole of the needle is Hm when H is the horizontal component of the magnetic field at the point before the current flows in the coil. The force f, due to the current, is practically perpendicular to the plane of the coil in the small region occupied by the magnet, and has for its value $f = \frac{2\pi m I}{r}$, where m is the pole-strength of the needle, I the current, and r the radius of the coil. Consider, first, the force Hm. It is evident that only that component of it perpendicular to the needle can rotate it about the point of suspension. The value of this component is $Hm \cos \alpha$. Similarly, only the component of the force f, which is perpendicular to the needle is to be taken into account; this component is $\frac{2\pi m I}{r} \cos \beta$; now, when the needle is acted upon by both forces, it will come to rest at the point where these components are equal; at this point we have $\frac{2\pi m I}{r} \cos \beta = Hm \cos \alpha$, but the angle α is equal to θ, the deflection, and β is the complement of θ; hence $\cos \alpha = \sin \theta$ and $\cos \beta = \cos \theta$; hence we may write, $\frac{2\pi m I}{r} \cos \theta = Hm \sin \theta$, or $I = H \frac{r}{2\pi} \tan \theta$. If the coil have n turns close together, and n is not large, then the value of the current is $I = H \frac{r}{2\pi n} \tan \theta$. It will be noticed that H is a force which can be measured, and is practically constant during any one measurement and the quantity $\frac{r}{2\pi n}$ is made up of constants; hence the current is proportional to the tangent of the angle of deflection, and the instrument is called a tangent galvanometer. Such an instrument is useful only to determine the absolute value of the current; i.e., measure it directly with the unit we have defined. The chief objection to its use is the variability of H For practical purposes other forms are used, the principal types of which are,—

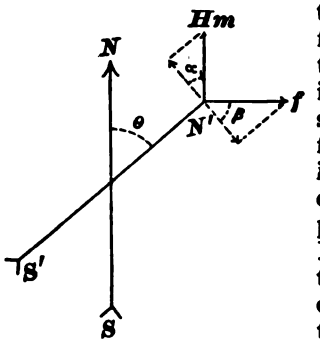

FIG. 37.

1. Galvanometers similar to the tangent galvanometer, in that they have a fixed coil and movable magnet.

2. Those in which the magnet is fixed in position, and the coil moves.

3. Electrodynamometers, instruments in which both fields are produced by the current, one of the coils being suspended or movable.

§ 52. SUSPENDED-NEEDLE GALVANOMETERS. Fig. 38 shows the construction of an ordinary

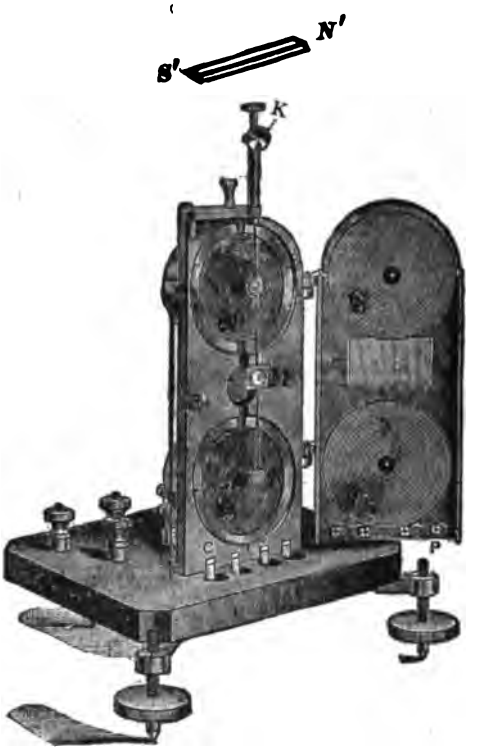

Fig. 38.

mirror or reflecting galvanometer. There are two small magnets, N and S, connected by a light aluminium rod, to the center of which is attached the mirror, M. The magnets, connecting-rod and mirror constitute the system, or suspension as it is sometimes called. Each of the magnets is built up of several small bits of magnetized steel wire, one fourth to three eighths of an inch long. The poles of the two magnets are reversed, as shown in the figure, and the upper magnet is the stronger; hence the force tending to set the system north and south is the difference between the strength of the two needles. If the needles were of the same strength, the system would remain in any position. Such a system is called an *astatic system*. N′S′ is a magnet placed on the case of the instrument, and above the system. (The case is not shown.) This magnet can be moved up and down, and rotated about a vertical axis. In the position shown, N′S′ creates a magnetic field at the upper needle which is opposite to that of the earth at the same point; hence if N′S′ is lowered to a certain point, it neutralizes the earth's field, and the system becomes as nearly

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astatic as we choose to make it. In this condition the galvanometer is extremely sensitive, since the force opposing the rotation of the system is very small. It is evident that if the magnet N′S′ is reversed, the galvanometer becomes less sensitive, as then the earth's field is increased. N′S′ is called the control-magnet; if the system consisted of but one magnet, it would be controlled in the same manner. A, B, C and D are four coils connected in such a way, that when a current is sent through them each one deflects the system in the same direction. In the figure, C and D are thrown open to show the suspension. The system is suspended from K by a fine silk or quartz fiber with little torsion, and the deflections are read by a spot of light reflected from the mirror, M, to a scale, or with a telescope and scale.

§ 53. SUSPENDED-COIL GALVANOMETERS. Since the action of a current upon a magnet is mutual, it is immaterial which is fixed and which is movable, except from practical considerations.

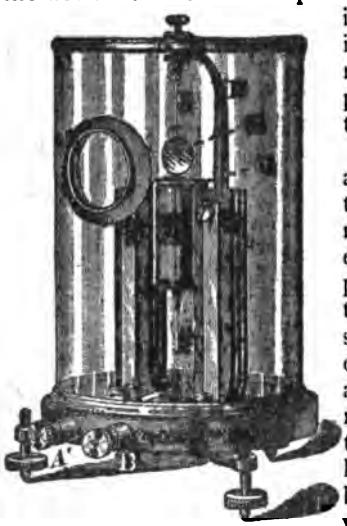

Fig. 39.

Fig. 39 represents a common form of this type. The current to be measured enters the binding, post A, passes under the base of the instrument to the foot of the post P, up P and down the fine metal wire, S, through the coil, C, and the lower wire, S′, to the binding-post, B. The wires, S and S′, are very fine, and their elasticity of torsion provides the force against which the coil acts when it rotates. N and S are the poles of a large magnet, between which the coil C is suspended. I is a soft iron core supported from behind. This is often omitted, and the coil made more narrow. The effect of the soft iron core is to strengthen the magnetic field in which the wires of the coil move. The deflection is read by means of the mirror, in connection with a lamp or telescope, and scale.

Instruments built upon this principle are known as D'Arsonval galvanometers; the advantage of this type over others is, that, having a strong magnetic field of its own, it can be used in any position, and is only slightly affected by the presence of magnetic material in its neighborhood. The suspending-wire must be strong enough to support the coil and large enough to carry the current, and though we make the wire as small as possible, it still has considerable torsion, as compared with the fine silk or quartz fibers used in the suspended-magnet instrument.

The well-known Weston ammeters and voltmeters are instruments of this type; the coil is supported on an axis which turns in jeweled bearings, and the current is led in and out of the coil by two coiled springs on the axis, like the hairspring of a watch. The springs also furnish the force against which the coil acts.

§ 54. ACTION OF CURRENTS UPON EACH OTHER. Let A (Fig. 40) represent a conductor and its magnetic field due to a current flowing in it. A line of magnetic force behaves as if it were a stretched spiral spring rotating about the axis of the spiral, and having its ends joined to form a closed curve about the conductor. A small portion of a line is represented in this manner, at B. Suppose the conductor, A, to be divided longitudinally into two parallel portions, and these separated as shown at C and D. Some of the lines nearest the conductor would part as C and D are separated, and form closed curves around the separate conductors. The other lines would remain as closed curves, somewhat elongated, but enveloping both conductors and exerting a force tending to draw the wires together again. Since the current in the two portions is flowing in the same direction, it follows that *currents flowing in parallel conductors and in the same direction attract each other.* If the currents in parallel conductors flow in opposite directions, the lines, rotating, as it were, in opposite directions, cannot coalesce to form closed curves around both conductors, but are crowded between them, as at E and F, thus forcing the wires apart. Hence *parallel currents flowing in opposite directions repel each other.*

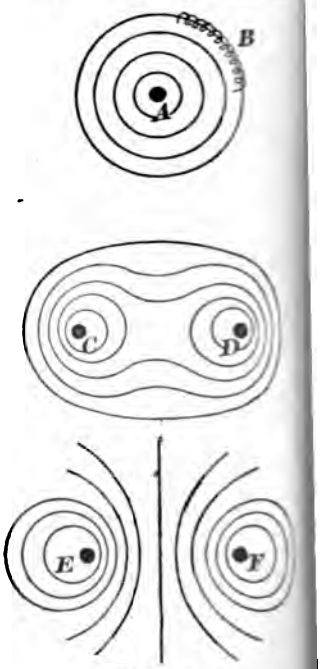

Fig. 40.

It can be shown that the force between parallel currents is directly proportional to the product of the current strength, to the length of the portions taken, and inversely proportional to the distance between them.

Instruments for measuring current-intensity which depend upon the mutual attraction or repulsion by currents are called electrodynamometers. Several forms have been devised, but those in common use consist either of a coil suspended in the field of another, or a coil so arranged that the force of attraction can be balanced directly against the force of gravity.

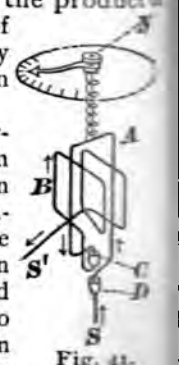

Fig. 41.

Fig. 41 illustrates those of the first class. The

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current enters at S, passes through the coil, A, to the mercury-cup, C, thence through the coil, B, and out at S′.

When a current passes, the movable coil tends to rotate about a vertical axis, and set itself in the plane of the fixed coil, B. The head, N, is then turned until the coil is brought back to its initial position.

The force of torsion exerted by the spring is proportional to the angle moved through. Since the same current flows in each coil, doubling the current would make the attraction four times as great, etc. Hence the square of the current is proportional to the number of divisions moved through by the index in order to bring the coil back to zero. If I is the current and D the number of divisions, and A a constant depending on the winding of the coil and the helix, then $I^2 = A^2D$.

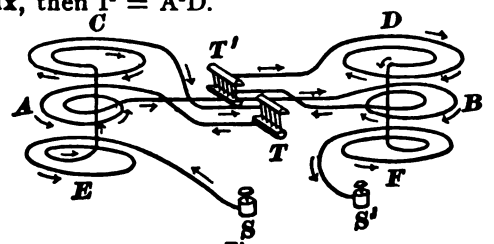

Fig. 42.

Fig. 42 represents the windings of an instrument in which the force between the currents acts against the force of gravity. The current enters at S, passes through the coil A, up to B, and through B in the reverse direction, and so on through the system, as indicated by the arrows. T and T′ are flexible conducting-suspensions; hence the coils A and B form a balance-beam supported at T and T′. When a current is sent through the system, the coils C, D, E and F all tend to turn the balance-beam in the same direction; this force is opposed by weights added to one end of the beam, or by a sliding counterpoise. The value of the current is found from the amount of weight required to restore equilibrium.

This form of the instrument is due to Lord Kelvin, and they are known as the *Kelvin current balances.*

III. Electromagnetism.

§ 55. Electromagnetic Intensity. We have seen that the intensity of the magnetic field

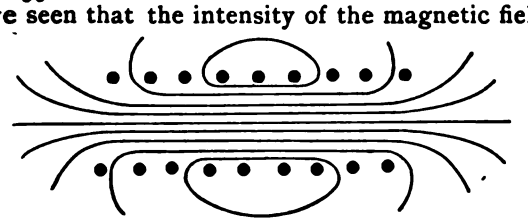
Fig. 43.

at the center of a circular current is $\frac{2\pi I}{r}$. If a number of these circles are placed side by side, as shown in section (Fig. 43), the lines of force will pass through them parallel to a line through the center of the circles. A wire wound in the form of a helix or solenoid, and carrying a current, would be practically the same thing. The magnetic field inside of a long solenoid is uniform, except at points near the ends, and its intensity can be shown mathematically to be $4\pi nI$, or $\frac{4\pi nI}{10}$, in case the current is measured in amperes, in which I is the strength of current and n the number of turns in the helix per unit of its length. This quantity is also called the magnetizing force of the helix, and is designated by the symbol **H**.

The intensity of the magnetizing force **H** is often expressed as the number of lines per unit of area at the point.

§ 56. Effect of Iron in the Field. If, instead of air, soft iron is placed in the helix, as shown in

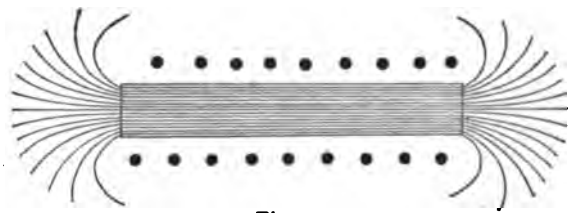
Fig. 44.

Fig. 44, it is found that a great many more lines are set up through the iron than in air; that is to say, iron is a more suitable medium for the formation of the magnetic lines of force than air. Other substances, such as cast-iron, steel and nickel, are more or less suitable for the medium, but pure iron excels all other substances. The number of lines per unit of area in the iron is called the induction, and is designated by **B**.

§ 57. Permeability. Since the capacity of substances for magnetic lines vary, it will be necessary to take some one substance as a standard and compare others with it; hence air is taken as this standard. This property of substance is termed *permeability* and is expressed by the character μ.

If **H** is the number of lines per unit area in air, and **B** the number per unit-area when iron is the medium, then $\mu = \frac{B}{H}$

Fig. 45 shows the effect of placing a sphere of iron in a uniform magnetic field. Since the iron has a greater permeability than air, the lines concentrate in the iron part of the field. If the substance placed in the field has a less permeability than air, the effect would be that shown in Fig. 46.

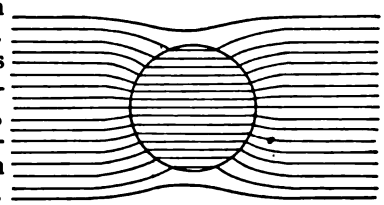
Fig. 45.

§ 58. Magnetic Susceptibility. The magnetic property of a substance is sometimes expressed in another way.

When iron is put in the helix (Fig. 44), it becomes a magnet, with north and south poles; the intensity of magnetization is the number of unit poles

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per square unit of the polar surface. This intensity, or, what is the same thing, the pole-strength per square unit, is represented by **I**.

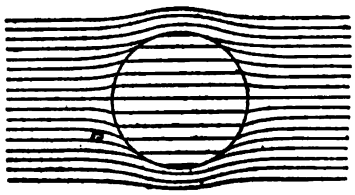

Fig. 46.

The ratio of the intensity of magnetization to that of the field producing it is called the susceptibility of the substance; it is denoted by the symbol k. Therefore, $k = \frac{I}{H}$.

§ 59. Relation between μ and k. A unit magnet-pole placed at the center of an imaginary sphere of unit radius would produce unit intensity of field at all points on the sphere. Since the surface of a sphere of unit radius is 4π, the total number of lines of force proceeding from any unit magnet-pole is equal to 4π.

Then if **I** is the number of unit poles per square unit of the face N (Fig. 47), $4\pi\mathbf{I}$ is the number of lines through the same area due to the polarity of the iron. The intensity of the field before the rod was inserted is **H**; hence the total number of lines per square unit, which has been called **B**, is also $(\mathbf{H} + 4\pi\mathbf{I})$. Hence $\mathbf{B} = \mathbf{H} + 4\pi\mathbf{I}$; dividing by **H** we get $\frac{\mathbf{B}}{\mathbf{H}} = 1 + 4\pi\frac{\mathbf{I}}{\mathbf{H}}$ or $\mu = 1 + 4\pi k$.

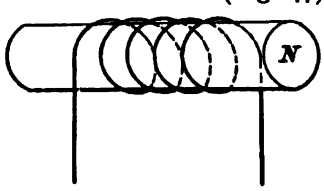

Fig. 47.

§ 60. Paramagnetic and Diamagnetic Substances. It has long been known that some substances, when suspended in the magnetic field, come to rest with their longest dimension at right angles to the field; such substances are called diamagnetic substances. Bismuth and many liquids are examples. Substances that behave like iron are called paramagnetic substances.

A clear conception of permeability enables one to understand this action. Let *mm* (Fig. 48) be a small bar of a substance having a permeability greater than air, and placed in the field between the two magnet-poles N and S. Since the permeability of the substance is greater than air, a line of force, as *ab*, will tend to take the path, having as much of the substance and as little air as possible, as shown in the upper sketch of the figure. But if the body *mm* is free to move, and rotates about its center, the lines will set themselves straight again and pull the body into the line *ab*.

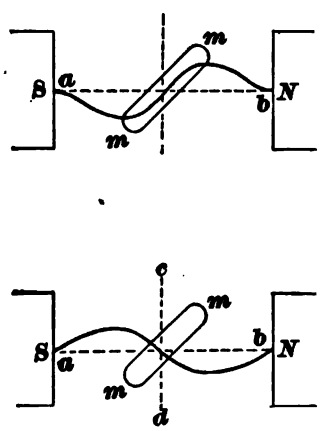

Fig. 48.

If, however, the substance has less permeability than air, a line, as *ab*, will set itself through more air and less substance; and, as before, if the body is free to rotate the lines, setting themselves straight will set the body along the line *cd*.

§ 61. Method of Representing Magnetic Properties. The relation of the magnetic force, **H**, to the induction, **B**, is best represented by a curve, as in Fig. 49. The substance in the form of a bar or ring forms the core of a helix of known length and windings. The current in the helix is given different values, and the magnetizing force, **H**, in each case is calculated by the formula given in § 55. The value of the induction, **B**, is measured for each value of **H**, and the result plotted

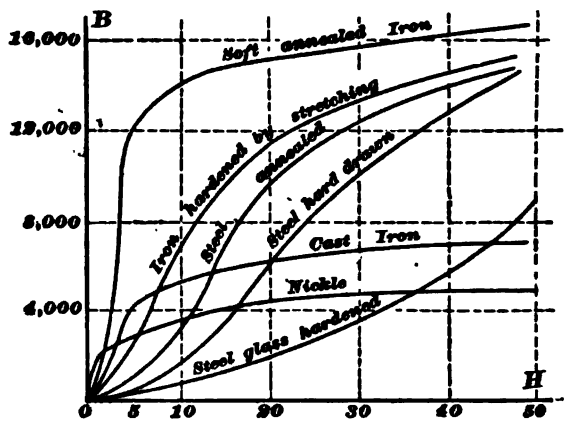

Fig. 49.

in the form of a curve. If the induction, **B**, increased in direct proportion with the magnetizing force, **H**, the curve would become a straight line. It will be noticed that in the case of soft iron the curve rises rapidly, bends over, and then rises very slowly. Beyond the bend, the iron is said to be approaching saturation, and is saturated when an increase of **H** causes the same increase in **B**. Hence we see that the effect of iron in the field is limited, and the permeability of a substance is not a constant, but depends upon the induction. At the point of saturation, **B** is equal to **H**, and the permeability is unity, or that of air.

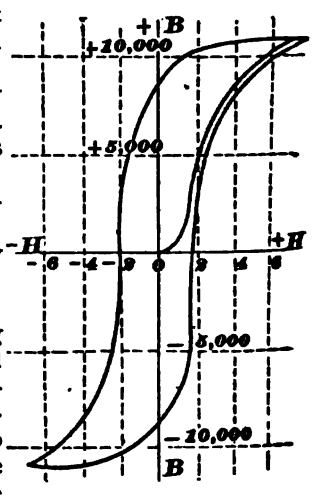

Fig. 50.

§ 62. Hysteresis. If, in the preceding article, **H** is increased step by step to a definite value, then decreased through o to an equal value in the other direction (the current is reversed at o), and then again increased to o, the curve will not be the same for the increasing values

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of H as for the same values when H is decreasing. Fig. 50 shows such a curve. It will be seen that the induction lags behind the magnetizing force. For example, when H is increasing from its lowest value,—H, and reaches o, the induction is not o, but nearly —9000. This phenomenon is known as *magnetic hysteresis*. The area inclosed by the curve has been shown to represent the amount of heat generated during the cycle, which is lost as far as magnetic energy is concerned.

§ 63. The Magnetic Circuit. Since magnetic lines always exist as closed curves, their path is called the magnetic circuit. In Fig. 44 the magnetic circuit is through the iron inside of the helix and through air outside of it.

The magnetic circuit is unlike the electric circuit, in that the magnetic lines cannot be confined totally to any one circuit, since there is no material in which the magnetic lines cannot exist.

§ 64. Reluctance. The reluctance of a bar of magnetic substance is defined as the resistance it offers to the flow of magnetic lines. If l is the length of the bar, S its cross-section, and μ the permeability of the material, then the reluctance of the bar is $R = \frac{l}{\mu S}$. If l and S are unity, the reluctance becomes $\frac{1}{\mu}$, and this should be termed the *specific reluctance* of the material. The terms are used to express the property of magnetic resistance in exactly the same way that resistance and specific resistance are used to express electrical resistance.

§ 65. Magneto-Motive Force. The electromotive force in an electric circuit is the work done by the electric force in urging unit-quantity of electricity completely around that circuit.

Magneto-motive force is defined in the same manner; i.e., the work required to carry unit magnet-pole completely around the magnetic circuit. Inside the spiral of Fig. 43 the intensity is $4\pi nI$. The intensity outside is very small, so that the work done in carrying unit-pole around the circuit is the product of the force into the distance, which is equal to $4\pi nIL$, or $\frac{4\pi nIL}{10}$ in case amperes are used, in which L is the length of the spiral. Since nL is the total number of turns in the spiral, the above expressions may be written, $4\pi NI$ or $\frac{4\pi NI}{10}$, in which N is the total number of turns of wire.

The product, NI, is called the *ampere-turns* of the coil, when I is expressed in amperes.

§ 66. Law of the Magnetic Circuit. The law of the magnetic circuit is similar to Ohm's law for the electric circuit, and is written

$$\text{Magnetic flow} = \frac{\text{Magneto-motive force}}{\text{Reluctance}}$$

Let the poles of the electromagnet shown in Fig. 51 be connected by a bar of iron (called the armature), but separated from it by two air-gaps. The magnetic circuit then consists of three parts, —the core, the armature and the air-spaces. Let l_c, l_a and l_g be the length of core, armature and one air gap; S_c, S_a and S_g the cross-section of the same parts; μ_c and μ_a the permeability of core and armature (μ for the air-gaps is unity). Then the flow of magnetic lines is

$$F = \left\{ \frac{4\pi NI}{\frac{l_c}{\mu_c S_c} + \frac{l_a}{\mu_a S_a} + \frac{2l_g}{S_g}} \right\}$$

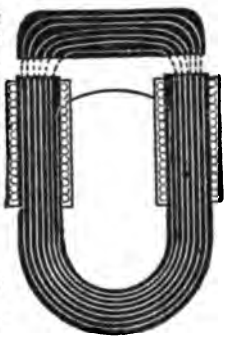

Fig. 51.

To apply the law to any particular magnetic circuit it is necessary to know the curve of magnetization for the material used. Since μ is different for difference of F, this fact makes the formula somewhat difficult to apply.

§ 67. Poles of an Electromagnet. If, when looking directly at the pole of an electromagnet the current in the helix flows around it in the same direction as the motion of the hands of a watch, the pole is a south-seeking pole; if opposite, a north-seeking pole.

§ 68. Motion in an Electromagnetic System. If any part of an electromagnetic system is movable, as, for example, an armature, the motion will always be such as to reduce the reluctance of the circuit, and hence increase the flow of lines. When the armature approaches the poles the air-gaps become less, and more lines of force traverse the circuit. (See Fig. 48.)

IV. Electromagnetic Induction.

The production of a magnetic field by an electric current is one of the many reversible processes found in natural phenomena.

If a conductor forming a part of a circuit is brought into a magnetic field, an electric current is set up in the circuit and continues as long as the intensity of the field about the wire is changing. Strictly speaking, it is an electromotive force that is induced in the circuit, and a current flows as a result of the E.M.F.

Faraday, the discoverer of this principle, could scarcely have realized its importance, as all dynamo-electric machines, induction coils, transformers and the telephone are examples of its application.

The intensity of the field about the circuit may be changed in a number of ways; as, for example, by moving a magnet near the fixed circuit, or the opposite, i.e., moving the circuit with the magnet fixed; or the circuit may be near another circuit in which a current is started, stopped or varied in intensity.

§ 69. Direction of the Induced Electromotive Force. The direction of the induced E.M.F., and consequently that of the current, may be determined by the following rule:

An increase in the number of magnetic lines passing through a circuit produces an indirect E.M.F., while a decrease in the number of lines

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produces a direct current. By direct or indirect is meant like or unlike in direction, compared with the current that produces the inducing field.

Fig. 52 represents a circuit, B, near the solenoid, A. Some of the magnetic lines due to the cur-

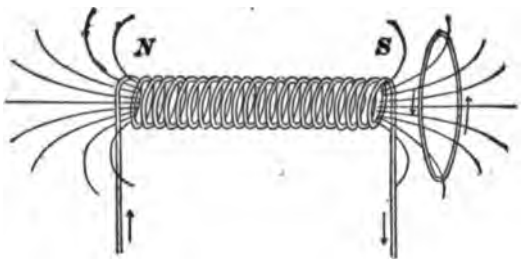

Fig. 52.

rent in A pass through the circuit B. If the current in A is increased, or the circuit brought closer to the solenoid, or a current started in the solenoid, the result in each case would be an increase of the number of lines threading through the circuit B; consequently the induced amount flows in the opposite direction to that in the solenoid. This result might have been predicted from the principle of the conservation of energy, for the three cases are equivalent to that of bringing the circuit B closer to A; in that case, if the currents were alike in direction, they would attract; hence no work would be required to bring them together, and a current would be produced without the expenditure of energy, which is impossible.

The same reasoning may be applied to the three reverse cases, which are equivalent to the separation of B from A, and produce the current which, acting upon the inducing current, resists the force producing the separation.

The solenoid of Fig. 52 may be replaced by a magnet, M, as shown in Fig. 53. The magnet

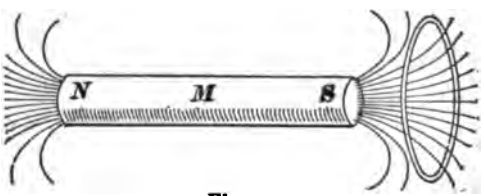

Fig. 53.

may be considered to replace the solenoid and current, which would give it the same polarity. Thus in the figure, the north pole of the magnet is toward the circuit, and the direction of a current in a solenoid which produces a north pole is opposite to the motion of the hands of a watch when viewed from a point facing the pole; therefore making the magnet stronger, bringing it nearer B, or making it a magnet would correspond to the first three cases of the solenoid, while if the magnet is made weaker, moved away, or has its magnetism destroyed, the induced current has the same direction as that in the imaginary solenoid.

§ 70. VALUE OF THE INDUCED ELECTROMOTIVE FORCE. *The value of the E.M.F. induced in any circuit is equal to the rate of change of the number of magnetic lines threading through the circuit.*

If dF is the increase in the number of lines during a small time, dt, then $E = -\frac{dF}{dt}$. The minus sign is given to the second member, since an increase in F induces a reverse E.M.F.

§ 71. MUTUAL INDUCTION. When a current is sent through a circuit which is near another, as in A (Fig. 52), the number of lines of magnetic force common to the two circuits is called their *mutual induction.*

In the case of two circuits or coils fixed as to the number of windings, distance apart and character of the magnetic circuit, the mutual induction will depend upon the current flowing in the *primary*, as the inducing current is called. If, then, the current in the primary is made unity, the number of lines common to both circuits is called the *co-efficient of mutual induction*, and is usually denoted by M. P and S (Fig. 54) are two coils, P the primary and S the secondary. Let the coils have a common core, m, of iron, so that approximately all of the lines of force set up by a current in the primary pass through the secondary. N_1 and N_2 are the number of turns in P and S respectively. Then by § 66 the magnetic flow through the primary is $F = \frac{4\pi N_1 I}{10R}$, where R is the reluctance of the iron core and I the current in amperes. But since there are N_2 turns in the secondary, and all of the lines pass through each turn, the secondary may be considered as composed of one turn, and the number of lines threading through it as $N_2F = \frac{4\pi N_1 N_2 I}{10R}$. If I is unity, $M = \frac{4\pi N_1 N_2}{10R}$. If the current in P varies at the rate $\frac{dI}{dt}$, the lines of force in S vary at the same rate, and the E.M.F. induced in the secondary S is $E_m = -M\frac{dI}{dt}$, where dI is the change in the current during a small time, dt.

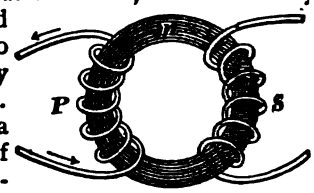

Fig. 54.

For the unit of mutual induction, see ELECTROMAGNETIC UNITS (§ 110).

§ 72. SELF-INDUCTION. When a circuit containing an E. M. F. is closed, the current does not reach its maximum value at once, but rises gradually to this value through a small time, depending upon the nature of the electric and magnetic circuit. The effect of closing the circuit is to introduce into the circuit its own growing magnetic field, which produces a reverse E.M.F., tending to retard the current. Similarly, when a circuit carrying a current is broken, its own field in dying out produces a direct E.M.F., tending to prolong the current. These effects are much more intense if the coil contains many turns, and the magnetic circuit is iron; for in that case the rate of change of the magnetic lines is greater.

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Let the coil consist of N turns of wire, then the flow of lines due to a current, I, is $F = \frac{4\pi N^2 I}{10R}$. Since there are N turns in the coil, the effect is the same as if it had but one turn and N times the above number of lines were passed through it; hence, $NF = \frac{4\pi N^2 I}{10R}$. If the current turned on or off is one C.G.S. unit, the number of lines becomes $\frac{4\pi N^2}{R}$, which is called the *inductance, or co-efficient of self-induction* of the coil.

The value of the induced E.M.F. at a time, t, after the current has been made or broken depends upon the rate at which the current changes; but since the rate at which the current changes is not uniform, the induced E.M.F. is not uniform. If in a time, dt, which is small as compared with the time required for the current to reach its maximum value, the current changes by an amount, di, the rate at which the current is changing at the time t is $\frac{di}{dt}$, and the value of the self-induced E.M.F. at the time, t, is $-L\frac{di}{dt}$. For the unit of self-induction, see ELECTROMAGNETIC UNITS (§ 110).

§ 73. VALUE OF INDUCED CURRENT. If R is the resistance of a circuit having inductance, and i the value of the current at any time, t, after the circuit is closed, then from Ohm's law Ri is the value of the E.M.F. producing the current, and is equal to the impressed E.M.F., E, minus the reverse E.M.F., $L\frac{di}{dt}$, due to the inductance; hence $Ri = E - L\frac{di}{dt}$; for a given coil, L, is constant, and the equation solved gives the value of the current, $i = I(1-\epsilon^{-\frac{Rt}{L}})$. Therefore, after a time, t, the current is less than its maximum value, I, by a quantity, $I\epsilon^{-\frac{Rt}{L}}$. The quantity $\frac{L}{R}$ is called the *time constant* of the circuit, for when $t = \frac{L}{R}$, $\frac{Rt}{L}$ is equal to unity; then $1 - \epsilon^{-\frac{Rt}{L}} = 1 - \epsilon^{-1} = \frac{\epsilon - 1}{\epsilon}$. ϵ is the base of the Napierian system of logarithms, and has for its value 2.7183, which, substituted, gives 0.632 as the value of the current at the end of a time, $\frac{L}{R}$.

Several of the more important applications of electromagnetic induction are described in the following sections.

§ 74. INDUCTION-COILS. An induction-coil is an instrument for changing the energy of a current into that of another having a higher or lower E.M.F. It consists essentially of two coils having a common magnetic circuit. The coil into which the current is sent is called the primary, and that in which a current is induced, the secondary.

If the induction-coil is to produce a high E.M.F. from a current having a low E.M.F., the primary consists of a few turns of large wire, in order that the current through it may be heavy; the secondary is made up of many turns of fine wire, the ratio of the transformation being nearly the same as the ratio between the two windings.

In the ordinary Ruhmkorff induction-coil the secondary coil is wound outside of the primary,

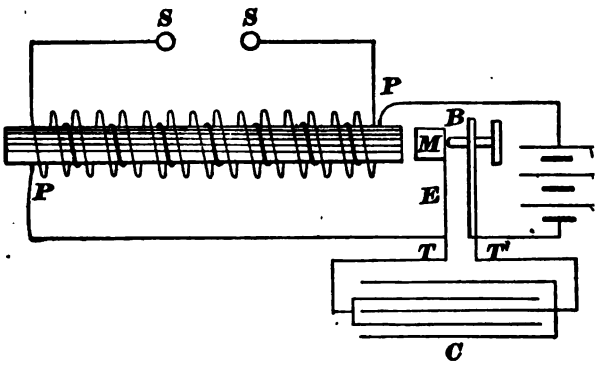

Fig. 55.

and both have the same iron core, consisting of a bundle of soft iron wires, as shown in Fig. 55, in order that a current made or broken in the primary may project the greatest possible number of lines through the secondary. Since the induced E.M.F. depends upon the change in the number of lines threading through the secondary, it is essential that the current in the primary be interrupted, or changed in value. Ordinarily, this is accomplished by means of an automatic circuit-breaker placed in circuit with the primary, as at B; when the primary circuit is closed, the core attracts the mass of iron, M, attached to the spring, E, thus breaking the circuit at B; the core, losing its magnetism, allows M to spring back, and the circuit is made again. Mechanical interrupters are also used.

The condenser, C, is connected with the points T and T'; when the primary circuit is broken, the inductance of the primary produces a direct E.M.F., which prevents the current from dying down immediately, and the current thus induced flows into and charges the condenser, C; but the condenser is free to discharge through the primary, and sends a current through it in the reverse direction, so that the flow of lines in the core is not only reduced to zero, but reversed, thus producing a more intense effect.

It has been shown that the condenser should be of such capacity that it absorbs a charge at a rate equal to the full delivery of the primary circuit during the time the circuit-breaker is opening to the maximum sparking-distance; the condenser then gives an equal reverse current through the primary, thus doubling the change in the magnetic flow, which doubles the induced E.M.F. The secondary is provided with two terminals, S and S', between which the discharge of the secondary takes place when the difference of potential reaches such a value that the air no longer insulates.

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In large coils the secondary is wound in flat spirals, well insulated from each other, as the difference of potential between adjacent wires is then not as large as when the coil is wound in layers from end to end. The primary is insulated from the secondary by a glass or rubber tube, and the turns of the secondary well insulated from each other, by boiling in melted paraffine or wax.

Spottiswood constructed a coil, the secondary of which consisted of 280 miles of wire wound in 340,000 turns, and gave a discharge through 42½ inches of air.

A current which is rapidly alternating in direction may be used in the primary, but in that case the circuit-breaker is not used. (See § 76.)

§ 75. TESLA'S INDUCTION COIL. Since the discharge of a condenser is oscillatory (see § 92), the rapidly alternating current thus produced, when sent through the primary of a properly constructed induction-coil, induces E.M.F.'s of enormous values; the discharge under these conditions is extremely beautiful and interesting. (See § 94.)

While the above principle has long been known, we are indebted to Tesla for its successful application.

The electrical connections for securing the above conditions are shown in Fig. 56.

I is an ordinary Ruhmkorff induction-coil, the interrupter of which is not shown. The terminals

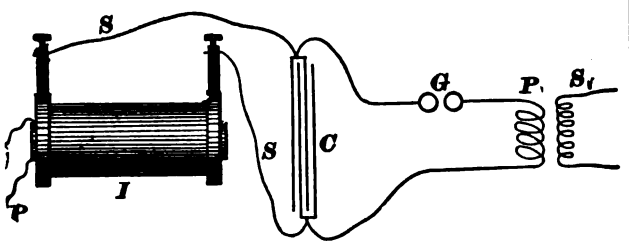

Fig. 56.

of the secondary SS are connected with the condenser, C; the terminals of the condenser are connected to the primary, P, of the *Tesla*, or *disruptive discharge coil* as it is often called. G is a spark-gap consisting of two polished metal balls a small distance apart. S_1 is the secondary of the Tesla coil. When the current in the primary, P, is broken a high E.M.F. is induced in the secondary S; this charges the condenser until the potential is sufficient to overcome the resistance of the gap, G. The air then breaks down, and the oscillatory discharge of the condenser takes place through the primary, P_1.

The construction of the Tesla coil is shown in Fig. 57. PP is the primary, wound oppositely, in two parts. In this particular coil each half of the primary is composed of four layers of twenty-four turns each, or ninety-six turns. The secondary, SS, is also in two parts of twenty-four layers, ten turns each, or 260 turns for each half. The two halves are wound oppositely and connected in series; the secondary is wound on two spools of hard rubber, RR, held apart by the hard rubber rods C. The primary is placed inside the secondary, and the terminals of both are brought to the top of the case through hard rubber tubes. The whole is then immersed in oil in a zinc-covered wooden box. The action of the coil depends largely upon the proper adjustment of the capacity, self-induction and resistance in the circuit.

§ 76. TRANSFORMER. A transformer is an induction-coil for the purpose of changing an alternating current, usually from a high to a low potential, though the reverse is sometimes the case.

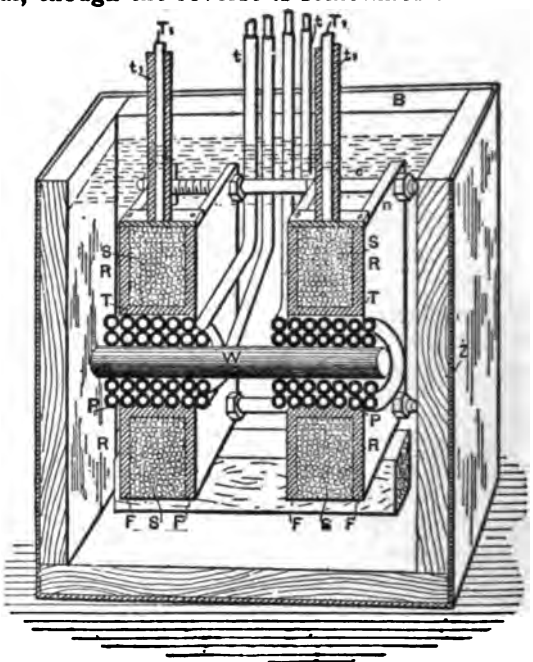

Fig. 57.

In the induction-coils previously described the object has been to transform a low to a high potential.

Faraday's ring (Fig. 54) is the earliest and the type of all transformers, and the electromotive force generated in the secondary circuit is to that employed in the primary very nearly as the relative number of turns in the two coils; if the primary has fewer turns than the secondary, it is called a "step-up" transformer, and a "step-down" transformer when the primary has the greater number of turns.

Fig. 58.

Fig. 58 shows the coils and magnetic circuit of one of the many commercial types of transformers. It will be noticed that the magnetic circuit is entirely of iron, the iron being built up of thin sheets separated by varnish or simply the oxide on the plates, in order that there may be no electric currents set up by induction in the iron core. The direction of the plate is arranged perpendicular to that in

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which the induced current would flow. The coils are placed inside of an iron box, which is then filled with oil, to further insulate the coils from each other.

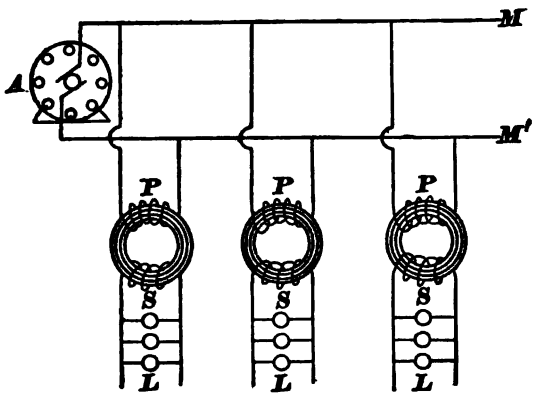

Fig. 59.

Fig. 59 shows the method of arranging transformers. M and M′ are the high potential mains leading from an alternating-current dynamo, A. The primaries, P, are connected in parallel to the mains. The incandescent lamps, L, are placed in the secondaries, S.

The regulation of a transformer is an interesting case of self and mutual induction. The primary remains in connection with the mains, yet very little current flows through it unless the secondary is closed; furthermore, the current supplied by the secondary is the correct amount needed for the number of lamps turned on.

Consider one of the transformers represented in Fig. 59, and let the secondary circuit be open; the reverse E.M.F. in P due to its self-induction almost equals the E.M.F. supplied; hence but little current flows through P. If, now, the secondary be closed, with, say, one lamp in circuit, there will be mutual induction, and this acts in opposition to the self-induction in the primary; thus more of the E.M.F. impressed upon the primary from the mains is allowed to act; or in other words, the mutual induction due to a current in the secondary opposes the self-induction of the primary almost in proportion to the current flowing in the secondary.

If more lamps are turned on, the current in the primary regulates itself to suit the load.

The rate at which electrical energy is transformed into heat in a conductor is I^2R (§ 43); therefore, if the current is doubled, the loss in the conductor is four times as great, or varies as to the square of the current. Since the energy of a current is also IV, or the strength of current times the fall of potential, the factors I and V may be varied, and the energy transmitted remain the same. For example, if I is five amperes, and V 1,000 volts, the rate at which energy is transmitted is 5,000 watts. Also, if I is ten amperes, and V 500 volts, the energy rate is 5,000. Now, if this energy is to be transmitted to a distance, through a conductor having a resistance of 2 ohms, the loss in the conductor would be, for the first case $(5)^2 \times 2 = 50$ watts; while in the second case it would be $(10)^2 \times 2 = 200$; therefore it would be more economical to use 5 amperes at 1,000 volts. There is a limit, however, to the extent this principle may be applied. It is not practical to use a voltage as high as 1,000 for incandescent lighting, on account of the danger to life, leakage, and difficulties attending the manufacture of the lamps; hence, when the electrical energy is to be distributed over distances of as much as one or two miles, the current is generated as an alternating current at, say, 1,000 volts, and changed, by means of a transformer, to a potential of 100 volts before it enters the house or place where it is to be used. The loss in transformation is slight if the transformer is properly constructed.

When very great distances are to be overcome, the current is generated at as high a potential as is practical; it is then transformed to a still higher potential by means of a step-up transformer, transmitted at this potential, and changed back again by a step-down transformer at the other end of the line.

§ 77. Rotary Transformers. A rotary transformer is not, strictly speaking, an induction-coil, but a dynamo and motor combined. The armature has two sets of windings, one of which receives the current to be transformed, and drives the machine as a motor; the other set of windings on the armature generates a current at the potential desired. Both armatures have a common axis, and rotate in the same magnetic field.

§ 78. Choking-Coil. A choking-coil is one having large self-induction, but little resistance, and used as a resistance for alternating-currents. The primary of a transformer is a good example of such a coil, when the secondary circuit is open. They are usually constructed so that the self-induction may be varied by varying the magnetic field, or the number of turns in the coil. Such a coil has the property of cutting down the current, but without the expenditure of energy which would take place were a simple resistance used.

§ 79. Dynamo Electric-Machines. Any treatment of the subject of electromagnetic induction would be incomplete without at least the elementary theory of the *dynamo electric machine*, which is by far the most important application of this principle. In the following articles no attempt is made to cover any but the most important and essential features of typical forms.

A *dynamo electric-machine*, or simply *dynamo*, may be defined as a machine for converting mechanical energy into the energy of an electric current; it consists of a series of conducting circuits, so arranged that the magnetic flow through them is continually changing. Figure 60 is a diagram of a typical dynamo. A is the armature, made of soft iron, and carrying on its surface the conductors through which the magnetic flow is made to change, and in which the current is generated. S and N are the poles of an electro-magnet, F, called the field-magnet; C is the col-

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lector, made of pieces of bare metal connected to the revolving conductors of the armature. The brushes, B, serve to connect the revolving circuits of the armature with the outside or main circuit.

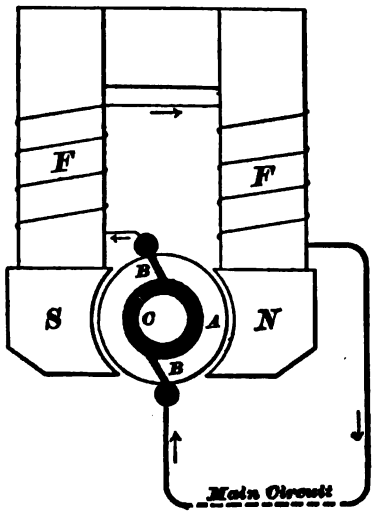

Fig. 60

A single closed circuit rotating in a uniform magnetic field, as shown in Fig. 61, constitutes

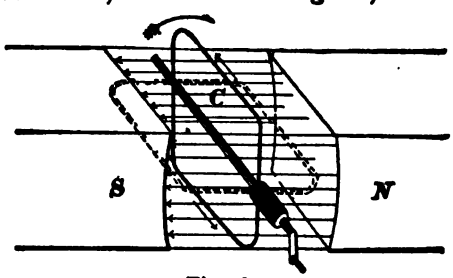

Fig. 61.

the simplest possible dynamo. Let the circuit, C, rotate in the uniform field produced by the poles, S and N. Consider one complete revolution of the upper side of the conductor, C, and represent the different positions by 1, 2, 3, etc., in Fig. 62.

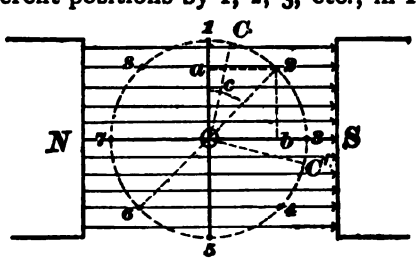

Fig. 62.

At position 1, the circuit incloses the maximum number of lines; at position 2, the number of lines is proportional to the line O*a*, the exact number being F cos θ, F being the maximum flow, and θ the angle moved through. At the position 3, the circuit does not inclose any lines; at position 4, the lines thread through from the opposite side of the loop, which is equivalent to a decrease in the flow from a maximum at 1 to a maximum at 5 in the other direction. At 7, the flow is again O, and increases to the maximum at 1; hence the magnetic flow through the circuit varies as the cosine of the angle revolved through.

The electromotive force generated in the circuit at any time does not depend on the flow, but the rate at which the flow is changing. At position 1, there is a large number of lines through the circuit, but if it be moved through a small angle, CO1, the number of lines is nearly as great as before, while at 3 the same small angle C'O3 would produce a large change in the flow, hence the E.M.F. will be 0 at 1 and 5, and a positive maximum at 3, and a negative maximum at 7.

Let the circle (Fig. 63) be divided up into a great number of small angle parts $d\theta$, and let dt be the time required for the conductor to revolve through this angle $d\theta$. The E.M.F. generated at any time is $\frac{dF}{dt}$ where dF is the change in the number of lines through the circuit in the small time, dt; ab may be considered as a straight line and proportional to dt, and ac is proportional to dF; hence the E.M.F. is $E = \frac{aC}{ab} = \frac{aO}{ad} = \sin\theta$; hence the E.M.F. varies as the sine of the angle of displacement.

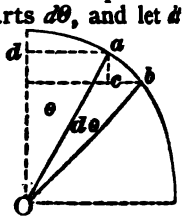

Fig. 63.

These relations can best be represented by curves, as in Fig. 64. The horizontal distances

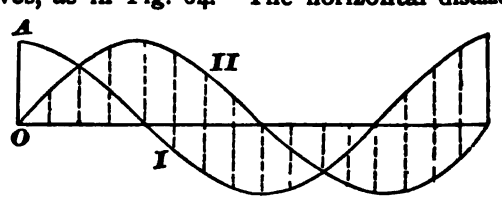

Fig. 64.

represent equal increments of time begun at 1 (Fig. 62); the vertical distances of the curve I are the values of the cosine for the different positions of the conductor, and represent the changes in the magnetic flow. The corresponding values of the sines are shown in curve II, the ordinates of which represent the induced E.M.F. The maximum values differ by 90°, or a quarter of a period. The current in such a circuit changes direction to correspond with the change in direction of the E.M.F.; such a current is called an alternating current.

In case it is desired to send the current always in the same direction, the coil terminates in two parts of a split tube, *a* and *b* (Fig. 65) insulated from each other, and from the shaft; the brushes, *c* and *d*, are placed so that they exchange contacts the same instant that the circuit reverses, thus sending the current in the same direction, but varied as before, all the curves lying above the axis, as in Fig. 66.

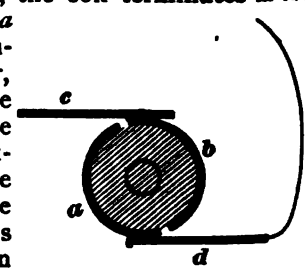

Fig. 65.

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This arrangement is called a commutator.

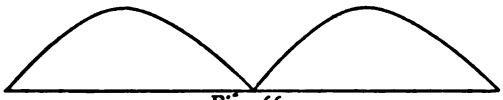

Fig. 66.

§ 80. RING ARMATURE. The gramme ring is one of the simplest, and occurs frequently in continuous current-machines. Its construction is shown diagrammatically in Fig. 67. The core, C, is a laminated iron ring; the wires are wound on the ring in one continuous spiral. In the figure the spiral is divided into eight coils, the end of one coil connected to the beginning of the next, as well as to one of the collector-bars, which are insulated from the shaft and from each other.

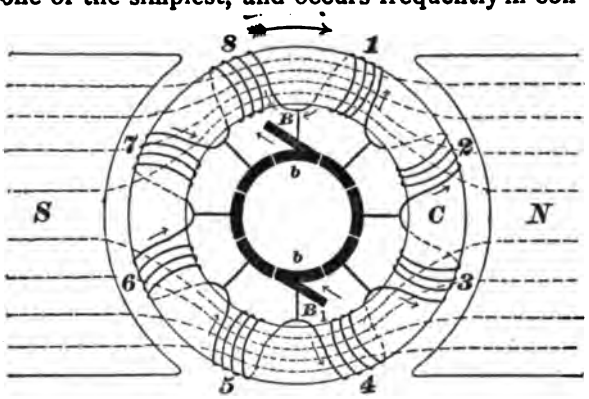

Fig. 67.

The current in coils 1, 2, 3 and 4 will be in the direction indicated by the arrows, and out through the brush, B, to the external circuits and back to the brush, B_1. If the coils 5, 6, 7 and 8 are examined, the current is found to be opposite in direction to the coils on the right half, but both currents have the common outlet, B, and inlet, B_1. The coils of each half are in series, and the two halves are in parallel, as shown in Fig. 68.

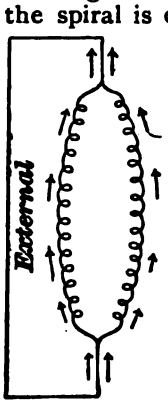

Fig. 68.

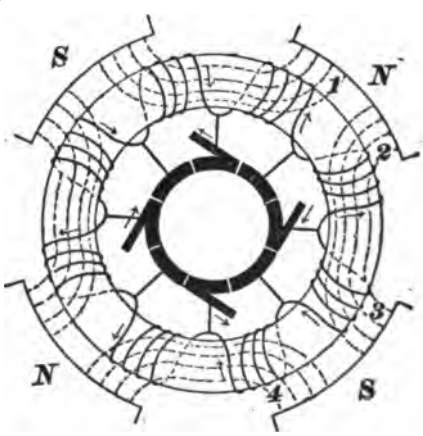

Fig. 69.

Fig. 69 shows the same type of armature, but rotating in a field due to four poles. The number of poles may be any even number; when more than two poles are used, the dynamo is said to be multipolar. The alternate brushes, being at the same potential, may be connected together, or the coils may be permanently connected across, so that two brushes suffice.

§ 81. DRUM ARMATURE. If, in Fig. 67, the coils are supposed to enlarge until they include the opposite side of the ring, the armature becomes a *drum armature;* the core would, of course, be

Fig. 70.

a laminated cylinder. Fig. 70 shows the construction of a drum armature.

§ 82. FIELD-MAGNETS. The field-magnets of a dynamo are usually made of good cast-iron. Cast-iron is not as permeable as wrought-iron, but the former is much more easily shaped, and since the armature requires a certain amount of space for the required number and size of conductors, the cross-section of the field is usually of such a size that the cast-iron cores may be enlarged enough to compensate for the poor permeability.

In many machines the cores of the field-magnet coils are made of wrought-iron, but united at the base by the cast-iron frame of the machine, and capped by cast-iron pole-pieces in order to get the required cross-section of field.

The field-magnets are excited by the current of the machine; the method of winding the coils depending upon the use to which the machine is to be put. In all cases there is enough residual magnetism to start the machine.

Fig. 60 represents a *series-wound* machine. The current leaves the upper brush, B, and is all sent through the coils of the field-magnets; that is to

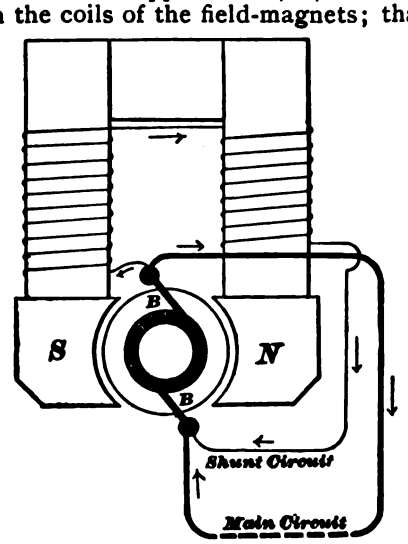

Fig. 71

say, the coils of the field-magnets are a part of the main circuit.

In the *shunt-wound* machine (Fig. 71) the field-

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magnets are wound with many turns of fine wire, and the terminals of the coil are connected directly with the brushes; hence the current arriving at the positive brush has two paths by which it may return to the negative, one around through the main circuit, the other through the field-magnet coils; the proportion of the current in each path is inversely as the resistance. Since but a small amount of the current is needed to energize the field, the coils are made of high resistance.

If, in the last case, a few turns of the main circuit are placed on the field, they become *compound-wound*. (See Fig. 72.)

§ 83. CONSTANT-CURRENT MACHINES. The load of a dynamo is usually added in one of two ways. In the first, the resistances are added in series, as in the case of arc lamps, and each lamp means so much resistance added to the main circuit. This would require that the machine should increase its potential as the load is added, or, what is the same thing, maintain a constant current. In the case of the series-wound machine, more resistance added to the main circuit would lessen the current, thus weakening the fields, when they should be made stronger. When a series-wound machine is used under these conditions, some mechanical device is used to regulate the field by cutting turns into or out of the field-magnets.

The shunt-wound machine, when an increased load means an increased resistance, would regulate, since, then, the greater the load or external resistance, the greater the current through the field-coils, but other disadvantages exclude the shunt in favor the series-wound with mechanically regulated fields for purposes requiring constant current.

§ 84. CONSTANT-POTENTIAL MACHINES. In the second case, the resistances are added in parallel; an increase of load meaning a decrease in resistance, as in incandescent-lighting and electric railways. In such cases it is required that the dynamo should supply current at a constant potential, but varying in amount.

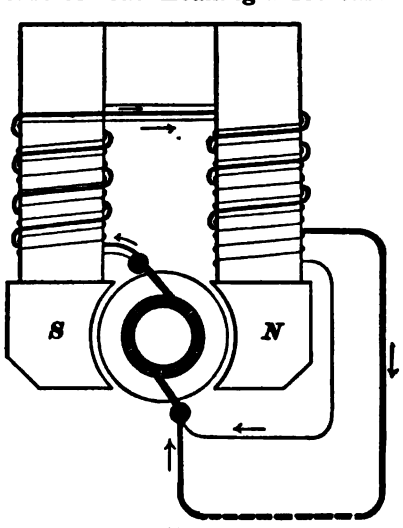

Fig. 72.

If a shunt-machine were used, a decrease of resistance in the external field would cause less current to go through the shunt, when there should be more. The current in the main circuit, however, is increased because its resistance has been decreased, but the increase is not sufficient to compensate. The drop or decrease in the shunt-current is not excessively large, and may be compensated by putting a few turns of the main circuit around the field-coils; it then becomes a compound-wound machine, and beautifully self-regulating for constant potential. (Fig. 72.)

§ 85. ALTERNATING-CURRENT DYNAMOS. An alternating-current dynamo is one in which the current is periodically changing its direction, as in the case of the current resulting from the E.M.F. generated by the single coil of Fig. 61. The time taken for one complete alternation to and fro is called the *period*, and the number of complete alternations per second is called the *frequency*. The frequency used in practice varies from 50 to 150 per second.

Since a two-pole machine gives but one alternation per revolution, alternators are multipolar, with 8 to 22 or more poles; the number of alternations per revolution of the armature is equal to the number of pairs of poles. By this means the desired number of alternations per second is obtained without increasing the speed of the armature beyond practical limits.

The arrangement of the armature-coils and field-magnet is shown diagrammatically in Fig. 73. The coils of the armature are turned to the front, in order that the method of connecting them may be seen. The two contact-rings at which the armature circuit terminate, are also turned to show the connection; the contact-rings are two complete rings insulated from the shaft, but revolving with it, the connection with the outside circuit being made with brushes, as usual. Since the poles of the field-magnet alternate north and south, the alternate coils of the armature are reversed as to the direction of the winding, so that the current induced by all poles is in the same direction at any one time; the current reverses each time the coils pass the point midway between the poles. The armature of an alternating-current dynamo

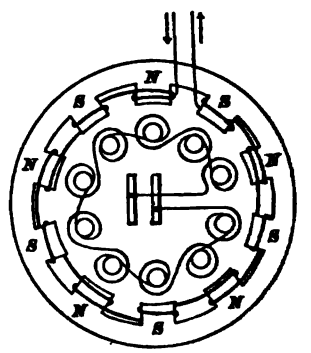

Fig. 73.

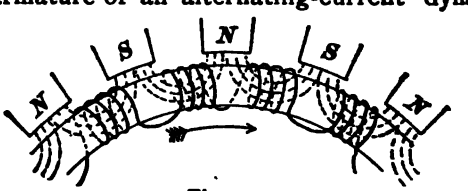

Fig. 74.

may be of either the ring, drum or disk type. Fig. 74 shows an alternating-ring armature; the sec

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tions are wound alternately right and left handed.

Fig. 75 shows a drum armature; the windings lie flat on the outside of the drum, the ends of the coils being bent over the end of the drum, as shown. The coils are often sunk in grooves along the surface of the drum.

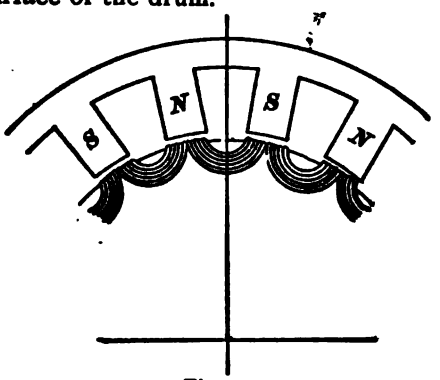

Fig. 75.

The field-magnets of alternators are usually excited by a current from some outside source, commonly a small direct-current dynamo.

Alternating-current dynamos are generally used when the current is to be transmitted over long distances, since the current can be generated at a high potential for transmission and reduced at the other end by means of transformers.

§ 86. Alternating Currents. In any circuit containing an alternating E.M.F., the value of the current at any time would be, by Ohm's law, the E.M.F. at the instant divided by the resistance of the circuit, provided there was no self-induction in the circuit; but since there is self-induction in any circuit in which the current is changing, the effective E.M.F. at any time is less than the impressed E.M.F.; hence the current does not follow the E.M.F., but reaches its maximum value later. If we consider the current as produced by the single circuit of the simple dynamo (Fig. 61), the E.M.F. may be represented as before by the sine curve, E (Fig. 76). The E.M.F. reaches its first maximum at 3 (Fig. 62); but while the E.M.F. has at that position

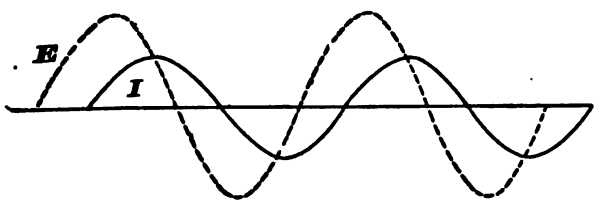

Fig. 76.

its maximum value, its rate of change is 0, and the current due to it at that instant would not be changing; and as the self-induction depends upon the rate of change of the current, the reverse E.M.F. due to self-induction would have a maximum value at the place where the impressed E.M.F. has the greatest rate of change, which is necessarily 90° from the position where it is at a maximum.

The effect of the reverse E.M.F. due to self-induction is to cause the current to lag behind the impressed E.M.F., as shown by the curve I (Fig. 76). The angle between the maximum E.M.F. and the maximum current is called the *lag*.

The effective E.M.F. producing the current must, of course, correspond to the current and its maximum value is RI, where R is the resistance of

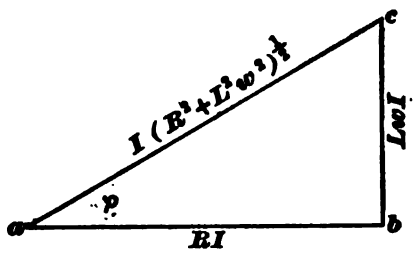

Fig. 77.

the circuit, and I the maximum current. The E.M.F. due to self-induction at any time is L times the rate at which the current changes, or $L\omega I \cos \omega t$, which gives $L\omega I$ as the maximum value, since then $\cos \omega t = 1$, where L is the coefficient of self-induction, and ω the angular velocity.

If the maximum effective and self-induced electromotive forces are represented by the two sides of a right triangle (Fig. 77), the hypothenuse will represent the maximum impressed E.M.F. Therefore we may write $E = I(R^2 + L^2\omega^2)^{\frac{1}{2}}$, or $I = \frac{E}{(R^2 + L^2\omega^2)^{\frac{1}{2}}}$. The expression $(R^2 + L^2\omega^2)^{\frac{1}{2}}$ is called the *impedence*, and is the actual resistance offered to the flow of current. The effect of the self-induction on the value of the current is equivalent to added resistance. No energy is lost in overcoming the resistance, as in the case of ohmic resistance, the machine being simply reduced in capacity. The angle c a b is evidently the angle of lag φ; hence $\tan\varphi = \frac{L\omega}{R}$.

§ 87. Virtual Volts and Amperes. Instruments for measuring alternating currents and voltages depend upon the attraction between currents, as in the case of the electrodynamometer (§ 54) or the heating effect of the current. Since either of these effects varies as the square of the current, the instruments, when used to measure alternating currents, indicate the square root of the average square of the current or voltage throughout the cycle; the values of the readings given by these instruments are called *virtual* volts and *virtual* amperes.

The virtual values exceed the arithmetical mean values by 10 per cent. A continuous current and an alternating current of equal virtual value have the same heating effect; but a continuous current equal to the arithmetical mean of the alternating one will have a smaller heating effect in the ratio of $1 : 1.23$ (or $.637^2 : .707^2$).

§ 88. Polyphase Currents. If the armature of any alternator be wound with two sets of coils, one ahead of the other, and each connected with a separate outside circuit, two alternating currents may be generated alike in period and intensity.

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but differing in the position of maximum value, or phase as it is termed, by an amount depending upon how much one set of coils is ahead of the other. Fig. 78 represents two alternating currents differing by one quarter of a period, or simply with a difference of phase of one fourth; the currents in this case are usually referred to

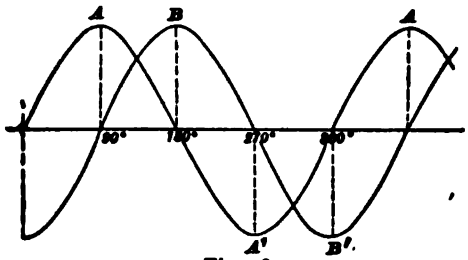

Fig. 78.

as a *two-phase* system of currents. Three currents generated by the same machine would constitute a three-phase system of currents, as shown in Fig. 79. The terms *polyphase* and *multiphase* are

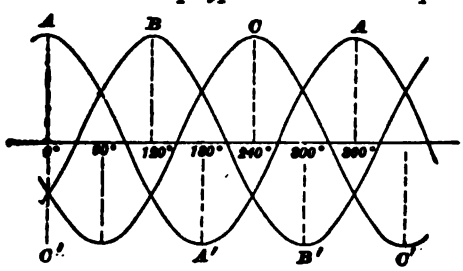

Fig. 79.

used to designate any system of more than one alternating current, each current having its own separate circuit or the equivalent, since, as will be seen later, a conductor may serve as a part of two different circuits.

§ 89. Rotary Magnetic Field. If the currents of a two-phase system are properly com-

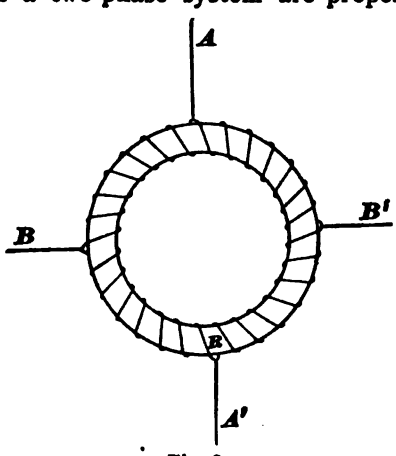

Fig. 80.

bined, they can be made to produce a *rotary magnetic field;* masses of metal and conductors, when placed in a rotary field, have currents induced in them, and the action between these currents and the field may be utilized to produce continuous rotation. Let R (Fig. 80) be a soft iron ring wound with a continuous coil. If a single alternating current is introduced at A and A', it would set up an alternating magnetic field in the ring, a north pole growing at A and a south pole at A', then dying away and reversing in direction. If a similar alternating current is introduced at B and B', but differing from the first by one fourth of a period, it would also produce an alternating magnetic field, and the effect of the two is to produce a rotary magnetic field, though the coil itself is stationary. Let three alternating currents, differing from one another by one third of a period, or 120°, be led into a ring-wound, as shown in Fig. 81, at the points A, B and C; the current flows in first at A and out by B and C, then in at B and out at C and A, then in at C and out by way of A and B, thus producing a rotating magnetic field as before. Inside the ring is placed a rotor,

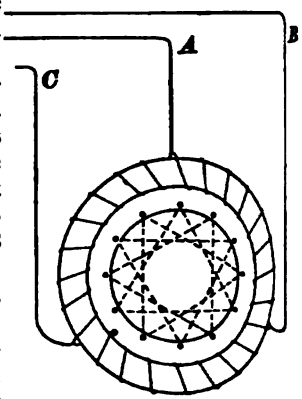

Fig. 81.

as it is termed, consisting of a laminated iron cylinder mounted upon an axis; heavy conductors are placed in grooves at the surface of the rotor and parallel to the axis of rotation; they are connected together at the ends, as shown in Fig. 81. The induced currents in this system of conductors are pulled around by the rotating field. The strength of the currents in the rotating part depends upon the relative speed of the field and rotor. If they rotated at the same speed, no current would be induced, and there would be no driving force. The rotor has no commutator or brushes, and is entirely separate from any other circuit. It receives its currents wholly by induction; such motors are termed *asynchronous motors.*

§ 90. Electrodynamic Action between Alternating Currents — Thompson's Experiments. A harmonic current induces a harmonically varying E.M.F. in an adjacent circuit, which gives rise to a current also harmonic and of the same period. The difference in phase between the two currents cannot be less than $\frac{\pi}{4}$ or greater than $\frac{\pi}{2}$, for the secondary E.M.F. is retarded by an amount $\frac{\pi}{4}$ with respect to the primary current, and the self-induction produces a further lag between 0 and $\frac{\pi}{4}$ in value.

Professor Elihu Thompson has devised a number of experiments to show that there is always repulsion between the two currents. Fig. 82 represents a large electromagnet; the core is of iron wire, well insulated, and the coil consists of a few layers of heavy wire. When a strong alternating current is sent through the coil, a simple

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circuit or ring is repelled with considerable force.

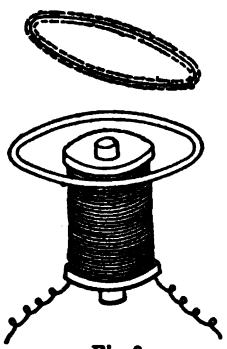

Fig 82.

The force between the magnet and ring at each instant is proportional to the strength of current equivalent to the magnet a..d that of the ring. The two currents will attract if they are in the same direction, and repel if opposite.

Let the two currents be represented by the two sine curves A and A′ (Fig. 83), having the same period, but a difference in phase of $\frac{\pi}{4}$ and with amplitudes as 4 to 1. The ordinates of the curve B are taken equal to the products of the ordi-

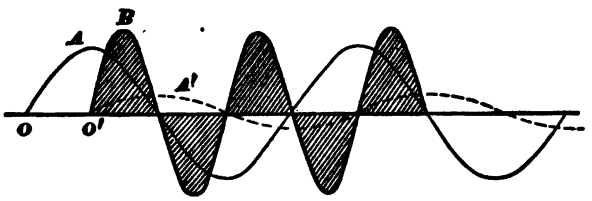

Fig. 83.

nates of A and A′ at the points, and are drawn above the line if the product is positive and below when negative. In this case the attraction

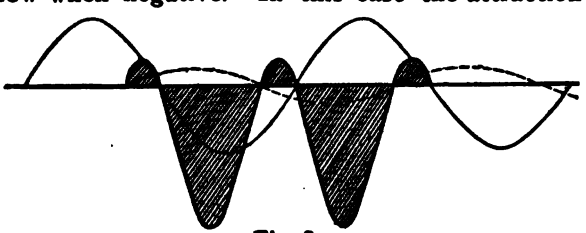

Fig. 84.

and repulsion are equal, and hence there is no effect. But if the difference of phase is greater than $\frac{\pi}{4}$, the curve B takes the form shown in Fig. 84, and the repulsion is greater than the attraction. Fig. 85 shows another experiment, in which the force of repulsion is made to produce rotation. The copper disk, B, mounted on an axis, rotates when it is placed eccentrically in reference to the alternate pole and partially screened by the disk, A. If A is movable, it will turn in the direction opposite to that of B. The rotation is caused by the repulsion of the currents induced in the metal of the disks by the magnet.

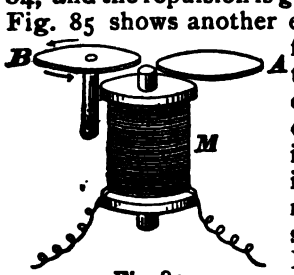

Fig. 85.

§ 91. Electrical Resonance. If a condenser having a certain period of oscillation (§ 92) in the neighborhood of a similar condenser of the same frequency, oscillations are set up in the second condenser, much the same as one tuning-fork or sounding-body may excite vibrations in another body having the same period of vibration. This phenomenon is known as *electrical resonance*, and is very important, since it suggests a wave-motion in the medium as the means by which the energy is transmitted across space.

Any electric circuit having certain relations between its self-inductive capacity and resistance has its own particular periods of electrical oscillations, and is extremely sensitive to impulses or changes in the medium about it when properly timed.

§ 92. Oscillatory Electric Discharge. If the coatings of a charged condenser or Leyden jar be connected by a conductor of small resistance there is a sudden electric current from one coating to the other, through the conductor, but, owing to the self-induction of the conductor, the current does not stop when the discharge is complete, but rushes on and charges the condenser in the opposite way; then follows a reverse discharge, which also rushes beyond the neutral point, and the condenser is once more charged in the original way. Each successive oscillation is feebler than the preceding, so that after a number of oscillations the discharge dies away, as shown in Fig. 86. The conductor between the two coatings usually contains an air-gap, the two ends of the conductor at the gap terminating in polished metal spheres (see Fig. 87); as the condenser is charged, the air-gap prevents a discharge until the potential is sufficiently high to overcome its resistance, when the air suddenly gives way and the *spark* "passes," to use the ordinary term. The effect is the same as that of suddenly introducing a conductor into the gap; the light of the spark is due to the heat generated by this passage of the current. The oscillating nature of the electric discharge may be illustrated by two tanks containing water at different levels, and suddenly connected by a pipe, with little resistance to the flow of water, as in Fig. 88.

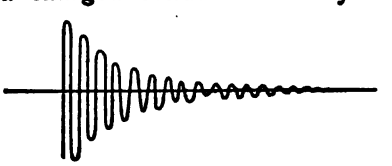

Fig. 86.

Fig. 87.

T and T′ are the tanks filled to the levels *a* and *c*, respectively; *b* is the common level when the valve at *d* is open. If the valve is suddenly opened (it might be a membrane which bursts when the level of the water in T is sufficiently above that in T′), the water in T rushes to T′; it does not stop when the common level, *b*, is reached, but rushes beyond, owing to the inertia of the water, and fills the tank T′ with more water than T; then the same thing will occur in the opposite direction, the water settling down to a common level only

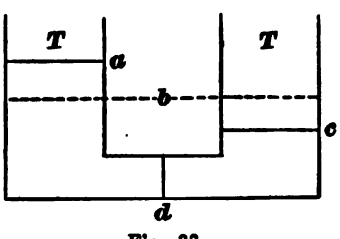

Fig. 88.

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after several oscillations. It is evident that the frequency of the oscillations will depend upon the mass of water and the resistance of the connecting pipe; if the resistance of the connecting pipe is large, which would be the case if it were a small pipe, it is easily seen that there would be no oscillation. In the analogy, the capacity of the tanks corresponds with the capacity of the condenser, the inertia of the water to self-induction, and the resistance of the connecting pipe to the electrical resistance of the conductor. If the capacity of a condenser is K (farads), the resistance of the conductor R (ohms), and its self-induction L (henries), oscillations will occur if $R<\sqrt{\frac{4L}{K}}$, and no oscillations if $R>\sqrt{\frac{4L}{K}}$; in the former case the frequency of the oscillations is given by the equation $2\pi n=\sqrt{\frac{1}{KL}-\frac{R^2}{4L^2}}$. The oscillations of an ordinary Leyden jar last only from $\frac{1}{10000}$ to $\frac{1}{1000000}$ of a second.

By using a large condenser and a well-insulated coil for resistance, Lodge succeeded in slowing down the oscillations to 400 per second; the spark then emitted a musical note. The oscillatory character of the discharge may be seen by viewing the spark with a telescope and revolving mirror.

§ 93. ELECTRIC WAVES. If a current increases in strength, the magnetic field about it increases; the circular lines of force which surround the currents (§ 46) may be pictured as enlarging and traveling outward, much the same as the ripples caused by dropping a pebble on the surface of water. When the current decreases, the circular lines decrease in diameter and return to the conductor, but if these changes in the magnetic field be extremely rapid, as when electric oscillations (§ 91) are taking place in the conductor, electromagnetic waves are set up in the space about the conductor, which travel out through the medium with the velocity of light. Maxwell predicted in 1865 that such waves existed, and put forward the theory that light-waves are very short electrical undulations, partly electric and partly magnetic. This theory is known as the *electromagnetic theory of light*, and according to it, electro-magnetic phenomena and the phenomena of light are all due to certain modes of motion in the ether, electric currents and magnetic fields being streams and whirls in the substance of the ether, while light is due to the vibrations in it. An electric displacement while taking place produces a magnetic force at right angles to itself; it also produces (by induction) an electric force, which is propagated at right angles both to the electric displacement and the magnetic force. Now it is known that, in the propagation of light, the motion or displacement of the ether is at right angles to the direction of the ray,—a striking analogy and an important piece of evidence in favor of the theory. It has been calculated in several ways that the velocity of propagation of electromagnetic disturbances is 2.9857×10^{10} centimeters per second, while the velocity of light, according to the best determinations, is 29992×10^{10} centimeters per second. From the equations for the propagation of a disturbance in an electromagnetic medium having a specific inductive capacity k (§ 36) and a permeability μ (§ 57), Maxwell showed that the velocity of propagation should be $\frac{1}{\sqrt{k\mu}}$. It follows that if light is an electromagnetic phenomenon, its velocities in two media having the same permeability, but different specific inductive capacities, ought to vary inversely, as $\sqrt{k}$. This velocity ratio is called their refractive index, hence, according to the theory, the specific inductive capacity of an ordinary transparent medium ought to be equal to the square of its refractive index. The agreement has been found to be fairly close for long waves; the following table gives the value of K and the square of the index of refraction of four common dielectrics:

	K.	(Index)^2
Flint glass	3.162	2.796
Bisulphide of carbon	1.812	2.606
Sulphur	4.151	4.024
Paraffine	2.32	2.33

Another consequence of the electromagnetic theory is, that conductors, since they dissipate the energy of currents set up in them, ought to be opaque to light; this is generally true except in the case of liquids which conduct electricity in an entirely different manner (see ELECTROLYSIS, in these Supplements); hence they do not form an exception. In some crystalline bodies the electrical conductivity is better in one direction than in another; in these the opacity to light differs accordingly. But the most commonly experimented proofs of Maxwell's theory were brought out in 1888 by Hertz, who succeeded in producing electromagnetic waves in a way which enabled him to examine their properties. He showed that while the rays are much longer than light-waves, they possess the same properties, travel at the same speed and are capable of being reflected, refracted and polarized. They also exhibit interference phenomena, the test of wave-motion. Hertz used as a source of waves an apparatus which he called an *oscillator*, or vibrator, one form

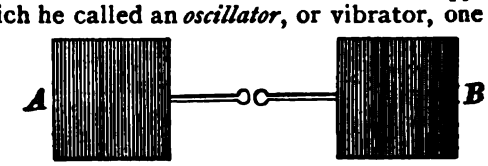

Fig. 89.

of which is shown in Fig. 89. It consists of two conductors, A and B, connected by two metal rods and a spark-gap between two small well-polished metal balls.

To detect the waves he used a *resonator*, which consisted of a simple circuit of wire (Fig. 90), having in it an adjustable spark-gap. The

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simple circuit is called a resonator from the fact that it gives the best results when the natural period of oscillation set up in it is the same as the period of oscillation in the vibrator. In one experiment the oscillator consisted of two zinc plates, A and B (Fig. 91), 40 c.m. square and mounted 60 c.m. apart; each plate is provided with a short copper wire terminating in a polished ball, the space between the two balls constituting the spark-gap. The oscillator may be considered as a simple condenser, the two plates forming the coatings. An ordinary induction-coil is connected to the oscillator, as shown; when the two

Fig. 90.

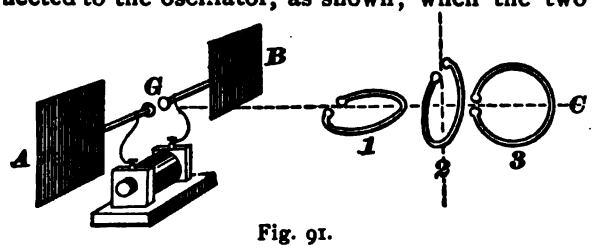

Fig. 91.

plates become charged to a high potential, the air breaks down and an oscillatory discharge takes place, consisting of a dozen or so oscillations (§ 92), and as long as these oscillations last, the wire connecting A and B through the spark-gap carries an alternating current of extremely high frequency, thus producing about the conductor an alternating magnetic field of the same frequency, which is high enough to send out waves in the ether. In this particular case the resonator was 35 c.m. in radius. Let the line of the conductor connecting A and B be the line of oscillation, and GC drawn at right angles to it, a convenient reference-line. If the resonator is placed with its center on the reference-line, and turned first in the position shown at 1, sparks pass in the spark-gap of the resonator when a discharge takes place in the oscillator, and they are brightest when the spark-gap is nearest the oscillator, for in that case the induced spark is parallel to the line of oscillation. If the resonator is turned to the position shown at 2, sparks pass when the gap is at the top and bottom of the circuit, but none if the gap is on the side. When the resonator is placed as at 3, no sparks are observed, whatever the position of the gap; we have then electrical oscillations set up in the resonator similar to those in the oscillator; and it is difficult to conceive of this effect being caused by any other than periodic disturbances in the medium, which are propagated across space, and require a finite time for their propagation; in other words, a wave motion. Hertz showed that the radiation is reflected by, using two large parabolic mirrors, as shown in Fig. 92.

The oscillator, R, was placed in the focal line of the mirror A. The detector in this case, consisting of two long wires, was placed in the focal line of the mirror B; the wires of the detector were bent back, so that the spark-gap was outside the mirror, in a position convenient to be seen. When the mirrors are placed facing each other, as shown in the figure, if this electrical action through space is in the form of waves, they should, after reflection from the first mirror, emerge as parallel rays, and, falling upon the second mirror, be concentrated at its focal line, and produce a much greater effect in the receiver than when the

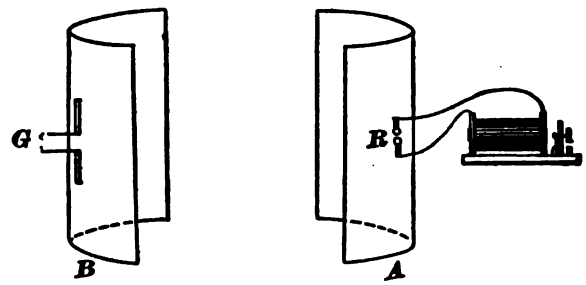

Fig. 92.

mirrors are not present; this was found to be the case. Hertz further showed that the radiations were reflected by placing the mirrors as shown in Fig. 93. No sparks passed in the detector when the vibrator was in action until a metal plate, M, was placed at the right angle to reflect the waves into the second mirror, and a slight variation of this angle caused the sparks to disappear. To

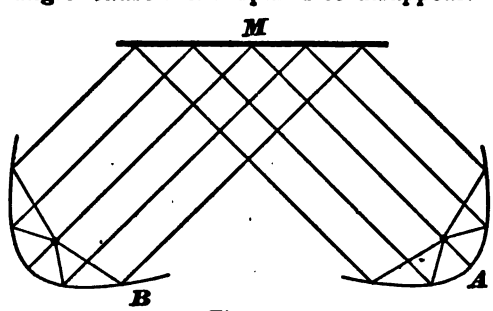

Fig. 93.

show that the electrical radiation is refracted, Hertz used a large prism of pitch one and five tenths meters high, one and two tenths meters along the edge, and a refracting angle of 30°. When the prism was placed between the two mirrors shown in Fig. 92, the second mirror had to be moved to produce a spark in the detector, thus showing that the radiation is refracted; the index of refraction of the pitch for these waves was found to be 1.69. By using a plain metal reflector at some distance from an oscillator, standing waves should be set up between the oscillator and the plate; the resonator, when placed in different position between the plate and oscillator, clearly showed the maxima and minima, or nodes and loops as they are termed. Therefore, since the electrical radiation can be shown to possess all the properties of light-waves, it is reasonable to suppose that they are disturbances of the same kind and in the same medium, but differing in wave-length, the length of the waves in Hertz's experiments being of the order of a meter in light. Recently, Hertz's experiments have been repeated by others, using waves but a few millimeters in length. Other means have been devised for detecting electric waves, such as a sensitive vacuum tube, electrometer, thin wires

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which expand when heated, and thermo-electric couples. Lodge has recently brought out the most sensitive detector of electric waves; it consists of a glass or paper tube filled with coarse iron filings. This tube is placed in circuit with a battery and galvanometer, the galvanometer showing a deflection depending upon the resistance of the filings: but if the electrical radiation is allowed to fall on the tube, the resistance of the filing, is greatly reduced, thus causing a large increase in the deflection of the galvanometer. This detector is extremely sensitive, and is capable of detecting the electric radiation when placed at a distance of several hundred feet from the oscillator. The form of the oscillator has lately been very much improved; it often consists of two small spheres, a centimeter in diameter or smaller, immersed in oil. The oil prevents the balls from tarnishing, as it is necessary to keep the surfaces between which the gap is formed continually bright. The balls are made smaller, since they will then have a smaller capacity, and the oscillations a correspondingly high frequency, thus giving a short wave-length.

§ 94. DISCHARGE AT HIGH POTENTIAL. As the potential of the current causing a disruptive discharge increases, the nature of the discharge changes its appearance. At first the spark is a thin bright line between the terminals; this line grows broader (the coil furnishing a high potential current) and becomes more like a flame as the potential of the current increases, and finally, at very high potential, breaks into numbers of small sparks, which shoot out in all directions from each terminal, totally irrespective of the relative positions of the two. When this point is reached, an exhausted bulb, such as a Crookes tube, will light up when attached to only one (it is immaterial which one) of the terminals. If two long wires, one end of each attached to each terminal of the generator, be stretched out parallel to each other (Fig. 94), the space between will be filled with showers of fine sparks, so that the whole has the appearance of a band of soft light. If two metal plates (Fig. 95) be set up parallel to each other, several feet apart, and each connected with one terminal of the generator, there will be no apparent discharge, but an exhausted bulb, when brought into the space between the plates, will glow with a soft white light. If the potential of the discharge is high enough, it can be taken through the body, not only without harm, but without sensation of any kind. The discovery of these, and many other beautiful effects of high potential discharges, and the invention of the simplest means of producing them, are due to Tesla. (See TESLA COIL, § 75.)

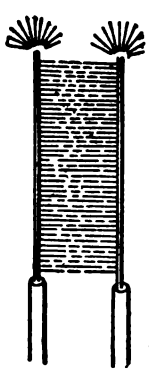

Fig. 94.

§ 95. DISCHARGE IN HIGH VACUA—CATHODE RAYS. When a disruptive discharge passes between electrodes in a rarefied gas, the appearance of the discharge at the positive and negative electrodes is so strikingly different that the discharge loses all appearance of uniformity. Around the

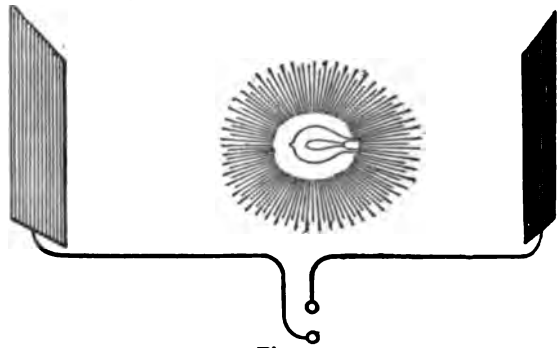

Fig. 95.

negative electrode or cathode there is a dark space, and then alternate bright and dark bands, the size and number of which depend on the degree of rarefication of the gas.

Fig. 96.

Fig. 96 represents the appearance of the discharge under these conditions. The exhausted tube is known as a *Geisler tube*. Crookes found that if the exhaustion be continued, the dark space about the cathode increased in width, and that across the space electrified molecules were projected in lines perpendicular to the surface of the electrode. If the exhaustion be pushed almost to the limit, the dark space fills the entire tube, and the streams of electrified molecules, or *cathode rays* as they are termed, impinge against the glass wall of the tube, causing the glass to emit a beautiful fluorescent light, the color depending upon the nature of the glass; the tube is then known as a *Crookes tube*. Hard German glass gives a greenish yellow light, probably due to the small amount of uranium it contains, while lead glass fluoresces with a pale blue light. A solid object placed in the path of the cathode rays protects portions of the glass, thus casting a shadow, the fluorescence only appearing on the glass where the cathode rays strike.

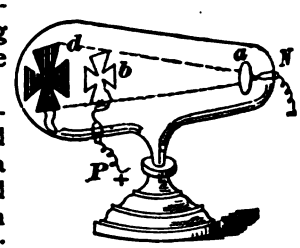

Fig. 97.

Fig. 97 shows a shadow tube; *a* is called the cathode, *b* is a plate of metal mounted inside the tube and in the path of the rays; *d* is the portion of the glass protected from the cathode rays by the screen, *b*. Diamonds, rubies, many crystals and

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salts, when placed in the path of the cathode streams, become brilliantly fluorescent (Fig. 98). Calcium tungstate, under these conditions, emits a very brilliant bluish white light; it has been proposed to utilize this light for purposes of illumination.

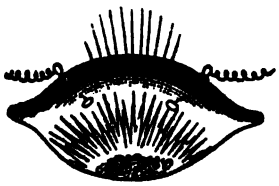

Fig. 98.

Cathode rays develop heat when they impinge against a substance; the effect can be greatly magnified by making the cathode a concave plate, as shown in Fig. 99. The rays are thus concentrated on a platinum plate, P, which becomes intensely heated and is incandescent.

The rays are attracted by a magnet, and exert a force upon the object against which they strike. This is shown by the tube in Fig. 100; the cathode is concave, and concentrates the rays on the screen *d*. A magnet placed at *m* deflects the rays so that they strike against the veins of the pivotal wheel, causing it to rotate.

Fig. 99.

If, in these tubes, the exhaustion is pushed to the extreme limit, the discharge no longer takes place through the tube, going, in preference, through many centimeters of air; hence the electric discharge cannot pass through a vacuum.

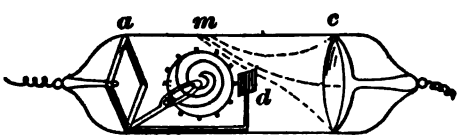

Fig. 100.

Crookes, who devised these tubes and many others, attributed the phenomena to streams of charged gaseous molecules repelled from the cathode, but their exact nature is yet a matter of doubt.

In 1892 Hertz discovered that thin films of gold are somewhat transparent to these cathode rays, —a discovery that led him to believe he could get them outside the tube, and so study their properties in air. This was actually accomplished by Lenard the following year. Lenard succeeded in getting the cathode rays outside his exhausted receiver through a small, thin window of aluminium foil. He discovered that in air the cathode rays are not a prolongation of the cathode stream in the vacuum tube, but that they spread out diffusely from the window; that they differ from light in their penetrating power, being able to pass through aluminium, but not through glass. He concluded that they were not electrical rays, as conductors were not opaque to them; he also found that their penetrating power is roughly inversely propositional to the density of the substance; that they cause fluorescence when allowed to fall on certain substances, and are capable of acting on a photographic plate; that an electrified body loses its charge when these rays are allowed to fall upon it; that they were deflected by a magnet always in a vacuum, and sometimes in air. Lenard considered these rays, which he called *cathode rays in air*, an ethereal phenomenon, and not charged particles of gas. The late discoveries of Roentgen and other physicists, working along the line he proposed, have added greatly to our knowledge of these phenomena.

§ 96. Roentgen Rays and Photography. Professor Roentgen, in 1895, made the startling discovery that when the cathode rays inside a Crookes tube impinge on the glass they originate a new form of radiation hitherto unknown. These he termed, for brevity, "X rays," on account of their unknown character; however, it is but just that they should be termed "Roentgen rays," in honor of the discoverer. Roentgen, in his original paper, ascribes to these rays the following properties: They excite fluorescence in many substances, the most sensitive being barium platino-cyanide, which showed fluorescence when placed at a distance of two meters from the tube; a screen of cardboard covered with this salt formed the detector used by Roentgen in many of his experiments. The rays possess the property of penetrating substances opaque to light, such as a book of one thousand pages, thick blocks of wood, aluminium, 15 m.m. (approximately 9-16 of an inch) thick, thick glass plates, ebonite several centimeters thick; and the hand, if held before the fluorescent screen (between it and the tube), shows only a shadow of the bones, since the flesh allows the rays to pass almost unobstructed, while the bones are opaque. It is this property of the Roentgen rays which has interested the public more than any other scientific discovery of late years. Many important applications of it have been made in surgery, and time will no doubt develop many more.

Water and several other liquids are very transparent, but the metals are in general opaque. Plates of gold, silver, copper, platinum and lead allow the rays to pass, but only when the plates are thin; the opacity of bodies for these rays seems to depend only on their density. The rays are not refracted or regularly reflected to any great extent, if at all, nor do they give rise to interference or polarization phenomena; in these respects the radiation is totally unlike ordinary light.

Photographic dry plates are sensitive to the rays, and, as a consequence, a new photography has been developed, in which the object is depicted according to the transparency of its parts to these rays, while an ordinary photograph records the reflection of ordinary light from the surface of objects. Fig. 101 shows the manner in which photographs are made with Roentgen rays.

The Crookes tube, T, is supported in any con-

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venient manner, as a stand, S; the primary of the induction coil, D, is connected to three or four

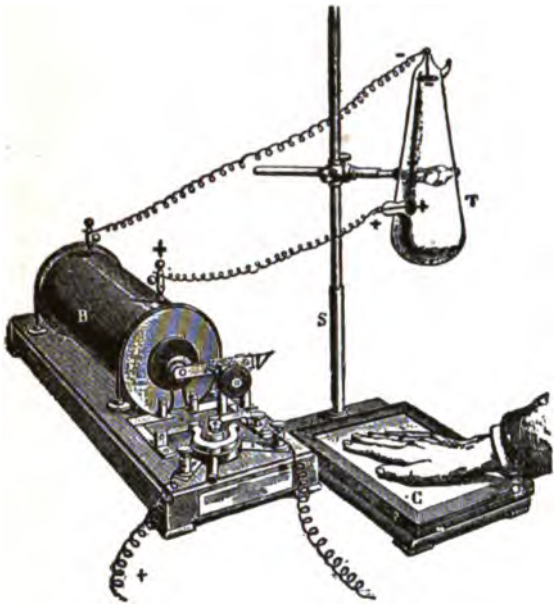

Fig. 101.

good primary or secondary cells. The secondary terminals of the coil are connected with a Crookes

Fig. 102.

tube, the negative terminal of the coil being connected with the cathode of the tube. The dry plate is inclosed in a light-tight case or holder, C, which is placed directly below the tube, and the hand or other object to be photographed is placed on the holder, as shown. When the circuit is made through the primary of the coil, the automatic vibrator, V, interrupts the current several times per second, and the secondary of the coil discharges through the tube at each interruption. The tube emits a pale greenish yellow light where the cathode rays strike, but the fluorescent light is not to be confused with the Roentgen rays, which are invisible. The time of exposure depends upon the thickness or density of the body to be photographed and the intensity of the radiation, which depends largely on the character of the tube and the current sent through

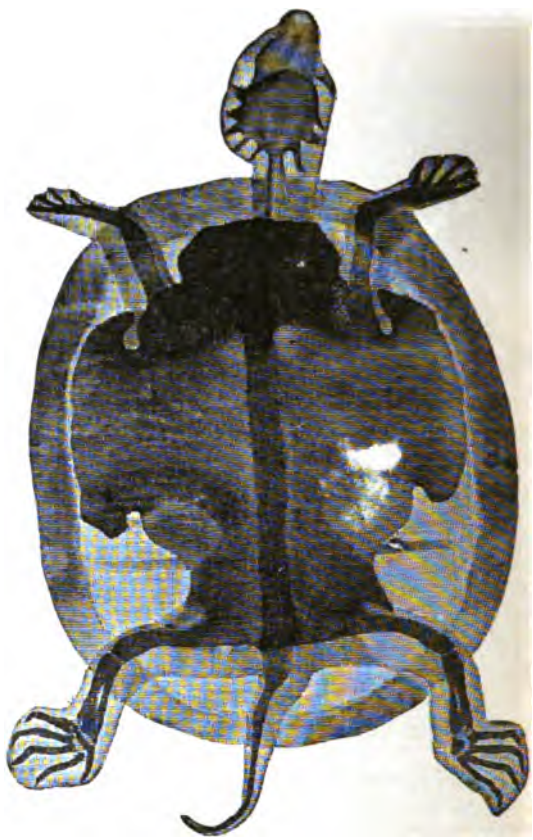

Fig. 103.

it. Slow plates appear to be about as sensitive as quick ones.

Figs. 102 and 103 show photographs taken in this manner. While the whole scientific world has, to a great extent, been interested in this discovery, and many of the ablest investigators have attempted to solve this intensely fascinating problem, very little has been added to our knowledge as to the true nature of the Roentgen rays.

Lenard's cathode rays in air must have been in part at least, Roentgen rays, since the condition under which he worked and the tests applied

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would produce and detect Roentgen rays. Whether or not Lenard's rays and Roentgen's are different modifications of the same thing remains to be determined.

It has been conclusively demonstrated that the source of the Roentgen rays is the first dense object the cathode rays strike. In the vacuum this object need not be the wall of the tube, but may be any solid placed in the path of the cathode streams. Advantage is taken of this fact in constructing tubes for photographic work. If very powerful streams are directed against the glass, it becomes heated and breaks down. A piece of platinum placed in the path, since it can withstand great heat, permits of a concentration of the cathode rays, hence a powerful source of Roentgen rays.

Fig. 104 is a Crookes tube constructed on this principle; these are called focus tubes, but it is to be understood that there is no focusing of the Roentgen rays. The concave cathode, M, concentrates the cathode rays upon the piece of platinum, M′; here the cathode rays are totally or in part changed into Roentgen rays, which radiate in all directions from the front of the platinum plate. One advantage in this form is, that the rays, coming from a small source, produce sharp photographs or shadows on the fluorescent screen.

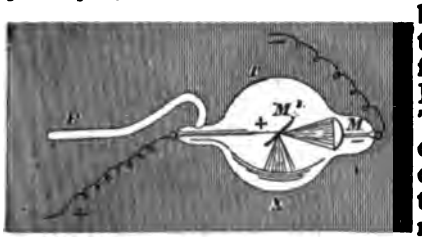

Fig. 104.

Many of the properties of Roentgen rays lead us to believe that the radiation consists of short waves in the ether, shorter than the waves of violet light; other properties indicate a long wave-length, longer than the waves of red light. Roentgen suggests that they are longitudinal waves in the ether, while others insist that it is not a wave-motion at all, though the latter view has few adherents.

The solution of the problem is looked forward to with great interest, both by the scientific and unscientific world.

§ 97. PRIMARY CELLS. A *primary* or *voltaic* cell is a device for producing electrical energy in the form of a continuous current at the expense of chemical energy. It consists usually of two plates immersed in an electrolyte. (See ELECTROLYSIS, in these Supplements). The electrolyte combines chemically with at least one of the plates, and when the combination is complete the electrical action ceases. Such a cell is termed a primary cell. If, however, after the chemical combination is complete, the resulting substances may be decomposed by an electric current, and thus put back into the original form, the cell is called a secondary cell, which is but another name for accumulator or storage-cell. (See SECONDARY CELLS, § 109).

§ 98. TYPICAL VOLTAIC CELL. If a strip of amalgamated zinc and one of pure copper be immersed in dilute sulphuric acid, it constitutes the simplest and the typical voltaic cell. (See Fig. 105.) When the plates are placed in the acid, bubbles of hydrogen collect on the zinc, but the chemical action soon ceases. If, however, the plates are connected by a conductor, a current will flow around the circuit, flowing from zinc to copper through the acid, and from copper to zinc in the conductor. The acid attacks the zinc, forming zinc sulphate, while hydrogen is freely liberated, and collects at the surface of the copper plate. For each unit of electricity that flows around the surface one electro-chemical equivalent of zinc and sulphuric acid disappears, and equivalent amounts of zinc sulphate and hydrogen are formed. The E.M.F. has already been defined as the work done by unit quantity of electricity in passing entirely around the circuit, and it is interesting to note that the E.M.F. can be predicted from the principle of conservation of energy; for the work done by the current appears as heat in the circuit, which we have seen is I^2R, where I is the strength of current and R the resistance of the circuit. It is also known that when a current flows across the juncture of two conductors, heat is developed; hence in a simple cell the heat appears in three quantities, as follows: That developed in the outside circuit of resistance, R; that developed in the cell, due to the internal resistance of the cell, r; and that developed at the juncture, which can be represented by H. Then if a current, I, flows for a time, t, the number of units of electricity that have passed around the circuit in the time is It. If e is the electro-chemical equivalent of zinc (the amount of zinc that combines with sulphuric acid to produce unit quantity of electricity (see ELECTROLYSIS, in these Supplements), Ite is the number of grams of zinc consumed in the time, t. If W is the work-equivalent of the heat produced when one gram of zinc combines with sulphuric acid to produce zinc sulphate, then the work-equivalent of the heat which would be developed by the chemical action of the cell in the time, t, is $IteW$, which must be equal to the heat developed by the current. Hence we may write

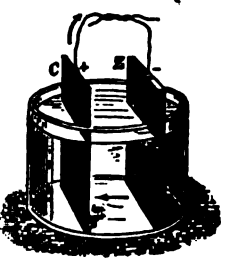

Fig. 105.

$$I^2Rt + I^2rt + HIt = IteW.$$

$$\text{or } I(R+r) = eW - H,$$

$$\text{and } I = \frac{eW - H}{(R+r)};$$

therefore $eW - H$ is the E.M.F. of the cell. The simple form of cell does not give a constant E.M.F., as some of the hydrogen produced adheres to the copper plate, forming a gaseous film, which increases the resistance of the cell, and also acts as a reverse E.M.F. The copper plate in this condition is said to be *polarized*, and is the seat of a reverse E.M.F. which reduces the theoretical E.M.F. in value. The reverse E.M.F. may be explained in the following manner: The hydrogen follows the current, and

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its atoms carry positive charges; these, arriving at the copper plate, are prevented from coming in contact at once with the plate by the film of gas already there. The layer of atoms in this condition may be considered to form one plate of a condenser and the copper plate the other, and this condenser tends to discharge around through the liquid in the reverse direction to that in which the current flows.

Polarization is usually prevented by chemical means. In the Daniell cell and similar cells, the hydrogen is utilized in the action of the cell; in other cases, substances are placed in the cell, which combine with the hydrogen or oxidize as soon as formed. Many different primary cells have been devised, but since they are all modifications of a few principal forms, which may be taken as types, the latter only will be described.

§ 99. THE DANIELL CELL. The Daniell cell is one of the oldest and best known, and may be taken as the type of all cells in which zinc and copper and copper sulphate are used. In the Daniell cell (Fig. 106) the plates are zinc and copper. The zinc rod, Z, is placed in a porous cup, P, with dilute sulphuric acid, but later the liquid in the porous cup becomes zinc sulphate. The copper plate, C, surrounds the porous cup; the space between the cup and jar is filled with a saturated solution of copper sulphate, with crystals of the same salt to replace that in solution as fast as it used up in the action of the cell.

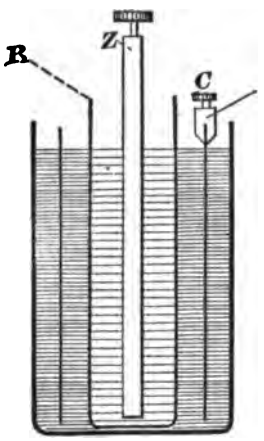

Fig. 106.

The sulphuric acid acting upon the zinc forms zinc sulphate and free hydrogen; the hydrogen, traveling with the current, passes through the porous cup to the copper sulphate, with which it combines, forming sulphuric acid, and setting free pure copper, which also travels with the current, and is deposited on the copper plate. The hydrogen, which ordinarily is detrimental to the action of the cell, becomes useful in keeping up the supply of acid to act upon the zinc. The cell may be set up with the zinc sulphate solution in the cup, instead of dilute acid. Since the copper sulphate is heavier than the zinc sulphate, the solutions are often kept separate by the action of gravity, the copper plate and copper sulphate being in the bottom of the jar, while the zinc and zinc sulphate are at the top (see Fig. 107). Such cells are called gravity cells. The solutions are also sometimes kept separate by a porous cup, which extends but half way down the jar, the bottom of the cup forming the partition.

Fig. 107.

§ 100. CALCULATION OF THE E.M.F. OF A DANIELL CELL. When one electrochemical equivalent of zinc sulphate is formed at the zinc plate, one electrochemical equivalent of sulphuric acid disappears; but at the copper plate one electrochemical equivalent of sulphuric acid is formed, and one electro-chemical equivalent of copper sulphate disappears. Hence the source of electrical energy is the chemical energy lost when the copper in the copper sulphate is replaced by zinc, which is equivalent to the difference between the heat developed when zinc dissolves in sulphuric acid and that developed when an equivalent amount of copper dissolves in sulphuric acid. When one gram of zinc dissolves in sulphuric acid the heat developed is 1670 thermal units, or $1670 \times 4.2 \times 10^7$ work-units, 4.2×10^7 being the work-equivalent of one thermal unit, or the mechanical equivalent of heat. The electro-chemical equivalent of zinc is 0.003364 grams; hence the heat developed when one electrochemical equivalent of zinc is dissolved in sulphuric acid is $0.003364 \times 1670 \times 4.2 \times 10^7 = 2.359 \times 10^8$ work-units. When one gram of copper is dissolved in sulphuric acid, 909.5 thermal units are developed, which are equivalent to $909.5 \times 4.2 \times 10^7$ work-units. The electro-chemical equivalent of copper is 0.003261, hence the heat developed when one electro-chemical equivalent of copper is dissolved is $0.003261 \times 909.5 \times 4.2 \times 10^7 = 1.245 \times 10^8$ work units.

The difference between these two quantities, 1.114×10^8, must represent the work done by one unit of electricity in going around the circuit, or the E.M.F. of the cell. The E.M.F. of a Daniell cell is found to be approximately 1.028×10^8; the difference between this and the calculated result is insignificant, and is probably due to the quantity of heat, H, of § 98.

§ 101. GROVE'S CELL. Grove's cell is a zinc-platinum cell; the zinc is acted upon by sulphuric acid, while the platinum is placed in a porous cup containing strong nitric acid, which oxidizes the hydrogen and prevents polarization. Since there is no chemical action upon the platinum, the electromotive force is high, being approximately 1.9 volts.

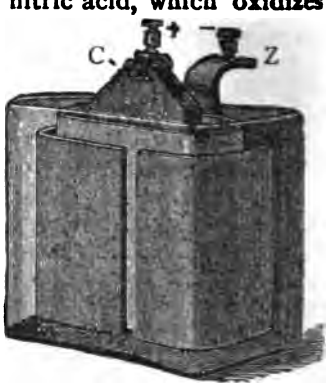

Fig. 108.

§ 102. BUNSEN'S CELL. The Bunsen cell (Fig. 108) is like the Grove, except that the platinum is replaced by hard carbon, which, of course, is more economical. The cell may be modified by placing the zinc and

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sulphuric acid in the porous cup, and the carbon (several rods of electric-light carbon will answer) outside the cup in a saturated solution of potassium nitrate acidulated with one tenth its volume of strong sulphuric acid; sodium or ammonium nitrate may be used in place of the potassium salt.

§ 103. BICHROMATE OR GRENET'S CELL. A Bunsen cell without the porous cup, and in which bichromate of potassium or sodium is added to the sulphuric acid as a depolarizer, becomes a Grenet cell. The bichromate in the presence of sulphuric acid forms chromic acid, which gives up its oxygen readily to the free hydrogen.

The sodium salt is to be preferred, since it is more soluble. Fig. 109 is a common form of the bichromate cell, in which the zinc plate can be raised when the cell is not in use. In this and other forms of the cells where the zinc is in an acid solution, it should be amalgamated; commercial zinc contains impurities which form local closed circuits in the plate itself, when placed in the acid. These cause a wasting away of the zinc and add nothing to the E.M.F. of the cell. The zinc is amalgamated by cleaning it in sulphuric acid and rubbing mercury over its surface; the mercury readily forms an alloy with the zinc, dissolving the pure zinc only; hence the acid is in contact with the amalgam or pure zinc dissolved in mercury.

Fig. 109.

§ 104. THE LECLANCHÉ CELL. The Leclanché cell (Fig. 110) may be taken as a type of a large number of cells, in which the zinc and carbon are used as the plates, and a strong solution of ammonium chloride as the electrolyte. The carbon is packed in a porous cup with granulated manganese dioxide and carbon; the granulated carbon is added to decrease the resistance of the cell, and the manganese dioxide serves as a depolarizer. This, however, acts slowly; hence, if the current is kept closed, these cells polarize in a few minutes, but rapidly recover when the circuit is opened. The chemical action practically ceases when the circuit is opened; hence this class of cells is well suited for all kinds of light intermittent work, such as door-bells, signals, etc. The cells are often made portable by replacing the glass jar with a zinc cup, which serves also as the zinc plate; the electrolyte is made into a stiff paste by adding dextrine, starch, chloride of lime and other ingredients; it is then known as a *dry cell*. When the circuit is closed in this class of cells, the zinc displaces the ammonium from the ammonium chloride, forming zinc chloride. The ammonium breaks up into ammonia and hydrogen; the former is dissolved by the liquid of the cell, or escapes when the cell is worked hard, while the hydrogen is oxidized by the manganese dioxide. In a number of these cells the porous cup is omitted, the manganese dioxide being incorporated in the carbon plate or omitted altogether.

Fig. 110.

§ 105. COPPER OXIDE CELL. The copper oxide cell was invented by Lalande and Chaperon. A zinc spiral or plate is immersed in a strong solution of caustic potash or soda, containing thirty to forty parts of alkali to one hundred parts of water. The positive plate is either copper or iron, in contact with copper oxide. The zinc replaces hydrogen in the alkali, forming sodium zincate (Na_2ZnO_2); the hydrogen, following the current, takes oxygen from the copper oxide, leaving metallic copper. Fig. 111 is a common form of the copper oxide cell, known as the Edison-Lalande cell. The copper oxide is in the form of a compressed plate held in a copper frame, C. A layer of paraffin oil, O, is placed on the solution of caustic potash to prevent the absorption of carbon dioxide from the air. The cell has a very low internal resistance, about 0.03 of an ohm; hence it is capable of giving a large current. The E.M.F. is only 0.7 volts.

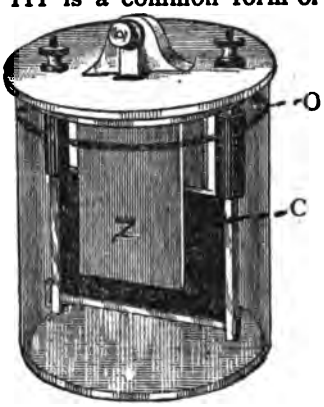

Fig. 111.

§ 106. SILVER CHLORIDE CELL. In a silver chloride cell the elements are zinc and silver; silver chloride is cast on the silver, which acts as a depolarizer. The electrolyte is dilute ammonium chloride containing 23 grams of the salt to one liter of water; a denser solution dissolves the silver chloride. The cell polarizes but slightly and recovers quickly, but can be used for small currents only.

§ 107. CLARK'S STANDARD CELL. The Clark standard cell, one form of which is shown in Fig. 111, has for its negative electrode pure zinc (or a ten-per-cent amalgam) in a neutral saturated solution of zinc sulphate, with an excess of the zinc sulphate crystals. The positive electrode is pure mercury in contact with a paste of mercurous sulphate. In the form shown, due to Carhart, the zinc sulphate solution and the paste are kept from mixing by a layer of asbestos. Wher

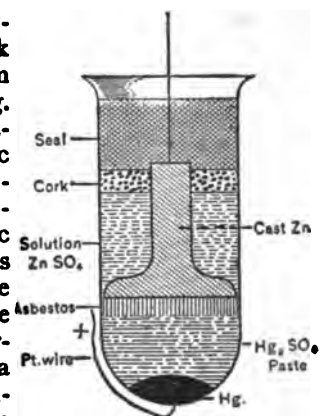

Fig. 112.

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this cell is carefully prepared from pure materials, the E.M.F. is constant, and is 1.434 volts at 15° C. It diminishes by about 0.001 volt per degree rise in temperature between 10° and 25° C. The cell has been adopted as the international standard of E.M.F. Helmholtz suggested the substitution of the chlorides of zinc and mercury for their sulphates. The E.M.F. is then lower, and may be made exactly one volt by adjusting the density of the zinc chloride solution. Cadmium and cadmium sulphate have been substituted for the zinc and zinc sulphate; the E.M.F. is then nearly one volt, and the variation with temperature is small.

§ 108. DATA RELATING TO PRIMARY CELLS.

CELL.	NEGATIVE ELECTRODE.	EXCITANT.	DEPOLARIZER.	POSITIVE ELECTRODE.	APPROXIMATE VOLTS.
Daniell	Zinc	$ZnSO_4 + aq.$	$CuSO_4 + aq.$	Copper	1.1
Bunsen	Zinc	$H_2SO_4 + aq.$	HNO_3	Carbon	1.9
Grove	Zinc	$H_2SO_4 + aq.$	HNO_3	Platinum	1.9
Bunsen	Zinc	$H_2SO_4 + aq.$	$NaNO_3 + H_2SO_4$	Carbon	1.8
Bichromate	Zinc	$H_2SO_4 + aq.$	$Na_2Cr_2O_7 + H_2SO_4$	Carbon	1.9
Leclanché	Zinc	$NH_4Cl + aq.$	MnO_2	Carbon	1.5
Lalande	Zinc	$NaOH$	CuO	Copper	0.8
Silver chloride	Zinc	$NH_4Cl + aq.$	$AgCl$	Silver	1.1
Clark	Zinc	$ZnSO_4 + aq.$	Hg_2SO_4	Mercury	1.434
Calomel	Zinc	$ZnCl_2 + aq.$	Hg_2Cl_2	Mercury	1.0
Weston	Cadmium	$CdSO_4 + aq.$	Hg_2SO_4	Mercury	1.022

§ 109. SECONDARY CELLS, OR ACCUMULATORS. If two pieces of platinum, A and B (Fig. 113), are immersed in dilute sulphuric acid, and an electric current sent through the cell in the direction indicated, oxygen and hydrogen are liberated, oxygen collecting at the plate, A, or anode, and hydrogen at B, the cathode (see ELECTROLYSIS, in these Supplements). Electrical energy has been used up in separating the oxygen and hydrogen, and they possess a certain amount of chemical energy because of this separation. If, now, the source of current be removed, and the wires leading from A and B are connected through a galvanometer, it shows a deflection, and indicates a current in the *reverse direction;* for since the E.M.F., which was applied to produce the separation, has been removed, the oxygen and hydrogen are free to combine, which they do under these conditions, and give back the chemical energy in the form of electrical energy.

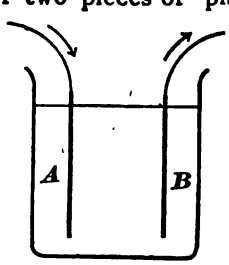

Fig. 113.

Grove constructed a gas battery working upon this principle. The action just described may be taken as the type of all *secondary batteries, accumulators,* or *storage-batteries*; but it is to be noted that they do not store electrical, but chemical, energy, the only difference between a primary and secondary battery cell being that in the former the active materials are taken from some outside source, and brought together under the proper conditions, and in uniting they produce a current; but in the secondary cell the active materials are prepared in the cell by means of a current sent through it. When the current is continued, the materials revert to their original state, and during this process the secondary cell is precisely the same as the primary cell. While the fact that a reverse current could be obtained in the case of oxygen and hydrogen under the conditions stated was known as early as 1803, it was not until 1860 that Planté discovered the exceptional efficiency of lead for this purpose, and constructed the first secondary batteries which were commercially useful.

Planté's cell consisted of two large sheets of lead rolled up together, but without metallic contact, and immersed in dilute sulphuric acid. To "form" or prepare the lead, a current is sent through the cell; the oxygen liberated at the anode oxidizes the lead, forming a dark brown coating of peroxide of lead. The cell is then discharged and a current is sent through in the reverse direction, coating the other plate with peroxide, while the hydrogen which collects at the plate first coated reduces the peroxide on it to metallic lead again, but leaving it in a finely divided state. The current is reversed several times in this manner until the plates are covered with a coating of finely divided lead. The cell is finally charged by sending a current through it until the electrolyte begins to be decomposed, showing that the action is complete; it will remain in this condition for many days, and will furnish current until the two plates are reduced to a chemically inactive state. The E.M.F. of the cell is approximately two volts. Faure, in 1881, modified the Planté cell by supplying the two plates with a coating of active material. The plates are cast or rolled in the form of grids, the holes or spaces being filled with the lead oxides which compose the active material, thus dispensing with the tedious and expensive process of forming. During the operation of charging, the oxides are changed to the peroxide at the anode or positive plate, and spongy lead at the cathode or negative plate. The chemical reactions of the cells are not thoroughly understood; sulphuric acid is formed during the charging and disappears when the cell is discharged. An almost endless variety of storage-cells have been devised, but they are generally some modification of one or the other of the two types described.

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A commercial form of the Planté cell is shown in Fig. 114. Fig. 115 shows a section of the lead plates, which are grooved in order that they may present as much surface as possible. The active material is formed on the surface of the plates by an electrochemical process which greatly reduces the time and expense of forming.

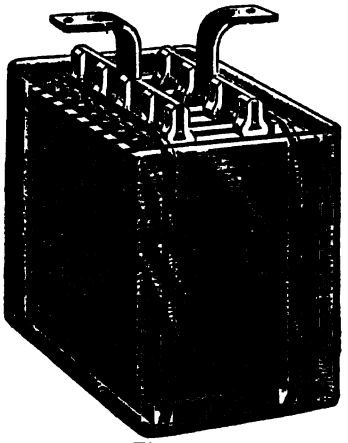

Fig. 114.

Fig. 116 is a common form of cell known as the chloride accumulator. The elements are made of half-tablets or pastilles of a salt of lead, inclosed in a dense frame of metal cast around them under heavy pressure; this plate of lead-salt so framed is then reduced electro-chemically to pure metallic lead. This gives a plate entirely composed of metallic lead, partly in compact form, partly in minute crystalline subdivision, differing only from a plate of cast or rolled lead in that some of its parts are of a granular character. The plates to be oxidized are then put, with alternate lead plates, in an electrolytic cell, and a current is passed through them for a sufficient time to convert the pure crystalline metallic lead into peroxide of lead.

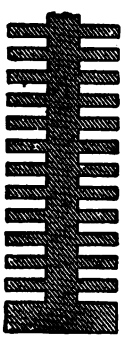

Fig. 115.

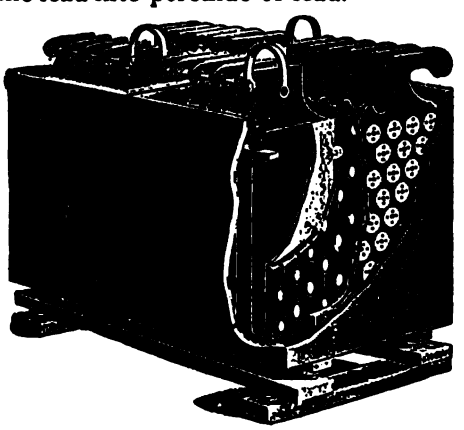

Fig. 116.

In cells of the Faure type the plates are cast full of square holes, the holes in the positive plate being filled with a stiff paste, prepared by mixing red lead (Pb_3O_4) with dilute sulphuric acid. This hardens as it dries, and during the process of charging it is partly changed to the peroxide. The paste for the negative plates is made of yellow lead, or litharge (PbO) and dilute sulphuric acid, which is covered with spongy metallic lead when the cell is charged. The voltage of both types is approximately the same.

Secondary batteries are usually rated at a certain number of ampere-hours. A 150-ampere cell should provide a current of 15 amperes for 10 hours, or one ampere for 150 hours. There is a limit, however, to both the charging and discharging rate, for if the current in either case is too great, the cell is not efficient. A change in the nature of the active material causes, also, a change in its volume; hence if the change in volume takes place too rapidly, the active material crumbles and falls off the plate. Secondary cells have, in general, a high electromotive force and low internal resistance, and hence are better suited to give large currents than primary cells; they give back from 70 per cent to 85 per cent of the energy used in charging. For many purposes they possess the disadvantage of great weight, and many attempts have been made to replace the lead by some lighter material, but as yet none have been entirely successful. The negative plate has been, in some cases, replaced by a zinc plate, well amalgamated; the solution used is dilute sulphuric acid containing zinc sulphate. On charging, zinc is deposited electrolytically on the zinc plate, while the action on the positive plate is the same as in other cells. The voltage is somewhat higher, being 2.5 volts; but the chief defect in the cell is its tendency to local action, necessitating the keeping of the zinc plate well amalgamated.

§ 110. ELECTRICAL UNITS. An absolute system of electrical units is one in which the units are independent of any arbitrary quantities, other than the fundamental units of mass, length and time. Two such systems are in use, and since they both take the centimeter, the gram and the second as the units of length, mass and time, they are called "centimeter-gram-second" systems, or, briefly, C.G.S. systems. The units of these systems have no special names, and are convenient only for mathematical investigation, being, in most cases, too large or too small for practical use.

The first of these systems is built up from the phenomenon of attraction between two charged bodies, and is called the *electrostatic system*. Unit-charge, or quantity of electrification, in this system has already been defined (§ 13). The second system depends upon the magnetic field about a conductor carrying a current (§ 50), and is therefore called the *electromagnetic system* of units.

Electrostatic Units.

Unit Quantity. The unit of quantity is that quantity of electricity which, when placed at a distance of one centimeter (in air) from a similar and equal quantity, repels it with a force of one *dyne* (§ 13).

Unit Potential. Potential being measured by *work* done in moving a unit of positive electricity against the electric forces, the unit of potential will be measured by the unit of work, the *erg*.

Unit Difference of Potential. Unit difference of potential exists between two points when it requires the expenditure of one *erg* of work to

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bring a positive unit of electricity from one point to the other against the electric force (§ 25).

Unit Capacity. A conductor has unit capacity when it requires a charge of one unit of electricity to bring it up to unit potential. A sphere of one centimeter radius possesses unit capacity (§ 31).

Specific Inductive Capacity. This is defined in § 36 as the ratio between two quantities of electricity. The specific inductive capacity of air is taken as unity.

Electromagnetic Units.

Unit Magnet-Pole. Unit magnet-pole is one of such strength that, when placed at a distance of one centimeter (in air) from a similar pole of equal strength, repels it with a force of one *dyne*.

Unit-Strength of Current. A current has unit-strength when one centimeter length of its circuit, bent into an arc of one centimeter radius (so as to be always one centimeter away from the magnet-pole), exerts a force of one *dyne* on a unit magnet-pole placed at the center (§ 50).

Unit Quantity of Electricity is that quantity which is conveyed by unit-current in one second.

Unit Difference of Potential (or E.M.F.). Potential is work done on a unit of electricity, hence unit difference of potential exists between two points when it requires expenditure of one *erg* of work to bring a unit of positive electricity from one point to the other against the electric force.

Unit Capacity. A conductor of unit capacity requires unit quantity to charge it to unit potential.

Unit Induction. Unit induction is such that unit E.M.F. is introduced by the variation of the current at the rate of one unit of current per second.

Practical Units and Standards.

The practical units are derived by taking convenient multiples of the units in the C.G.S. electromagnetic system.

A *Standard* is a quantity of the same kind as that to be measured, and with which comparisons are actually made. A standard is conveniently a unit, but not necessarily so; for example, the standard of E.M.F. is that of a Clark cell, but this is known to be 1.434 practical units, or volts.

Resistance. The *Ohm* $= 10^{9}$ absolute electromagnetic units, and is represented by the resistance offered to an unvarying electric current by a column of mercury at 0° C., 14.4521 grams in mass, of a constant cross-sectional area, and a length of 106.3 centimeters.

Current. The *Ampere* $= 10^{-1}$ absolute electromagnetic units, and is represented by the current which deposits silver at the rate of 0.001118 grams per second.

Electromotive Force. The *Volt* $= 10^{8}$ absolute electromagnetic units, and is that E.M.F. which, applied to one ohm, will produce in it a current of one ampere; being $\frac{1}{1434}$ of the E.M.F. of a Clark standard cell at 15° C.

Quantity. The *Coulomb* $= 10^{-1}$ absolute electromagnetic units of quantity, being the quantity of electricity conveyed by one ampere in one second.

Capacity. The *Farad* $= 10^{-9}$ (or one thousand-millionth) absolute electromagnetic units of capacity, being the capacity of a condenser such as to be charged to a potential of one volt by one coulomb. The *microfarad* (or millionth part of one farad) $= 10^{-15}$ absolute units.

Induction. The *Henry* $= 10^{9}$ absolute electromagnetic units of induction, is the induction in a circuit when the E.M.F. induced in this circuit is one volt, while the inducing current varies at the rate of one ampere per second.

The prefixes *mega-* and *micro-*, when used in connection with the above units, signify, respectively, "one million" and "one millionth" part. Thus a *megohm* is a resistance of one million ohms and a *microfarad* is one millionth of a farad. The prefix *kilo* is used for "one thousand," and *milli* for "one thousandth" part.

The following units of work and power are used in connection with the practical units:

Work. The *Joule* $= 10^{7}$ ergs. It is represented by the energy expended per second by one ampere in one ohm.

Power. The *Watt* $= 10^{7}$ ergs per second; it is equivalent to the power of a current of one ampere due to an E.M.F. of one volt, or one joule per second; approximately, $\frac{1}{746}$ of a horse-power.

S. W. STRATTON.

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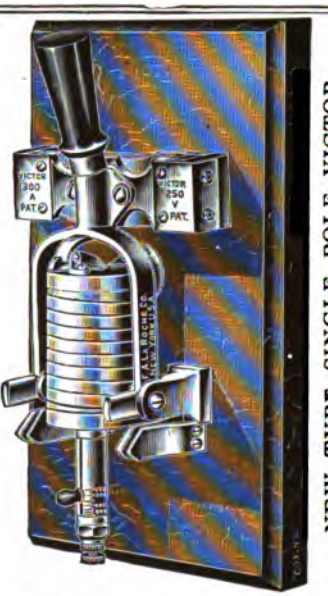
SPRAGUE MULTIPLE UNIT TRAIN



NEW TYPE SINGLE POLE VICTOR CIRCUIT BREAKER

SPRAGUE FLEXIBLE METALLIC CONDUIT

ROGERS CONSOLIDATED MEDICAL APPARATUS

LAKON TRANSFORMER

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ELECTROCHEMICAL ORDER OF THE ELEMENTS. The following table will show the electric order of the majority of the elements which are acted upon by gases and liquids, and from which electricity can be generated. It is graduated from the electropositive to the electronegative.

Electropositive.	Tin.	Tungsten.
Potassium.	Bismuth.	Molybdenum.
Sodium.	Copper.	Vanadium.
Lithium.	Silver.	Chromium.
Barium.	Mercury.	Arsenic.
Strontium	Palladium.	Phosphorus.
Calcium.	Platinum.	Iodine.
Magnesium.	Gold.	Bromine.
Aluminium.	Hydrogen.	Chlorine.
Uranium.	Silicon.	Fluorine.
Manganese.	Titanium.	Nitrogen.
Nickel.	Tellurium.	Selenium.
Cobalt.	Antimony.	Sulphur.
Cadmium.	Carbon.	Oxygen.
Lead.	Boron.	*Electronegative.*

ELECTROCUTION. See CAPITAL PUNISHMENT, in these Supplements.

ELECTRODYNAMIC ACTION. See ELECTRICITY, Vol. VIII, pp. 10, 62; and ELECTRICITY, § 90, in these Supplements.

*ELECTROLYSIS. While many new facts have been learned about electrolysis, or the decomposition of chemical substances by the agency of the electric current, the chief material additions to our knowledge of the subject have lain in the interpretation of the facts already known, and in the confirmation of the new theories. Electrolysis takes place when a current of electricity is passed through a fused substance, or a solution in water, and the latter is by far the more usual method. A very clear account of the phenomena is given in the main article (Vol. VIII, p. 99), but the conflicting nature of the views held in regard to them is made equally plain. The difficulty lay in our ignorance of the condition of the substance in solution, and of the nature of the process of solution in the case of acids, bases and salts, which are the only bodies whose solutions show electrolytic conduction.

The distinction between conductors, like copper and iron, which remain unchanged by the passage of the current, and solutions in which decomposition takes place, and the constituents are set free partly at one pole, and partly at the other, leads to the perfectly correct idea that the latter process is in some sense a transportation of the electricity with the substance, rather than a simple conduction through it. Thus when a current of electricity passes through a solution of hydrochloric acid, hydrogen is set free at the negative pole, and chlorine at the positive. It is found that the amount of each set free is proportional to the quantity of electricity passing round the circuit. It seems, at first sight, plain that the compound has been torn apart by the electricity. But this is inconsistent with the observation that the weakest current is capable of

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producing some decomposition, and that the resistance is comparable with that of ordinary conductors. These facts can only be explained on the assumption that the current finds the decomposition already effected, and merely performs the function of guiding the fragments to the electrodes. The question which remained to be settled was, whether this decomposition affected a large proportion of the salt, or whether only a small quantity was at any one time in a position to yield to the influence of the current.

It was Van t'Hoff's proof that acids, bases and salts are at all times largely dissociated (see CHEMISTRY, in these Supplements) that decided the question, and led Arrhenius to the statement of the theory of electrolytic dissociation as an explanation of all the hitherto unexplained peculiarities of the phenomena of solution. According to this theory, the act of solution of all substances of the above classes in water brings about their dissociation into the ions, to a greater or less degree. The ions $2H$ & SO^4 from H^2SO^4, H & Cl from HCl, Na & Cl from NaCl, K&NO^3 from KNO^3, K&OH from KOH, and so forth, behave as independent molecules as far as the physical properties of the solutions go. They are not particles of free K, Na, etc., and so do not act chemically, as these substances would do. They are possessed of large charges of electricity. It is only when they have been led to one of the poles, and their electricity has been discharged, that they assume the properties of the free elements. Hence we have no immediate evidence of their separate existence, excepting when a current is passing, and then only at the electrodes. Water is itself so poor a conductor that practically the current is all carried by the ions of the salts. It is true that frequently oxygen and hydrogen are given off, and the action seems to have been a decomposition of water. This is the case in the familiar electrolysis of dilute sulphuric acid. The substances really set free are $2H$ and SO^4; but the latter, not being a substance capable of independent existence, interacts with the water in the neighborhood: $2SO^4 + 2H^2O = 2H^2SO^4 + O^2$, and the result is the re-formation of sulphuric acid and the liberation of oxygen. That this is the real procedure is shown by the fact that sulphuric acid accumulates round the positive electrode. Such secondary reactions with water are, of course, very common. Thus from NaCl we get, primarily, Na and Cl; but only the latter appears in the free condition. The former interacts with the water, giving sodium hydroxide and hydrogen, $2Na + 2H^2O = 2NaOH + H^2$, and in this case the base accumulates round the negative electrode, and may be shown to be present by its action on red litmus.

It is evident that by this means important information can be gained in regard to the ions really present. Thus sodium platinic chloride, Na^2PtCl^6, cannot be a loose combination of the chlorides, but a compound giving the ions $2Na$ and $PtCl^6$, for the platinum appears along with the chlorine at the positive, and the sodium is set free at the negative wire. If the solution contained the ions $2Na$, Pt, and $6Cl$, both metals would appear at the negative end. Similarly, potassium ferricyanide separates as $3K$ and $Fe(CN)^6$. These facts are in entire accord with the chemical behavior of these and similar salts. On no other assumption can we explain the facts that $K^3Fe(CN)^6$ gives the ordinary tests for potassium, but not for iron; that potassium chromate, K^2CrO^4, does not give the ordinary test for chromium; and that potassium chlorate, $KClO^3$, and monochloracetic acid, $ClCH^2COOH$, give no precipitate of silver chloride on adding silver nitrate. In all those cases the tests are for the ions Fe, Cr, Cl, while the ions actually present are $Fe(CN)^6$, CrO^4, ClO^3, $ClCH^2COO$. Almost the whole of analytical chemistry is founded on reactions involving the interchange of ions. Thus on adding hydrochloric acid to silver nitrate, we get a precipitate of silver chloride by the union of the Ag and Cl ions, $\overset{+}{Ag} + \overset{+}{NO^3} + \overset{+}{H} + \overset{-}{Cl} = AgCl + \overset{+}{H} + \overset{-}{NO^3}$; the H and NO^3 ions remain in the solution. When silver nitrate is added to potassium chlorate no precipitate is produced, because the interchange of the ions can only form silver chlorate, which is soluble: $\overset{+}{Ag}\overset{-}{NO^3} + \overset{+}{K}\overset{-}{ClO^3} = \overset{+}{Ag}\overset{-}{ClO^3} + \overset{+}{K}\overset{-}{NO^3}$.

The electrolysis of solutions has been used industrially for many purposes. Thus copper now is extracted from its ores by bringing it into solution, depositing the copper electrolytically and using the exhausted liquid in the treatment of fresh quantities of the ore. A bleaching-solution, which is stated to be more active than ordinary bleaching-powder, is prepared by the electrolysis of calcium chloride dissolved in water: $CaCl^2 = Ca + Cl^2$. The calcium acts on the water, forming calcium hydroxide: $Ca + 2H^2O = Ca(OH)^2 + H^2$, and on mixing, the chlorine interacts with the base, forming bleaching-powder: $2Ca(OH)^2 + 2Cl^2 = Ca(ClO)^2 + CaCl^2 + 2H^2O$. Now that electrical power is very cheap in many localities, operations like this can be carried on profitably. A method of purifying sewage has been patented, in which salt-water is partially electrolyzed, and the chlorine set free acts as a disinfecting agent. In the field of organic chemistry it has been found that the hydrogen set free in electrolysis can be used for the reduction of nitrobenzene ($C^6H^5NO^2$) to amidophenol, and it is expected that this method will have a wide field in connection with the synthesis of bodies which have not hitherto been manufactured on a large scale, but for which technical uses exist. The manufacture of aluminium is now conducted commercially by the electrolysis of a solution of aluminium oxide in molten cryolite. (See ALUMINIUM, in these Supplements.)

When a solution containing two salts is electrolyzed, the results vary according to the character of the current used. Unless the current is very strong, both metals carrying it reach the electrode, but only the less oxidizable is deposited. Thus a mixture of salts of zinc and copper deposits, under these circumstances, only the latter. The zinc set free instantly precipitates an equivalent amount of copper, and goes itself into solution, just as it would do in the absence of a current. With a stronger current,

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however, there is not time for this chemical change, and brass is deposited.

The character of the deposit of metal depends on the current density, so that, for practical purposes of electroplating, this has to be adjusted carefully, in order to prevent the deposit from being crystalline, or from being formed so fast that it adheres only loosely to the plate.

The use of an exact method for the measurement of the conductivity of electrolytes has cleared up many of the difficulties in understanding the phenomena of electrolysis. The conductivity varies with different salts. With all, it becomes greater relatively to the quantity of substance dissolved on diluting the solution. In every case a maximum is reached or approached. For strong acids and bases and their salts, this occurs on moderate dilution; for weaker acids and bases, it is approached and would be reached only at an infinite dilution. Since the electricity is carried by the ions, this means that dissociation increases with dilution, and is nearly complete for strong acids and bases and their salts, even at moderate dilution. Another factor besides the degree of dissociation enters into the conducting power of every salt; namely, the speeds with which the ions move. These vary within wide limits. Thus hydrogen ions move five times as fast as chlorine ions; hydroxyl ions, two and a half times as fast. If we know the speed of the ions of any salt, and the conductivity at several dilutions, we can calculate the degree of dissociation of the salt in question at each stage of dilution. This degree of dissociation is a magnitude of great importance to the chemist, for it measures the chemical activity of the substance. It is important, therefore, to notice independent evidence in our hands which confirms the value obtained by electrical methods, and so establishes more securely the theory of electrolytic dissociation in general,

In the first place, Ostwald measured the relative affinities of various acids for various bases, where two acids competed for a quantity of the base insufficient to neutralize both. The values agreed with the values for the dissociation of the same acids in solutions of equal strength. Other methods of measuring affinity gave similar results.

In the second place, as we have seen in speaking of solution (see CHEMISTRY, in these Supplements), the osmotic pressure is proportional to the number of particles present, whether they are molecules or ions. A measurement of osmotic pressure of various solutions has given the same figures for dissociation as the electric conductivity method.

In the third place, the lowering of the freezing-point and elevation of the boiling-point give a means of measuring the number of bodies acting as molecules. For salts, this number is always much larger than the quantity of complete molecules present would lead us to expect. Thus, in one experiment, 78 per cent of the potassium chloride was dissociated into K and Cl; in another, 79 per cent of barium chloride was dissociated into Ba, Cl and Cl, three ions arising out of each molecule.

Again, the color of the ion is often different from that of the molecule. Thus anhydrous cobalt chloride is blue. In dilute aqueous solution it is red, the color of the cobalt ion. In concentrated aqueous solution, or in alcoholic solution, therefore, where the dissociation is inconsiderable, the color is blue. On diluting the water solutions, the ionization increases, and the color passes through purple to red. Similarly, the solution of potassium cobalticyanide, $K^3Co(CN)^6$, is colorless, since the ions are 3K and $CO(CN)^6$, and cobalt ions are absent.

Finally, the heat of neutralization of dilute solutions of strong bases by strong acids is the same, whatever bases or acids are selected. Yet the heats of formations of the salts by other methods are very different. The only possible explanation, is that in neutralization the same heat is given out because the same substance is formed; in every case, water only. The action which takes place is represented by the equation:

$$\overset{+}{H} + \overset{-}{Cl} + \overset{+}{K} + \overset{-}{OH} = \overset{-}{Cl} + \overset{+}{K} + H^2O + 13700 \text{ cal.}$$

Water not being appreciably dissociated, its ions H and OH cannot exist in presence of each other, and they unite to form water. The other two ions remain unchanged, unless the solution is evaporated. The action of neutralization consists, therefore, not in the formation of the salt, but simply and solely of water, so that the heat of neutralization is constant for all strong acids and bases, because the action is always the same union of H and OH.

ALEX. SMITH.

ELECTROMAGNETISM. See ELECTRICITY, § 55, in these Supplements.

ELECTROMOTIVE FORCE. See ELECTRICITY, § 40, in these Supplements.

ELECTROMOTIVE FORCE, DIRECTION OF THE INDUCED. See ELECTRICITY, § 69, in these Supplements.

ELECTROMOTIVE, VALUE OF THE INDUCED. See ELECTRICITY, § 70, in these Supplements.

ELECTROMOTOGRAPH, a device of Thomas A. Edison's for obtaining a mechanical effect from a very minute electric force. He made use of it in a telephonic receiver to increase the sound. It is based upon the principle that a sheet of roughened paper, which has been dipped in certain solutions and dried, may be laid upon a platinized metallic plate, so that a strip of lead, thallium or platinum is passed over it, when the passage of an electric current induces slipperiness, and lessens friction.

C. H. COCHRANE.

ELECTROPHORUS. See ELECTRICITY, Vol. VIII, p. 95; also ELECTRICITY, § 12a in these Supplements.

ELECTROPLATING. See ELECTRO-METALLURGY, Vol. VIII, p. 109.

ELECTROSCOPE. See ELECTRICITY, Vol. VIII, p. 32.

ELECTROTYPE. See TYPOGRAPHY, Vol. XXIII, p. 749.

ELEGY. See POETRY, Vol. XIX, p. 285.

ELEMENTS, NEW. See CHEMISTRY, in these Supplements.

ELEPHANT-BEETLE. A name applied to many species of beetles of the genus *Megasoma*, par-

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ticularly *M. elephas*. The name refers to their immense size. They are common in Central and South America, and one species occurs in California.

ELEPHANT-FISH (*Callorhynchus antarcticus*), a cartilaginous fish belonging to the subclass of chimæras (*Holocephali*). The genus contains only one species, which is found in Antarctic seas. The name refers to the prolonged snout, which resembles a proboscis. The fish is of little popular interest, but it possesses many characters which engage the attention of zoölogists. Sometimes the elephant fish is used as food.

ELEPHANTINE, Egypt, an islet of the Nile opposite Assuan, one mile long and a quarter mile broad, called by the Arabs Jeziret-el-Chaf, "islet of flowers." It is highly fertile, the surface interspersed with beautiful gardens, while quarries of the famous syenite granite of prehistoric fame are still worked. Shapeless mounds, however, are the only traces of its famous Egyptian and Roman antiquities, which included the Nilometer described by Strabo for measuring the periodical flood rise of the river, and temples and other edifices erected by the Pharaohs. C.L.S.

ELEPHANT-SEAL OR SEA-ELEPHANT, the popular name of two species of seals (*Phocidæ*), belonging to the genus *Macrorhinus*. They are the largest of the seals. The northern species (*M. angustirostris*) is found on the coast of California and the Pacific coast of Mexico. Specimens have been found which measured twenty feet in length. The species *M. leoninus* is found in southern seas. This is the larger species, specimens measuring 14 to 30 feet in length and 8 to 16 feet in circumference. Both species were formerly hunted for their oil, but now they are rare. The name *elephant* refers to the proboscis of the adult male. See MAMMALIA, Vol. XV, p. 450.

ELEPHANT'S-FOOT, a name primarily applied to the large tuberous stem of *Testudinaria elephantipes*, a South African climber of the family *Dioscoreaceæ*. The stem is roughly shaped, like an elephant's foot, and is covered with thick scales of cork, regularly arranged and separated by grooves. The name is also given to species of the genus *Elephantopus*, one of the *Compositæ*.

ELEPHANT-SHREW (*Macroscelides typicus*), an insectivorous mammal found on the African plains. The animal has long hind legs and progresses by jumping. It is not over nine inches long, including the tail. The name refers, not to the size, but to the elongated nose. The animal lives in burrows, and is diurnal in its habits. The elephant-shrew is a typical member of the African family of jumping-shrews.

ELETS. See OREL, Vol. XVII, p. 849.

ELEUSINE, a genus of Oriental grasses with digitate spikes and large, loose grains. *E. coracana* is cultivated for food in Asia and Africa. *E. Indica* has become naturalized in the United States as a lawn and pasture grass, and is variously known as "crab-grass," "yard-grass," "dog's-tail" and "wire-grass."

ELEUSINIA AND ITS MYSTERIES. See ELEUSINIA, Vol. VIII, p. 119; and MYSTERIES, Vol. XVII, pp. 131–134.

ELEUTHERIA. See PLATÆA, Vol. XIX, p. 118.

ELEVATED ROADS. See RAILWAY, Vol. XX, p. 249; and RAILROADS, in these Supplements.

ELEVATORS OR LIFTS. (For general description, see LIFTS, Vol. XIV, pp. 577–580.) The great demand for elevators, caused by the increased height of buildings, has brought these useful machines to a high degree of perfection. The public has become accustomed to the use of elevators, and has the utmost confidence in their safety and efficiency.

The one thing, more than any other, which has made passenger-elevators perfectly safe in operation is the multiplication of cables. No first-class passenger-elevators are now made that do not have at least four, while they have often six, cables. Four are used for the actual lifting of the cage, and the other two for counterbalance weights. In addition to this, all good machines have safety-appliances, which will prevent the falling of the cage in case the cables give out, or in case, for any cause, the car runs down at an excessive speed. By reason of these manifold precautions it is found as safe, and perhaps safer, to ride on an elevator in a twenty-story building than to ride on the ordinary street-car.

Hydraulic Elevators. Hydraulic elevators are mostly used for passenger service in the best office-buildings, and these are operated by water-pressure from tanks, either in the upper portion of the building or in the basement, but usually in the attic. Powerful pumps, equal in many cases to the water-works of small cities, are placed in the basement of all these large buildings, and the water is pumped from the receiving-tanks in the basement to the supply-tanks above, often under air-pressure in addition to the static pressure due to the head of water. With a proper proportion in the pumps, any desired pressure can be used, and any load may easily be raised. Tall buildings have greatly stimulated the desire for increased speed, so that the hydraulic passenger-elevators in the large buildings are now operated at a speed of from three hundred to four hundred feet per minute, under perfect control, with great smoothness of motion and entire reliability.

Electric Elevators. Electric elevators of various construction have come into general use, and for many purposes are preferred to hydraulic. They are usually made in the form of the worm-gear steam-elevator, winding the rope on a large drum, by means of electric motors instead of steam-engines, and this form has proved, in hundreds of cases, entirely satisfactory. It has also been demonstrated that the cost of operating an electric elevator of this kind is very much less than any other form of elevator; and where current is obtained from street-mains, as is now customary in most of the cities of the country, the simplicity of connections and operation recommends it to a large number of purchasers.

Another form of electric elevator has been introduced, consisting of a long screw operated by an

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electric motor which is used to push apart a series of sheaves over which the lifting-ropes of the cage are passed. This machine is still in its experimental stages, and while it operates smoothly and rapidly, its permanence and reliability are not yet established.

All forms of elevators, hydraulic, steam and electric, are used for both passenger and freight purposes. In many tall buildings the number of elevators to accommodate the large structures are from 6 to 16 or 18 in a single building, thus making the top stories as available as the lower. In the higher buildings the elevators are divided into local and express service, so that each story is equally well supplied with quick access.

The increased height in buildings made the demand for counterbalancing the cables, already referred to, much more imperative, and they are now usually counterbalanced by the use of chains under the cars themselves, or attached to the counterbalance weights sufficient to compensate for the transfer of the lifting-cables from one side of the overhead sheaves to the other. In very high buildings the cost of operating hydraulic elevators may thus be reduced one half. See also GRAIN ELEVATORS, in these Supplements. W. E. HALE.

[A working, inclined elevator was shown in 1896. It was a stepped, endless-chain affair, turning at either end about sprocket-wheels.—ED.]

ELGIN, a city of northwestern Illinois, located in Kane County, on the Fox River, 36 miles N.W. of Chicago, on the Chicago, Milwaukee and St. Paul and the Chicago and Northwestern railroads. It is the center of a large dairy business, exporting annually two million five hundred thousand dollars' worth of dairy products, and has important manufactures, especially of watches and watch-cases, carriages, washing-machines, shoes, farming-implements and condensed milk, also meat-packing establishments, cotton and soap factories, etc. The Elgin National Watch Works employ three thousand skilled hands, and manufacture eighteen hundred watches daily. In addition to twelve public schools, there is an academy, a Catholic seminary, a school of manual training, and a public library; also the Northern Illinois Hospital for the Insane, costing $750,000. Pop. 1890, 17,823; 1900, 22,433.

ELGIN MARBLES. See ELGIN, THOMAS, Vol. VIII, p. 123; ARCHÆOLOGY, Vol. II, p. 301.

ELGINSHIRE OR MORAYSHIRE. See ELGIN, Vol. VIII, p. 121.

ELGON, an extinct volcano in British East Africa, N. E. of Victoria Nyanza; 14,090 feet high.

EL-HAZA, the low-lying coast strip of Arabia, on the Persian Gulf, north of Oman, belonging to Turkey; is generally hot, dry, and sterile, but has numerous oases, where wheat, millet, fruits, and garden vegetables grow plentifully. Camels, horses, and dates are raised and sold in great quantities. A small tribute is payable to the sultan. Area, about 31,000 sq. miles; estimated pop. 150,000.

ÉLIE DE BEAUMONT, JEAN BAPTISTE ARMAND LOUIS LÉONCE, a French engineer and geologist; born at Canon, Calvados, Sept. 25, 1798. He became engineer of mines in 1824; professor in the School of Mines in 1829; professor in the Coll of France in 1832; member of the Academy of Sciences in 1835 (and, after the death of M. Arago, its permanent secretary); Senator in 1852; and grand officer of the Legion of Honor in 1860. He was also a corresponding member of the academies of Berlin, London, etc. In collaboration with M. Dufrenoy he spent 23 years in preparing the large *Geologic Map of France*, published in sections between 1825 and 1841. He died Sept. 22, 1874.

ELIOT, CHARLES WILLIAM, educator, was born in Boston on March 20, 1834, and was graduated from Harvard College in 1853. He was a tutor at Harvard in 1854–58, a professor in the Lawrence Scientific School in 1858–63, professor in the Massachusetts Institute of Technology in 1865–69, and in 1869 was elected president of Harvard University, in which place he has since been one of the most conspicuous and influential figures in the educational world.

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CHAS. W. ELIOT.

He has been a leader in the "elective" system, in the omission of Greek from various courses, in the shortening of the required undergraduate course, in the establishment of university summer schools, and other advanced educational methods, and is the author of several books and many essays and addresses upon educational topics. W.F.J.

ELIOT, GEORGE. See CROSS, MARY ANN, in these Supplements.

ELIOT, JOHN, an American clergyman; born in Boston, Mass., May 31, 1754. He co-operated with his friend Dr. Belknap in founding the Massachusetts Historical Society, to the publications of which he contributed many valuable papers. In 1809 he published a *New England Biographical Dictionary*, and at various times published a number of sermons and memoirs of distinguished persons. He died in Boston, Feb. 14, 1813. E.E.T.

ELIOT, SAMUEL, historian and educator, was born in Boston on December 22, 1821, and was graduated at Harvard in 1839. He projected a comprehensive history of liberty, and completed two volumes on *The Liberty of Rome*, and two more on *The Early Christians*. Later he wrote a *Manual of United States History* for school use. He had many private pupils, organized a free school for street children, and gave free instruction to classes of young workingmen. He was professor of history and political science in Trinity College in 1856, was elected president of the college in 1860, and filled that place until 1864. He was lecturer on history at Harvard in 1871–73, headmaster of the Boston Girls' High School from 1872 to 1876, and superintendent of public schools in Boston from 1878 to 1880. He died on September 15, 1898. W.F.J.

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ELISABETH AMALIA EUGÉNIE, Empress of Austria, daughter of Maximilian-Joseph, Duke of Bavaria, was born Dec. 24, 1837. On her mother's side she was cousin to the king of Bavaria. She was married to Francis Joseph I, Emperor of Austria, April 24, 1854. In 1857 she accompanied him on a visit to his Italian and Hungarian dominions, when an amnesty was granted to political offenders. The Empress was fond of horseback riding and other outdoor exercises, and often visited England and Ireland for hunting. She bore three children, one son, the late Archduke Rudolf, who committed suicide on Jan. 28, 1889; and two daughters, the Archduchess Gisela Louisa Maria and Maria Valeria Matilda Amelia, the former of whom is married to Prince Leopold of Bavaria, and the latter to Franz Salvator, Archduke of Austria-Tuscany. The Empress Elisabeth was murdered, by being stabbed to the heart, by Luigi Luccheni, an Italian anarchist, at Geneva, Switzerland, Sept. 10, 1898.

ELIZABETH, Cape, the most northern point of Sakhalin Island, in the sea of Okhotsk, eastern Siberia, lat. 54° 24′ N., long. 142° 47′ E. It is also the name of a cape, the western point of Chugatz Island, to the east of the entrance to Cook Inlet, Alaska, lat. 59° 8′ N., long. 151° 50′ W.

ELIZABETH, a city and the county seat of Union County, New Jersey, in the northeastern part of that state. (See Elizabeth, Vol. VIII, p. 135 for general description and history.) It forms a part of the metropolitan district of which New York city is the center, and is steadily growing in harmony with that region. In 1870–80 a reckless administration of public works expanded the city far beyond its needs, and involved it in overwhelming indebtedness. Since then it has, however, regained its prosperity. It is the site of many manufacturing establishments, including one of the largest sewing machine factories in the world, and has a considerable commerce by water and rail. It has a port on Staten Island Sound, and Newark Bay, and is traversed by the Pennsylvania railroad and the Central railroad of New Jersey. It is a favorite place of residence for many New York business men. Its population is now increasing rapidly, having been 37,764 in 1890 and 52,130 in 1900. W.F.J.

ELIZABETH, capital of Pasquotank County, North Carolina, on the Pasquotank river; has a deep, safe harbor, which can be entered by large vessels; steamboat connection with Norfolk, via the Dismal Swamp canal; a park, state normal school, planing-mill, shingle factories, carriage factories, cotton-seed oil and cotton factories. Population 1900, 6,348.

ELIZABETH, a borough and township of Allegheny County, Pennsylvania, in the southwestern part of the state. It had in 1900 a population of 1,866. W.F.J.

ELIZABETH, Queen of Roumania (Pauline Elizabeth Ottilie Louise), daughter of the late Prince Hermann of Wied by his marriage with the Princess Maria of Nassau, was born Dec. 29, 1843, in the ancestral castle of Monrepos, in Neuwied, on the Rhine. Five years of European travel followed her twentieth year. Then her romantic spirit went out in admiration of the military career of Karl, prince of Hohenzollern-Sigmaringen, a Prussian lieutenant who had won the affection of the Roumanian nation, and was fighting for a throne, as well as for the heart of Elizabeth von Neuwied. Married on Nov. 15, 1869, her career in Bucharest was a continuous ovation from the chivalric race her husband ruled. In their wars she was the *mama rantilor* ("mother of the wounded") who hovered in the rear of the army; in their victories, the Miriam who composed their triumphal songs. The princely pair were crowned king and queen of Roumania, May 22, 1881. Elizabeth's ceaseless plans for the welfare of her people, and for the promotion of asylums, schools, and charities of all kinds, have made her regarded as Roumania's patron saint.

In 1874 her only child, a daughter, died, and from this sorrow arose her literary activity. In the world of letters she is best known as "Carmen Sylva," a pen-name first adopted in 1880, when she published two poems privately in Leipsic. With a taste for missal-illustration, she adorned the service-books of the Roumanian Church. She rendered the wild and romantic folk-lore of her adopted home into German, exhibiting a dainty and felicitous touch as a translator. Her works include *Sappho* (1880); *Hammerstein* (1880); *Stürme* ("*Storms*," 1881); *Leidens Erdengang* (1882; in English, "*Pilgrim Sorrow*," 1884); *Jehovah* (1882); *Pensées d'une Reine* (1882); *Pelesch-Märchen* (1883); *Le Pic aux Regrets* (1884); *Es Klopft* ("*Some One Knocks*," 1887); *Edlem Vaughan* (a novel, 1891); and *Meister Manole*, a tragedy produced with brilliant success in Vienna, in 1892. Her lyric poems were published under the title *Meine Ruh'* (4 vols., 2d ed., 1886). With Madame Kremnitz she has written the novels *Aus Zwei Weiten* (1882); *Astra* (1886), etc. See Kremnitz, *Carmen Sylva* (1882); Von Stackelberg, *Aus Carmen Sylva's Leben* (4th ed., 1886); Baroness Deichmann, *Life of Carmen Sylva* (1890); and Blanche Roosevelt, *Elisabeth of Roumania* (1891).

ELIZABETHAN ARCHITECTURE. See Architecture, Vol. II, 387; England, Vol. VIII, 307.

ELIZABETH ISLANDS, Massachusetts, extending in a southwesterly direction from Barnstable County between Buzzard's Bay and Vineyard Sound, comprise 16 islands administratively attached to Dukes County, Martha's Vineyard. The largest is Naushon, with the safe harbor and summer resort of Tarpaulin Cove. C.L.S.

ELIZABETH STUART, Queen of Bohemia, oldest daughter of James I of England; born August 19, 1596. In 1613 she was married to young Friedrich V, elector of the palatinate. At her urgent solicitation her husband accepted the royal crown of Bohemia, offered to him in 1619, but lost it in 1620 by his defeat in the battle on the Weissen Berg, and had to flee with his family to Holland. After his death in 1633 she lived on a pension at The Hague till 1661 when she, on the restoration of her nephew, Charles II, to the throne, returned to England, where she died in 1662. Of her 13 children are to be men-

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ioned Prince Rupert, at Rhine; Elizabeth, elec-ress at Rhine, and Sophie, electress of Hanover. 'articulars of her career are to be found in *Mem-irs of Elizabeth Stuart*, by Miss Berger (2 vols., ondon, 1825). See also DESCARTES, Vol. II, pp. 02–103. G.A.S.

ELIZABETHTOWN, the capital of Hardin Co., Il., on the Ohio River, in a lead-bearing region. Its nterests are mining and shipping. Pop., 1900, 659.

ELIZABETHTOWN, the county seat of Har-in County, in north-central Kentucky. Its pop-lation in 1900 was 1,861. W.F.J.

ELIZABETHTOWN, the capital of Essex Co., I. Y., on Bouquet River, 125 miles N. of Albany, ituated in the vicinity of iron-mines, in the Adi-ondack Mountains. Population, 1900, 491.

ELIZABETHTOWN, a borough of Lancaster County, Pennsylvania, on the Pennsylvania rail-oad, had a population in 1900 of 1,473. W.F.J.

ELK, IRISH. See ARCHÆOLOGY, Vol. II, p. 294.

EL KHARGEH OR EL KHARIGEH, is a own of Upper Egypt, the capital of the Great Oasis, near Boulak and 325 miles south of Cairo. t lies in latitude 25° 28′ north and longitude 30° 0′ east, and is on one of the great caravan routes rom the Soudan to Lower Egypt. It is marked rith noteworthy ruins of temples and other uildings of ancient date, and with an extensive ecropolis. W.F.J.

ELKHART, a city of Elkhart County, on the orthern border of Indiana. It stands at the con-uence of the Elkhart and St. Joseph's rivers, nd is an important railroad center. It is widely nown as a place of manufacture of musical in-truments, especially for military and brass bands, ut it has also various other industries, including our mills and carriage factories. It is the site of he car shops of the Lake Shore and Michigan outhern railroad, and is reached by that railroad nd by the Cleveland, Cincinnati, Chicago and t. Louis. It had a population of 11,360 in 1890 nd 15,184 in 1900. W.F.J.

ELKHORN, a town and the county seat of Walworth County, Wisconsin, in the "southern ier" of that state. It is in an agricultural region, ut has considerable industries. It is 42 miles outhwest of Milwaukee, and is reached by the Chicago, Milwaukee and St. Paul railroad. Its opulation was 1,731 in 1900. W.F.J.

ELKHORN RIVER rises in Rock County, in ortheastern Nebraska, flows east-southeast past everal towns of importance, through a fertile un-ulating plain, and enters the Platte River, 20 miles W. of Omaha. It is about 250 miles long.

ELKIN, WILLIAM LEWIS, an American astron-mer; born in New Orleans, April 29, 1855. He vas educated at the Royal Polytechnic School n Stuttgart, Germany, and was graduated from he University of Strasburg. In 1883 he went to he Cape of Good Hope with Sir David Gill, the English astronomer, and took part with him in bservations with the heliometer for the determi-ation of stellar parallax. He became astronomer t the Yale College Observatory in 1884, where e has continued his work in stellar parallax. He has published numerous papers in astronom-ical journals and is a recognized authority on Jupiter and Saturn. W.M.C.

ELKINS, STEPHEN BENTON, an American lawyer and statesman; born in Perry County, Ohio, September 26, 1841. He removed with his parents to Missouri, where he graduated from the University of Missouri in 1860. In 1863 he went to New Mexico where he practiced law and was a member of the territorial legislature. He was then appointed attorney-general of New Mexico and later United States district attorney. From 1873 to 1877 he was a member of Congress. He then removed to West Virginia, becoming largely interested in coal mining and railroad en-terprises. President Harrison appointed him Secretary of War in 1891 and in 1894 he was elected to the United States Senate. He has long been a member of the Republican National Committee. W.M.C.

ELK POINT, a township and the capital of Union County, southeastern South Dakota, on the Missouri River, 21 miles N.W. of Sioux City, and on the Chicago, Milwaukee and St. Paul railroad. It is in a grain and stock raising district, and mills a great deal of flour. Population, 1900, 1,081.

ELK RAPIDS, a town and the capital of Antrim County, in the northwestern part of the southern peninsula of Michigan. It is on a peninsula be-tween Clam Lake and the east arm of Grand Trav-erse Bay, and on the Chicago and West Michigan railroad. It has a large saw-mill, chemical-works and a blast-furnace. Pop., township, 1900, 2,042.

ELK RIVER, a village and the capital of Sher-burne County, Minnesota, situated 38 miles N.W. of St. Paul, on the Elk and Mississippi rivers, and on the Great Northern and Northern Pacific railroads. It has several manufactories; its prin-cipal business is lumber, stock and grain. Popu-lation, 1900, 831.

ELK RIVER is a considerable stream of West Virginia, which rises in the Rich Mountains of Randolph County, and flows westward for 150 miles to the Great Kanawha River. W.F.J.

ELKTON, a town and the county seat of Todd County, Kentucky, on the southwest border of that state. It is on the Louisville and Nash-ville railroad, 125 miles southwest of Louisville. Its population in 1900 was 1,123. W.F.J.

ELKTON, a town and the capital of Cecil County, northeastern Maryland, at the head of navigation on Elk River, 52 miles N.E. of Baltimore, on the Philadelphia, Wilmington and Baltimore railroad. Flour, iron and papier-maché are manufactured. The town has abundant water-power and a large fer-tilizer factory. The place was settled by Swedes in 1694. Population, 1890, 2,318; 1900, 2,542.

ELLAGIC ACID. See GALLIC ACID, Vol. X, p. 38.

ELLAND, a town of northern England, in the West Riding of Yorkshire, on the river Calder, three miles S.E. of Halifax by rail. It has cloth-mills, and there are valuable stone-quarries in the vicinity. Population, 8,278.

ELLENBOROUGH, JANE ELIZABETH, LADY, a

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daughter of Admiral Sir John Digby and a noted heroine of the modern *Chronique Scandaleuse*, was born in 1807, and in 1824 married Edward Law, Earl of Ellenborough. She was divorced for cause in 1830, and within two years married Baron Venningen. She afterward married a Greek general, who deserted her. In 1855 she left Athens for the East, and on the road to Palmyra met the Arab chief Midjouel and married him. This peculiar union seemed the most stable for this woman of many marriages. Midjouel spent half the year with his "Ianthe," as she styled herself, and the remainder with his harem in the desert, where she visited him once a month. She lived this curious desert life to the end of her checkered career, and died in September, 1881. Kinglake dealt with her curious life in his *Eöthen*, and thus preserved her memory from oblivion.

ELLENRIEDER, MARIE, a German painter of excellence; born at Constance, Germany, in 1791; studied in Munich, and in 1820 went to Rome to perfect her knowledge of art. On her return to Germany, she painted a *Martyrdom of St. Stephen* as an altar-piece for the Roman Catholic Church at Karlsruhe. She afterward was appointed court painter at Munich, but subsequently fixed her residence at Constance, and devoted herself exclusively to her profession. Among her principal pieces are the *Transfiguration of St. Bartholemy; Christ Blessing Little Children; Mary and the Infant Jesus; Josesph and the Infant Jesus; St. Cecilia; Faith, Hope and Charity;* and a *Madonna.* She died in June, 1863.

ELLET, CHARLES, an American soldier and civil engineer; born in Penn's Manor, Bucks County, Pennsylvania, January 1, 1810. He was educated at the Polytechnic School in Paris and upon his return to America built at Fairmount, Philadelphia, the first wire suspension bridge in the United States, and in 1845 planned a suspension bridge at Niagara Falls adapted for railway purposes. He constructed a bridge 960 feet long across the Ohio River at Wheeling; built a remarkable temporary track leading over the Blue Ridge, and he was also prominent in the works to improve the navigation of the Knanwha River. He was employed on the Baltimore & Ohio railroad, the Reading railroad and other important enterprises, and in 1846 was president of the Schuylkill Navigation Company. In the Civil War he was commissioned as colonel of engineers, converted into rams a dozen powerful steamers of light draught built for use on the Ohio and Mississippi rivers. With this fleet he rendered valuable assistance in the naval battle at Memphis where he sunk and disabled several of the enemy's vessels. He exposed himself under fire and was struck by a musket ball above the knee, from the effects of which he died. He wrote an *Essay on the Laws of Trade, in Reference to the Works on Internal Improvement in the United States* (1839); *On the Physical Geography of the Mississippi Valley, with Suggestions as to the Improvement of the Navigation of the Ohio and Other Rivers* (1851); *The Mississippi and Ohio Rivers, Containing Plans for the Protection of the Delta from Inundation* (1853); a pamphlet on *Coast and Harbor Defences, or the Substitution of Steam Battering Rams for Ships of War* (1855), and many other scientific works. He died at Cairo, Illinois, June 21, 1862. W.M.C.

ELLICE ISLANDS. See POLYNESIA, Vol. XIX, pp. 434, 435, 441.

ELLENSBURG, a city and the county seat of Kittitas County, Washington, in the central part of that state. It lies upon the Yakima, a tributary of the Columbia River, in a mining and agricultural region. It is reached by the Northern Pacific railroad, and had in 1900 a population of 1,737. W.F.J.

ELLENVILLE, a village of Ulster County, New York, in the eastern part of the state. It lies on Basher's Kill, at the western foot of the Shawangunk Mountains, near Lake Mohonk and Lake Minnewaska. It is a favorite summer resort, is the seat of a large academy, and has some manufacturing industries. It is reached by the New York, Ontario and Western railroad, and is about seventy miles from New York city. Its population in 1900 was 2,879. W.F.J.

ELLERY, WILLIAM, an American public man; born in Newport, R. I., Dec. 22, 1727. He graduated at Harvard in 1747 engaged in mercantile pursuits in Newport, being also for some time naval officer of the Colony of Rhode Island; and in 1770 commenced to practise law. In 1776–81 he was a member of the Continental Congress, and as such signed the Declaration of Independence. He was again a delegate, 1783–85; was appointed chief justice of Rhode Island in 1785; and in 1790 was appointed collector of Newport, a position which he held till his death in that city, Feb. 15, 1820. E.E.T.

ELLICOTT, ANDREW, an American civil engineer; born in Bucks County, Pa., Jan. 24, 1754. He was employed on many boundary commissions. In 1789 he made the first accurate survey of the Niagara River, and in 1790 he was employed in laying out the city of Washington. In 1792 he was appointed surveyor-general of the United States, and in 1795 he built Fort Erie and plotted the towns of Erie, Warren, and Franklin. In 1796 he was employed to determine the boundaries between United States and Spanish territory. He was next appointed secretary of the Pennsylvania land office, and in 1812 became professor of mathematics at West Point where he died, Aug. 28, 1820. E.E.T.

ELLICOTT, CHARLES JOHN, an English divine, bishop of Gloucester and Bristol; born at Whitwell, near Stamford, April 25, 1819. He graduated from Cambridge University in 1841, and was elected fellow of St. John's College. In 1848 he became rector of Pilton, Rutlandshire, and professor of divinity at King's College, London, in 1858; Hulsean lecturer at Cambridge in 1859, and Hulsean professor of divinity the year after. He was nominated dean of Exeter in 1861, and raised to the episcopal bench in 1863. Dr. Ellicott was chairman for 11 years of the New Testament Revision Committee, and well

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known as a commentator on the epistles of the New Testament.

ELLICOTT CITY, the county seat of Howard County, central Maryland, on the Patapsco River, 10 miles S.W. of Baltimore, deriving its name from its founders, the Quaker father and uncle of Andrew Ellicott (q.v., in these Supplements). It has two cotton factories, a large flouring-mill, a barrel factory, machine-shop, a foundry and valuable granite-quarries. It is the seat of Rock Hill and of St. Charles colleges. Population, 1900, 1,331.

ELLICOTTVILLE, a village of Cattaraugus County, western New York, on Great Valley Creek, 44 miles S.S.E. of Buffalo, on the Buffalo, Rochester and Pittsburg railroad. It is in an agricultural region. Population, 1900, 886.

ELLINWOOD, FRANK FIELDS, an American clergyman and author; born in Clinton, New York, June 20, 1826. He was graduated from Hamilton College in 1849 and was ordained a minister in the Presbyterian Church in 1853. He was a pastor at Belvidere, New Jersey, and at Rochester, New York, until 1870, and became secretary of foreign missions for that denomination in 1871. His published works include *The Great Conquest* (1876); *Oriental Religions and Christianity* (1892); *Questions and Phases of Modern Missions* (1899). W.M.C.

ELLIOT, JEAN (1727–1805). See COCKBURN, MRS. ALISON, Vol. VI, p. 90.

ELLIOTT, A. MARSHALL, educator, was born at Wilmington, N. C., on January 24, 1846, and was graduated from Harvard University in 1868. He studied languages in France, Germany, Italy, Spain and elsewhere, and in 1876 became professor of the Romance Languages in Johns Hopkins' University. He was United States Commissioner to the Paris Exposition of 1900. W.F.J.

ELLIOTT, CHARLES, an American clergyman; born in Killybegs, Ireland, May 16, 1792. He was engaged in the work of the ministry, Ohio Methodist Episcopal Conference, 1818–27; professor of languages in Madison College, Pennsylvania, 1827–31; presiding elder of the Pittsburg district, 1831–34; editor of the *Pittsburg Conference Journal*, 1834–36, and of the *Western Christian Advocate*, 1836–48 and 1852–56; professor in Iowa Wesleyan University, 1857–58, and its president, 1858–60 and 1864–67; editor of the *Central Christian Advocate*, 1860–64. He died in Mt. Pleasant, Ia., Jan. 6, 1869. E.E.T.

ELLIOTT, CHARLES LORING, artist, was born at Scipio, N. Y., in 1812, studied painting under Trumbull and others. He devoted himself almost exclusively to portrait work, and produced about seven hundred such pictures, including many of eminent men, generally marked with much fidelity to life and with vigor of coloring and execution. He was elected a National Academician in 1846, and died at Albany, N. Y., on September 25, 1868. W.F.J.

ELLIOTT, STEPHEN, an American naturalist; born in Beaufort, S. C., Nov. 11, 1771. He graduated at Yale in 1791; was a member of the State legislature, 1793–1812; and president of the Bank of the State from 1812 till his death. In 1813 he founded the Literary and Philosophical societies of South Carolina, of each of which he was president. In 1825 he aided in founding the Medical College of South Carolina and was elected professor of natural history and botany. He wrote *Botany of South Carolina and Georgia*. He died in Charleston, S. C., March 28, 1830. E.E.T.

ELLIOTT, STEPHEN, JR., clergyman, son of Stephen Elliott (q.v.), was born at Beaufort, S. C., on August 31, 1806, and was educated at Harvard and South Carolina College. He practiced law until 1833, when he entered the ministry of the Protestant Episcopal Church, and in 1835 became chaplain and professor of evidences of Christianity in South Carolina College. In 1841 he was made bishop of Georgia, and in that place made earnest but unavailing efforts to organize a great church university in the south. During the Civil War he was a strong supporter of the Confederacy. He died at Savannah on December 21, 1866. W.F.J.

ELLIOTT, WILLIAM, an American lawyer; born in Beaufort S. C., Sept. 3, 1838; educated at Beaufort College, Harvard Univ. and the University of Virginia; entered the profession of law in 1861, and served as an officer in the Confederate army during the war of the Rebellion, elected a member of the state legislature and intendant of Beaufort in 1866; was a delegate to the Democratic national convention in 1876 and 1888, and a Democratic Presidential elector for the state at large in 1880. He was elected a Representative from the seventh Congressional district of South Carolina to the Fiftieth Congress; was declared elected to the Fifty-first Congress, but was unseated by the House of Representatives. He was elected from the same district to the Fifty-second Congress in 1890.

ELLIPSE. See CONIC SECTIONS Vol. VI, p. 242.

ELLIS, ALEXANDER JOHN (formerly Sharpe), an English mathematician and phonologist; born at Hoxton, June 14, 1814; he was educated at Shrewsbury, Eton and Cambridge; became in 1864 fellow of the Royal Society, and in 1870 of the Society of Antiquarians. He died Oct. 28, 1890. Among his writings are *An Extension of Phonography to Foreign Languages* (1848); *Algebra Identified with Geometry* (1874). In 1875 he translated *Theory on Sensations of Tone* by Helmholtz. G.A.S.

ELLIS, GEORGE EDWARD, clergyman, was born in Boston on August 8, 1814, and was graduated at Harvard in 1833. He became a minister of the Unitarian Church, and was for many years settled over a church at Charlestown, Mass. From 1857 to 1864 he was also professor of doctrinal theology in the Divinity School of Harvard University. For a number of years he was editor of the *Christian Register*, and also of the *Christian Examiner*. As president of the Massachusetts Historical Society he studied and wrote much concerning the early history of New England. Among his books were *A Half Century of the Unitarian Contro-*

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versy, History of the Battle of Bunker Hill The Puritan Age and Rule, and *The Red Man and the White Man*. He died in Boston on December 20, 1894. W.F.J.

ELLIS, ROBINSON, an English Latin scholar; born in 1834 at Banning; studied at Rugby and Oxford; became in 1870 teacher of Latin at the University College of London, and in 1883 Latin reader at Oxford. He published *Catulli Veronensis, Liber; A Commentary on Catullus; The Poems and Fragments of Catullus; The Ibis of Ovid; Glosses on Apollinaris Sidonius; The Fables of Arianus; The Fables of Phædrus; The Minor Poets Ascribed to Vergil*. G.A.S.

ELLSKWATAWA, prophet and chieftain of the Shawnee Indians, and brother of Tecumseh, was a native of Ohio and was born about 1775. He and his followers occupied lands on the Wabash River, and as a result of the United States's purchase of a part of them he went upon the war-path. He was one of the foremost Indian leaders at the battle of Tippecanoe, and afterward fled to Canada. In the latter part of his life he returned to the United States and lived with the Shawnees on the plains beyond the Mississippi. He had a great reputation as a prophet and "medicine man," and exerted a commanding influence over his tribe. W.F.J.

ELLSWORTH, a town and the county seat of Ellsworth County, Kansas, is in the heart of a grain growing district, and also has valuable deposits of rock salt, clay, gypsum and other minerals. It lies on the Smoky Hill River, and is reached by the Union Pacific and the St. Louis and San Francisco railroads. Its population in 1900 was 1,549. W.F.J.

ELLSWORTH, a city and the county seat of Hancock County, Maine, in the southeast part of the state. It is at the head of the estuary of the Union River, a few miles north of Mount Desert Island, and has shipping, ship-building and fishing industries, and is a summer resort. It is reached by the Maine Central railroad. Its population in 1900 was 4,297. (See ELLSWORTH, Vol. VIII, p. 140.) W.F.J.

ELLSWORTH, a town and the capital of Pierce County, central western Wisconsin, 40 miles S.E. of St. Paul, Minnesota, on the Chicago, St. Paul, Minneapolis and Omaha railroad. It has a stave-mill, steam saw-mill and a trade in farm produce. Population, 1900, 1,052.

EPHRAIM ELLSWORTH.

ELLSWORTH, EPHRAIM ELMER, soldier; was born on Staten Island, New York, on April 23, 1837, went to Chicago, studied law, and became interested in military life. He organized in 1859 a fine body of troops in Chicago. In 1861 he went to Washington with President Lincoln, and thence to New York, where he organized a regiment of firemen, known as Fire Zouaves, and was its colonel. While at the head of this regiment he removed a Confederate flag from a hotel at Alexandria, Virginia, and was shot dead by the hotel-keeper, on May 24, 1861. W.F.J.

ELLSWORTH, OLIVER, an American jurist; born in Windsor, Connecticut, April 29, 1745. He was graduated from the College of New Jersey in 1766 and in 1768 commenced the practice of law. In 1777 he was chosen a delegate to the Continental Congress and in 1780 was elected a member of the council of Connecticut. In 1784 he was appointed a judge of the superior court. In 1787 he was elected to the convention which framed the Federal constitution, and was afterward a member of the state convention, where he earnestly advocated the ratification of that important instrument. When the Federal government was organized in 1789, he was chosen a member of the Senate. This elevated position, which he filled with dignity, he occupied till in March, 1796, he was nominated by Washington chief justice of the Supreme Court of the United States as the successor of Mr. Jay. Though his attention had been for many years abstracted from the study of the law, yet he presided in that high court with the greatest reputation. His charges to the jury were rich not only in legal principles but in moral sentiments, expressed in a simple, concise style. Towards the close of the year 1799 he was appointed by President Adams envoy extraordinary to France for the purpose of settling a treaty with that nation. With much reluctance he accepted the appointment. In conjunction with his associates, Davie and Murray, he negotiated the treaty of March 2, 1800. Having accomplished the business of his embassy, he repaired to England for the benefit of the mineral waters, as his health had suffered much in his voyage to Europe. Convinced that his infirmities must incapacitate him for the future discharge of his duties on the bench, he transmitted a resignation of his office of chief justice at the close of the year 1800. He returned to his home at Windsor where in 1802 he became a member of the governor's council, retiring to private life in 1806. His career was one of the most notable among American jurists. In his debates in legislative bodies he was sometimes ardent, but his ardor illuminated the subject. In private life he was a model of social and personal virtue. He was just in his dealings, frank in his communications, kind and obliging in his deportment, easy of access to all, beloved and respected by his neighbors and acquaintances. Amid the varied honors accumulated upon him by his country he was unassuming and humble. He died in Windsor, Connecticut, November 26, 1807. W.M.C.

ELLWANGEN, a town of eastern Württemberg, on the Jagst River, 55 miles N. of Ulm by rail. It has a cathedral, a hospital and a gymnasium; also a bleaching establishment and tanneries. The old castle of Hohen-Ellwangen has been used as an agricultural school since 1843. Population, 4,793.

ELM, a village of Switzerland, at the head of a

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valley, in the canton of Glarus, 10 miles S.W. of Glarus, formerly celebrated for its sulphur spring. In 1881 the whole of the northern side of the Tschingelberg (10,230 feet) crashed down upon it, destroying a large part of the village, and filling the valley with *débris*. Population, 1,028.

ELMALU, a town of southwestern Asia Minor, in the province of Konieh, on the Lycian table-land, 45 miles W. of Adalia. It has manufactories of red leather and dye-works. Population, 25,000, chiefly Greeks and Armenians.

ELMHURST, a village of Dupage County, northeastern Illinois, 15 miles W. of Chicago, on Chicago and Northwestern railroad. It has a Lutheran college. The town is principally a residence suburb of Chicago. Population 1900, 1,728.

ELMIRA, a city of New York, and capital of Chemung County. Six railroads center here; viz., the New York, Lake Erie and Western, the Delaware, Lackawanna and Western, the Northern Central, the Lehigh Valley, the Elmira, Cortland and Northern, and the Tioga. The city contains ninety miles of streets, most of which are paved, lined with handsome shade trees, and well lighted with gas and electricity. The area of the city is three thousand acres. A board of trade was organized in 1879. Manufacturing interests are numerous and extensive, giving employment to about six thousand persons, and including iron bridges, fire-extinguishing engines and apparatus, furnaces, silk and woolen fabrics, etc. The educational advantages of Elmira are excellent. The city has over three million dollars invested in school property. There are nine public schools, four private select schools, three commercial colleges, and the Elmira Female College (Presbyterian)—Elmira College since 1890—with an endowment of one hundred thousand dollars. Among the charitable institutions are the Arnot-Ogden Memorial Hospital, Home for the Aged, Orphan's Home, Industrial School, and the Anchorage. The State Reformatory here is remarkable as embodying in its practice the ideas in penology of Z. R. Brockway, the superintendent. Each inmate has to work out his own position, the few incorrigibles being remitted to the state's prisons. The city contains six parks, among them Eldridge Park, with an area of 89 acres, Riverside Park, 40 acres, and Grove Park, 10 acres. During the war of the Rebellion Elmira was a recruiting-camp and a place of confinement for prisoners of war. Population 1890, 30,983; 1900, 35,672. See ELMIRA, Vol. VIII, p. 141.

EL MISTI, a volcano of the Andes, in Arequipa department, Peru, overlooking the city of Arequipa; height 20,320 feet. Harvard college has an observatory here at a height of 8,060 feet, and a meteorological station at 19,200 feet.

ELMORE, a town of Ottawa County, Ohio, in the northern part of the state, on Portage River, twelve miles from Lake Erie. It is reached by the Lake Shore and Michigan Southern railroad. Its population in 1900 was 1,025. W.F.J.

ELMSHORN, a town of Schleswig-Holstein, Prussia, 20 miles N.W. of Hamburg, on a railroad and on the Kruckau, a navigable stream and feeder of the Elbe. It is well built, has considerable manufactures, and an active trade in grain; it has a boat-building yard and tanneries. Population, 9,752.

ELMSLEY, PETER, was born in England in 1773, and was graduated from Oxford. He was a contributor to the *Edinburgh Review*, among his articles being reviews of Heyne's *Homer;* Schweighäuser's *Athenæus;* Blomfield's *Prometheus*, and Porson's *Hecuba*. He aided in an attempt to decipher the papyri found at Herculaneum. He died on March 8, 1825. W.F.J.

ELMWOOD, a village of Peoria County, northern central Illinois, 163 miles S.W. of Chicago, on the Chicago, Burlington and Quincy railroad. Principal industries, mining coal and making paper. Population 1890, 1,548; 1900, 1,582.

ELOHIM (Heb., plural of *Elôah;* Arab., *Ilâh;* Chald., *Elâh;* Syr., *Alôh*), might, power; in plur., intensified, collective, highest power—great beings, kings, angels, gods, Deity. As a *pluralis excellentiæ* or *majestatis*, and joined to the singular verb, it denotes, with very rare exceptions, *the One* true God. Joined to a plural verb, however, it usually means gods in general, whether including the One or not. For the place of this word, as distinguished from Yaveh, or Jehovah, in the higher criticism of the Pentateuch, see PENTATEUCH, Vol. XVIII, pp. 516–517.

EL PASO, a city of Woodford County, Illinois, in the north-central part of the state, on the Illinois Central and Toledo, Peoria and Western railroads. It has some manufacturing industries. Its population in 1900 was 1,441. W.F.J.

EL PASO, a city of western Texas, and the capital of El Paso County, situated on the left bank of the Rio Grande River, at one of the great gateways of travel between the United States and Mexico. In 1881 the first railroad reached the city; ten years later the river was bridged and five great trunk lines centered here, having their main connections with the Pacific Coast, the Mexican capital and the great grazing and mining regions of the Rocky Mountains. It is 3,830 feet above sea-level and has a mean annual temperature of 63° F. There are near by lacustrine salt deposits, and the region is supposed to be rich in minerals. It has a constantly increasing trade, and the customs revenue is important. There is no municipal debt. The people are of mixed races, Mexicans, Indian half-breeds and all varieties of Americans. The United States government has established a military post in the vicinity, the citizens having donated one thousand acres of land for that purpose. Population 1890, 10,338; 1900, 15,906.

ELPHINSTON, JAMES, grammarian; was born in Edinburgh, Scotland, in 1721, was educated at the university there, and in 1751 opened a school at Kensington. He was an advanced "spelling reformer." His chief works were *French and English Languages; Education; The English Language*, and *Fifty Years' Correspondence*. He died on October 8, 1809. W.F.J.

EL RENO, a village and the capital of Canadian County, central Oklahoma, near the Canadian River, on the Chicago, Rock Island and Pacific, and Choctaw, Oklahoma and Gulf railroads, 33 miles W.

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of Oklahoma. It has flour-mills, manufactories of wagons, carriages, etc., and several schools, churches and public buildings. Population 1900, 3,833

ELSSLER, FANNY, a famous dancer; born June 23, 1810, at Gumpendorf, made her *début* in 1817 at the Kärthnerthor Theater. In 1825 she went to Naples, where she became a pupil of Goja. From 1830–51 she toured Germany, Italy, America, England, and Russia, winning fame and wealth. She retired in 1851 to Vienna, where she died on Nov. 27, 1884. Her sister, THERESE, born April 5, 1808, also a noted danseuse, entered, in 1850, a morganatic marriage with Prince Adalbert, of Prussia, was raised to the rank of a Baroness of Barnim, and died at Meran, Nov. 19, 1878. G.A.S.

ELSTER, the name of two rivers of Germany, the White and the Black Elster. The White Elster rises at the foot of the Elster Mountains, in the kingdom of Saxony, near the northwestern boundary of Bohemia, flows in a northerly direction, and falls into the Saale three miles south of the town of Halle, in Prussia. Its chief affluent is the Pleisse, from the right. Total length, 110 miles. The Black Elster rises in the western part of the kingdom of Saxony, within two miles of Elstra, flows northwest, enters Prussia, and joins the Elbe eight miles southeast of Wittenberg. Length, 105 miles.

ELSTER, KRISTIAN, a Norwegian novelist; born March 4, 1841. He was author of *Tora Trondal* and *Farlige Folk*, both works of merit. The latter had not yet appeared in print at the time of the author's death. Some short sketches of his were collected and published by Alexander Kjilland in a volume entitled *Solskyer* (1882). He died April 11, 1881.

ELSTRACKE, RENOLD, a noted English engraver; born, probably in Belgium, in the sixteenth century. His engravings, including portraits of the kings of England, of Mary Queen of Scots, and other notables, are much sought after, chiefly from their rarity.

ELSWICK, a parish on the outskirts of Newcastle, Northumberland County, northern England, on the River Tyne, noted for its extensive gunworks. The works of Sir W. G. Armstrong, Mitchell and Company are located here. The engineering section of these works dates from 1847, the ordnance-works from 1857. The frontage on the river is about one mile, the entire area about 125 acres, and 14,000 people are employed. Population 51,600.

ELTON, CHARLES ISAAC, English jurist and ethnologist; born at Whitestaunton, Somerset, Eng., in 1839; died April 23, 1900. Educated at Cheltenham and Balliol College, Oxford; became fellow of Queen's College in 1862; was called to the bar at Lincoln's Inn in 1865, and afterward became a Queen's Counsel. He was returned to Parliament as a Conservative in 1884, was defeated in 1885, but again returned the year after. His books had already gained him reputation as a jurist, when he placed himself in the front rank of English ethnologists by his *Origins of English History* (1882). His other works include *Norway: The Road and the Fell* (1864); *The Tenures of Kent* (1867); *A Treatise on Commons and Waste Lands* (1868); *A Treatise on the Law of Copyholds and Customary Tenures of Land* (1874), and *Custom and Tenant-Right* (1882).

ELWOOD, a town of Madison County, northwestern central Indiana, 38 miles N.N.E. of Indianapolis, on the Lake Erie and Western and the Pittsburg, Cincinnati, Chicago and St. Louis railroads. It has saw and stave mills, glass, tin and flax factories, and exports grain and live-stock. Population 1890, 2,284; 1900, 12,950.

ELY, RICHARD THEODORE, an American political economist; born at Ripley, New York, April 13, 1854; educated at Fredonia and at Dartmouth and Columbia Colleges, and at the University of Heidelberg, Germany; professor of political economy at Johns Hopkins University (1885–92); subsequently director of the school of political science and professor of political economy in the University of Wisconsin, a position he continues to fill. His writings have been freely criticised on the score of socialistic tendencies, the State Superintendent of Public Education of Wisconsin having charged him with the inculcation of pernicious theories, an accusation from which he was officially exonerated by the board of regents of the university. His works include *French and German Socialism in Modern Times* (1883); *The Past and Present of Political Economy* (1884); *Recent American Socialism* (1885); *The Labor Movement in America* (1886); *Organization of the American Economical Association* (1886); *Coöperation in America* (1887); *Problems of To-Day* (1888); *An Introduction to Political Economy* (1889); *Social Aspects of Christianity* (1889); *Outlines of Economics* (1893); *Socialism and Social Reform*, a publication particularly distasteful to his professional opponents (1894); and *Taxation in American States and Cities*, one of his more recent works.

RICHARD T. ELY

ELYRIA, a city and the county seat of Lorain County, Ohio, in the northern part of the state. It lies on Black River, eight miles from Lake Erie, and 25 miles west by south from Cleveland. It has considerable manufacturing industries and stone quarries. It is reached by the Lake Shore and Michigan Southern and the Cleveland, Lorain and Wheeling railroads. Its population in 1900 was 8,791. W.F.J.

ELYSÉE, THE PALACE OF THE, formerly Elysée Bourbon, a stately palace of Paris, situated between the street of Faubourg St. Honoré and the Champs Elysées. Erected in 1718 for the Count of Evreux by the architect Molet, it was used successively as a residence by the Marquis de Pompadour; the financier Beaujon; the last Duchess of Bourbon; Murat; the Duke of Berry, and his son, the Count of Chambord, from 1820–30; Louis Napoleon, from 1848–52, and, since 1871, has been

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the residence of the president of the French Republic. G.A.S.

ELZE, KARL, a German philologist; born at Dessau, May 22, 1821. He studied classical philology and English literature at Leipsic and Berlin, and became, in 1876, professor of English philology at the University of Halle, where he died Jan. 21, 1889. His biographies of Byron and Shakespeare were translated into English. He also wrote *Notes on Elizabethan Dramatists* (3 vols., 1880–86), and *Grundriss der Englischen Philology* (1887). G.A.S.

EMANCIPATION. See SLAVERY, Vol. XXII, pp. 137–153.

EMBA, Asiatic Russia, a river of the western province of Uralsk, which flows into the northeastern corner of the Caspian Sea, after a southwesterly course of about 350 miles from its source in the Mugadzhar Mountains. It is the Kirghiz Jem or Jim. C.L.S.

EMBARGO, a public proclamation issued by the authorities of a state, prohibiting vessels from departing from certain ports or from all ports of the state. A civil embargo is the detention of the vessels belonging to the state issuing the proclamation. A hostile embargo is the detention of vessels belonging to the enemy. If war results while a hostile embargo is in force, the vessels detained are confiscated. An embargo may be ordered upon all vessels in port at the time, or upon certain vessels only, and frequently prohibits the exportation of goods until the embargo is released. An embargo is ordered only in time of war, or of threatened hostilities.

EMBIOTOCIDÆ. See ICHTHYOLOGY, XII, 730.

EMBLEM, an object or the figure of an object used as the visible sign of an idea, as, a balance is an emblem of justice; a scepter the emblem of authority, and a circle, having no apparent beginning or end, is an emblem of eternity.

EMBLICA, a genus of plants of the family *Euphorbiaceæ*, having a fleshy fruit. *E. officinalis* is a tree found in most parts of India, with a crooked stem, thinly scattered spreading branches, long narrow leaves, minute greenish flowers, and a globular fruit, about the size of a gall-nut, a source of tannin.

EMBOLISM. See SURGERY, Vol. XXII, p. 719.

EMBOLITE. See MINERALOGY, XVI, 400.

EMBRACERY, the offense usually called jury-bribery, and consists of any act or attempt intended to corrupt or influence a jury, or any juryman, to decide favorably to one side in the controversy. Any act which tends to influence the verdict of a jury, if done for that purpose, is embracery, and may consist of the use of money, promises, persuasion, threats or entertainment. Acceptance or solicitation of bribes by jurymen is also embracery.

EMBRASURE. See FORTIFICATION, IX, 381.

EMBRYOGENY, in botany, the development of the embryo from the spore (whether sexual or asexual). The first few segmentations have been considered quite important in indicating phylogeny, as they are found common to large groups whose members later become very diverse. The study of embryogeny demands careful manipulation and a special technique. See MORPHOLOGY, in these Supplements.

*EMBRYOLOGY. The rapid advances in the science of embryology in the past ten years have brought about so many radical changes, as regards the facts of development in animals and plants, and their interpretation, that a restatement of the scope and aims of the science in its new aspect is rendered desirable. It is the object of the present article to supplement, on the animal side, the original article on EMBRYOLOGY, Vol. VIII, pp. 150–156, and that on REPRODUCTION, Vol. XX, pp. 419–444. in such a way as to show the direction of progress and indicate some of the newer lines of investigation upon which embryologists have been engaged.

It is first to be observed that embryology is passing through a transition stage, in which its problems are being subjected to a new method of treatment. They are being approached from the standpoints of physiology and experiment, and such a wealth of new facts has already been brought to light, that, while it is clear the science is in a great wave of advance, many fundamental conceptions are undergoing modification, and are thrown into an unsettled condition. It is impracticable at the present time, particularly in the limits prescribed for this article, to attempt to give a systematic summary of the advance in knowledge regarding the embryology of the different groups of animals. The best course is to point out the line of progress and mention some of the newer problems of the science.

In reviewing the progress of the past ten years it is not merely great extension of knowledge in this department that is encountered, but the fact that the increase in knowledge has often made fundamental changes in the interpretation of the known facts; much that was regarded as established is, in the light of new investigation, found to be inadequate, and is now undergoing reconstruction.

During this period the importance of the embryological record to morphologists and physiologists has been more fully demonstrated than ever before. Embryology is now recognized as the most suggestive of the biological sciences, since it gives the best basis for understanding organisms in their relation to one another. It is the richest field open to investigators to furnish clews to the meaning of either adult or rudimentary structures. It was long since established by embryological study that every organism, no matter how complex, starts in the condition of a single microscopic cell, and between this simple state and the adult organism every graduation is exhibited. Each time a particular organism is developed, these changes are repeated in the same sequence. It is clear, that if we could follow these processes step by step, and see every modification and every complication as it is added, we should have a key for understanding the fundamental plan of construction of tissues, organs and animals. The adult stage of any animal represents the last step in a series of gradually acquired modifications, and it is evident that the adult anatomical conditions can be understood only in the light of their development. Therefore, we are driven to embryology for

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the full elucidation of any problem in anatomy. If, for instance, the vertebrate brain is examined after its modifications are all made, i.e., in the adult condition, we are dealing with a structure of remarkable complexity, and the fundamental plan of its construction (as a segmented tube) cannot be discovered so long as observations are confined to adult brains. Even though we resort to comparative studies, observing the brains of the simplest animals, and comparing them with those of the more complex, nevertheless the real constructive plan in which all vertebrate brains agree—in being composed of a series of (at first) similar segments—will not be revealed. Fortunately, the structure can be traced in the process of becoming; and its primitive condition in the embryo is accessible to observation. What is true of the brain in this regard is true likewise of the other organs of the body, and embryology is thus shown to be basal in its relation to the science of morphology.

But it is to be remembered there is something more important about a living organism than its structure,—namely, its life,—and the analysis of its vital actions is the chief aim of biological study. It will therefore be well to inquire how embryological study is related to the physiological side of biology. Whitman states the situation with great clearness, as follows: "Morphology raises the question, How came the organic mechanism into existence? Has it had a history, reaching its present state of perfection through a long series of gradations, the first term of which was a relatively simple stage? The embryological history is traced out, and the palæontological records are searched, until the evidence from both sources establishes the fact that the organ or organism under study is but the summation of modifications and elaborations of a relatively simple primordial. This point settled, physiology is called upon to complete the story. Have the functions remained the same throughout the series? or have they undergone a series of modifications, differentiations and improvements more or less parallel with the morphological series?"

There is good reason to believe that qualitative changes take place in the protoplasm as development proceeds. For example, if the right and left halves of a vertebrate egg are mechanically separated in the earliest stages of segmentation, the separated parts are capable of regenerating the part removed, and building up a complete symmetrical embryo that is smaller than the normal embryo. This power is soon lost, as Wilson has shown, in *Amphioxus* embryos. If the cells are separated after eight cells have been formed by segmentation, the protoplasm cannot produce a gastrula. The separated blastomeres undergo partial development, but cannot reach even the gastrula condition. The protoplasm has become so far differentiated that a separated part of the embryo is incapable of regenerating the whole, but in the two or four cell stages, the physiological differentiation has not proceeded so far, and a regeneration of the whole is possible.

Many other experiments of this nature indicate that "there is a steady increase in complexity of the idioplasm (or protoplasm) in the growing embryo." Wilson has pointed out the bearing of this in discussing homologies. The "adult homologies need not necessarily pre-exist in the form of egg-homologies, but may be created as ontogeny progresses." This leads us to qualify what was said above about the comparative study of adult structures. Homologies are not all indicated or settled by embryology. Comparative embryology and comparative anatomy should be pursued simultaneously, each in the light of observations derived from the other.

The scope of embryology, in its modern aspect, may now be indicated. The science embraces the study, comparatively and comprehensively, of all changes, both structural and physiological, through which an organism passes on its way from the egg to the period of hatching, and, also, the larval stages, where they exist, that extend from hatching to the metamorphosis. It deals comprehensively with all the phenomena of development, takes into account the responses of the embryo to its environment and the multitudinous questions that arise along the way. It has been shown that embryology is important in morphology, it is also very important to the comprehension of physiology, and, through these two sciences, is related to medicine.

In embryological study one meets with many unexpected and problematical structures. The great series of animals, in passing through the different embryonic stages, exhibit many structures not present in the adult. Familiar examples of such rudimentary structures are the gill-slits and gill-arches that make their appearance in the embryos of all higher animals, not excepting man. In birds and mammals they are not of use to the embryo, and energy, apparently not well directed, is consumed in forming them. Moreover, while they are present, the circulatory system is like that of a fish; the fish-like heart and aortic arches passing through each branchial arch. These blood-vessels are built up, and almost immediately undergo degeneration, some being entirely obliterated, and others remaining in a modified condition as a part of the circulatory system of later embryonic life. Rudimentary teeth make their appearance in the embryo of the whalebone-whale, but they are not destined to cut the gum, and disappear without having been of use to the animal. The pineal gland, remnant of a once functional eye, continues to appear in the brains of all vertebrates.

These, and a multitude of similar cases, lead to a consideration of how the facts of embryology are interpreted. The observed facts have led to the belief that animals are constrained to repeat in their individual development the general features of development of the race. This hypothesis is called the recapitulation theory. It was suggested in the writings of Von Baer, but was first clearly enunciated by Fritz Müller in 1863, and has been adopted by embryologists to account for the occurrence of these otherwise inexplicable structures. The appearance of gills in the bird, and mammal, is accounted for by supposing that they are derived from ancestors of aquatic habits, in which the gills were of use as breathing-organs, and they have been handed along to birds and mammals through

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the operation of heredity. But embryologists have been forced to recognize that the steps in ancestral development are not repeated in a complete and orderly succession in any animal, and the recapitulation theory, which at first would seem to make everything plain, must be extensively qualified. Every structure that appears in the embryo is not necessarily a survival. Some are undoubtedly secondarily acquired for the advantage of the growing embryo, and it thus becomes a matter of importance to distinguish between what is ancestral and what is secondarily acquired. There are also other facts that tend to obscure the embryological record. There is a tendency for animals to develop along a direct line and to omit ancestral phases; there is also a tendency to distortion: so that the sequence of organ-formation does not represent the sequence of their appearance in the race. There is also a tendency for certain stages to be unduly prolonged and others abbreviated. At first the recapitulation theory was applied with great confidence to account for the peculiarities of every embryological structure, but since this is found to be going too far, there has been a reaction against the too extensive application of this theory. "The great fault of embryology has been the tendency to explain any and every operation of development as merely the result of inheritance." It will be shown in the section on experimental embryology that surrounding conditions have much to do with individual development, and the course of events may depend largely upon stimuli coming from without, and not exclusively on an inherited tendency. It is, nevertheless, clear that the recapitulation theory is suggestive and of great value; it is not to be set aside, but to be applied with care and circumspection.

A pertinent question arises at this point: Why do animals continue to recapitulate, in part, their ancestral phases? They certainly would not build up useless organs if they were not in some way constrained to do so. There is clearly an attempt on the part of the organism to shake itself free from the past and develop along a direct line, but it is never completely successful. The protoplasm cannot escape from the influence of its past experiences. Kleinenberg has suggested that the developmental process depends on a succession of stimuli, and "that each historic stage in the evolution of an organ is necessary as a stimulus to the development of the next succeeding stage, and that the reason for the extraordinary persistence, in embryonic life, of organs which are rudimentary and functionless in the adult, may be that the presence of such organs in the embryo is indispensable as a stimulus to the development of the permanent structures of the adult. Should this theory prove to be well founded, it will afford a ready and welcome explanation of many perplexing facts in the development of animals": MARSHALL, *Vertebrate Embryology*, p. 34.

The science of embryology has just passed a period characterized by great progress, arising from critical studies of the facts of individual development. Many memoirs of a high order have been published, covering a wide range of topics. The formation of ova and the fertilizing agents have been critically studied, and much light has been thrown on the process of fertilization; the segmentation of the egg has received careful attention, and the knowledge of the formation of germ-layers, tissues and organs has been greatly advanced. During this period great attention has been given to technique, or the methods of preparing tissues for study. The great problem is to bring tissues under observation, with the normal relations as little disturbed as possible, so that the prepared material will represent the conditions existing in life, and no others. One great danger is that pseudo-structures will be artificially formed by the action of the reagents. "Many of the most important elements of cell-structure are invisible in life, and can only be brought to view by means of suitable fixation, staining and clearing." This shows the great importance of methods to the investigator, and why the success of a research may depend so largely on the care exercised in the use of reagents, and the mechanical part of getting sections in shape for observation. Much of the work that was done at an earlier period has now been repeated with greater refinement of technique, and also more critical observation, with the result of changing much of it. The bane of this period has been the indulgence, often on a slender basis, of the speculative spirit. Nearly every memoir of any extent published during this period contains general considerations of a speculative nature. There is now a general call for investigators to show a more judicial spirit and greater conservatism in discussing the general questions in the light of individual facts.

The science is now entering a period characterized by experimenting upon the developing organism, and observing the changes it undergoes in response to changed surrounding conditions. This is with a view to study the physiology of the embryo. It is a very promising and fruitful field of research. The results already attained by this method of study have profoundly modified some of the current views regarding the egg, and the general nature of the developmental process. The work in embryology has heretofore necessarily been mainly confined to the morphological side. It was necessary first to work out the structure of the organism, and the steps in normal development, before the more complex question of physiological differentiation could be approached. That pioneer work on structural embryology is now done, and it is possible to begin on the other side. Hereafter the morphological and physiological study of the embryo can go hand in hand to the benefit of both.

The basis upon which the experimentation rests should first be made clear. Let it be borne in mind that it is the living substance, or protoplasm, that is experimented upon. This is the only thing about the organism that is capable of responding, in the physiological sense, to external conditions. This living substance (idioplasm) is incessantly active; it is the substratum within which all vital processes, adult and embryonic, take place, and it is the substance, *par excellence*, that engages the attention of biologists. They have long since learned

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that one of its chief characteristics is its responsiveness. While protoplasm exhibits a group of vital properties, the most remarkable is, that it is impressionable, and responds to external influences, changing its own peculiar vital activities in response to external conditions. The nature of these responses is mainly in the line of adjustments.

In order to come to closer terms with this living substance, and determine its normal activities and capabilities, it must be observed under all possible conditions. It is obvious that the behavior of the idioplasm, when subjected to experimentation, may throw important light on its properties and functions. In its responses to external influences two sets of conditions are involved: the activities displayed in the protoplasm itself and the external causes by which these are modified. The former may be spoken of as the internal activities, and the latter as the external agencies. Between the two there is constant reaction, and it is evident that the life of the organism must be a series of continuous adjustments of the internal conditions to the external conditions. Many illustrations of the fact that the internal activities of protoplasm are directly influenced by external causes might be given, but a single one, based on recent experiments, will suffice. Loeb, (1892) placed fertilized eggs, that develop normally in sea-water, under slightly changed conditions. He increased the usual quantity of salt (NaCl) in the sea-water, and observed that the usual course of segmentation was interfered with. Under normal conditions, the protoplasm of the egg divides with the nucleus, and there are formed as many blastomeres as there are nuclei. In this slightly changed medium, however, the protoplasm of the nucleus (which is more active) undergoes segmentation while the cell-protoplasm remains undivided. There results a number of nuclei, distributed in unsegmented cytoplasm. If, now, the eggs in this condition are transferred to normal sea-water, the protoplasm of the cell very quickly splits into as many parts as there are nuclei. The presence of a larger quantity of salt than usual operates to reduce the irritability of the protoplasm of the egg (by reducing the amount of water contained in it), so that the stimulus to cleavage proceeding from the nucleus is not sufficient to dominate it, but as soon as the irritability is restored, by reducing the sea-water to a normal condition, then the stimulus tending to produce segmentation becomes effective. The effect of the salt is, not to destroy, but to suspend, the cleavage phenomena.

This shows that the protoplasm is acted upon by outside conditions, but is not a new point, since it was demonstrated by actual experiment, as long ago as 1882, that external forces influence directly embryological phenomena. From this date onward the results of experiments on eggs and embryos have been published in steadily increasing numbers. Within the past five or six years the field has been extensively cultivated. Pflüger and Roux were among the pioneers in this line of investigation. The former, in 1883, 1884 and 1885, published researches founded on experiments on frogs' eggs, with a view to determine the influence of gravitation on cleavage, and, also, to decide whether there is a prearranged relationship of the parts of the egg to the future embryo. On the latter point, he came to the conclusion that "the essential elements of an egg have no more prearranged relationship in position to the parts of the future embryo than do snowflakes to the avalanche they may give rise to." Born (1885) and Roux (1885), independently, experimented on the effects of gravitation on the cleavage planes, with the result of showing that its influence is insignificant, and segmentation is controlled by a power resident in the protoplasm of the egg. Roux made extensive experiments, that were published in 1887 and 1888, on the effects of mechanical injury to the eggs. He claims that the first-formed blastomeres are specialized, so that, when one blastomere of the two-cell stage is killed, the remaining cell is incapable of regenerating the other half of the embryo, but that development is carried on, and a one-half embryo is produced. He expresses the conclusion that the first four blastomeres are necessary to the building of the quadrants (right and left, anterior and posterior) of the embryo, and that the development generally proceeds like mosaic-work. The ovum is, to his mind, made up of predetermined organ-forming areas, or specialized parts definitely arranged. This is, of course, contrary to the conclusions of Pflüger, mentioned above, and also to those of most recent experimenters. According to the experiments of Hertwig and Driesch, a symmetrical, but smaller, embryo may develop from one of the first four blastomeres, and therefore they are equivalent, and not specialized. This difference in experimental results as to what may arise from a partial ovum has made the question a perplexing one. Morgan (1895) has thrown light on the matter by showing that the position of the egg makes a difference in the resulting form. In his experiments of separating the first two blastomeres, in most cases small whole embryos were formed when eggs were fixed upside down, and one-half embryos resulted when the eggs were in a normal position. Oscar Hertwig has, individually, made numerous experiments along this line, and with his brother Richard has experimented on the behavior of sea-urchin eggs toward heat, poisons and mechanical injury. In this country important experiments have been made by Loeb, E. B. Wilson, Morgan and others.

The experiments already made may be grouped, according to the nature of the agencies involved, as mechanical, thermal, luminous and chemical.

Those depending on mechanical causes involve the influence of gravitation, pressure, removal of part of the egg by shaking, extirpation, or other means, cutting or destroying the connection of the embryo with the germ-ring, etc. Most of the experiments already mentioned fall in this category. Morgan, in 1892, repeated Kastschenko's experiment of cutting the connection of the fish-embryo with the germ-ring, and found that it continued to lengthen, thereby showing that the germ-ring material is not indispensable to the growth of the embryo, as is assumed in the theory of concrescence.

It was long ago observed that the effect of increasing the temperature within certain limits is to in-

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crease the rate of development, and that lowering the temperature has the opposite effect. Temperature is also known to exert a directive influence on the germinal epithelium. As already indicated, the cells of the germinal epithelium are, at first, neither of the maternal or paternal type. An increased temperature has the effect of producing a larger percentage of female forms. Castle and Davenport (1895) have thrown light on the capabilities of protoplasm by showing that simple organisms, like *Protozoa* and tadpoles, may gradually be accustomed to high temperatures, and come to live in temperatures that would at first kill them. This is a good illustration of the adaptability of protoplasm. It acquires, gradually, a resisting power to high temperatures by responding to changed external conditions.

One illustration of the influence of light may be taken from physiological morphology. Cunningham experimented with flat fishes,—flounder, plaice and sole,—which are well known to be pigmented on the upper side, but white on the surface in contact with the bottom. He showed that the absence of pigment is due to the absence of light, and that it may be gradually formed on the lower side if that surface be made to receive the light. He arranged a mirror so that the light would be reflected on the under side of some of these fishes living in a tank with a glass bottom, and found that under the influence of light pigment was gradually formed.

Among the most noteworthy experiments yet published are those of Herbst, who observed the effect of slight changes in the chemical environment. Taking eggs that normally develop in sea-water, he found, by dissolving small quantities of different chemical substances in the water, that the organisms were profoundly influenced. He used, among other substances, the chloride, bromide, nitrate and sulphate of lithium, potassium and sodium, and experimented with eggs of sea-urchins. It is a well-known fact that the sea-urchin, in developing, builds up an immediate form (pluteus) with three long arms, which are supported by an internal skeleton of calcareous spicules. Of course this skeleton is derived from the lime-salts in the sea-water. The lime is probably taken out as a sulphate, and, by chemical processes within the protoplasm, is converted into carbonate of lime, and built into the supporting skeleton. If, now, a small quantity of lithium salt (carbonate or chloride) is added to the otherwise normal sea-water, a very different larval form arises. These salts apparently inhibit the power of the protoplasm to take up and transform the lime from the sea-water, and as there is not sufficient lime to construct an internal skeleton for the support of the arms, they are not developed. The resulting larva, instead of being like that of the normal sea-urchin, is like that of an entirely different animal, namely, tornaria. It is now to be observed that this great change is brought about by a very slight difference in the chemical environment, and leads to the conclusion that whole sets of organs may depend on the presence or absence of an apparently insignificant amount of substance.

But even more striking changes have been observed by Herbst. Embryologists have felt assured, until very recently, that the formation of the germ-layers was a fundamental feature of development that could not be altered by any external influence. The conception was, that this process depended on an inflexible and inherent law of development, which was too well established to be altered by external influences, but Herbst's experiments show that a slight change in the environment may produce changes even in the germ-layers. With lithium salts an embryo was sometimes formed with no endoderm (exogastrula), thus producing a change in the formation of the primary germ-layers. The action is very subtle. Eggs removed from the lithium solution may continue to develop along the abnormal direction. The first question to present itself is, How are these changes produced? and it can be answered in a general way by saying, that the protoplasm responds in a very intricate way to its surroundings. This raises the question, May not the whole developmental process depend upon physiological responses to stimulations that come from without? Herbst believes that the formation of organs can best be explained in this way. And there are many facts to support such an assumption. He thinks that the cells and organs in the embryo move and change form in response to various stimuli. "The migration of the nuclei to the surface of an insect's egg may be due to the response of the nuclei to the more abundant oxygen near the surface of the egg." "In later stages the collecting of mesenchyme cells to coat-nerves and blood-vessels may be due to migrations under the influence of directive stimuli."

That physiological stimuli may produce movement of a large mass is shown by Wheeler's interesting observations on the migrations of the embryo of the grasshopper. The eggs of this animal contain a considerable quantity of yolk. The embryo is formed first on the ventral surface of the egg, but it soon leaves this position and appears on the dorsal surface. It actually sinks down into the yolk and passes through to the dorsal surface. It does not remain there long, but subsequently travels round the end of the egg and comes to lie again on the ventral surface. This is a remarkable mass-migration, and is explained as of physiological use to the embryo. "The rapidly growing embryo, feeding upon the yolk, must give off waste-products that might accumulate in the adjacent yolk. Hence it would be of advantage if the embryo could move away to yolk not so contaminated."

The experimental method in embryology is very valuable, and much is to be hoped from this line of research. . . . However, too much has been claimed for it by some of its votaries,—namely, that it is to supersede the studies in ontogeny, and reduce that work to a low level; but it should rather be regarded as a valuable adjunct to structural embryology, to supplement it, in some ways to direct it, and to afford a check on some of its interpretations.

The next important line of advance to consider is that arising from critical study into the phenomena of cell-life. This, also, is a very important and essential line of investigation in embryology, as will appear from the following consideration. The

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starting-point of all higher organisms is a fertilized ovum which contains the hereditary mechanism, and potentially all the structure of the adult. In order to get closer to the basal problems of development, embryologists have been obliged to study cells, in hopes of determining more accurately the nature of the hereditary basis, and also the precise origin of the germ-layers. Cytology, which deals with the internal phenomena of cell-life, has been wonderfully advanced within the past few years. Cellular studies have very extensively occupied the attention of both embryologists and biologists, more broadly speaking, since on closer scrutiny it appears that the interpretation of biological problems depends largely on a deeper knowledge of the minute structure and behavior of pototoplasm within the cell.

The embryologist finds it necessary to study the origin of the germinal elements. He finds within the body of a growing, miniature organism a group of cells that are in origin like those of the rest of the body. They have, however, different potentialities, and are destined to give rise either to egg-cells or sperm-cells. These aggregations occupy a position on each side of the middle plane of the dorsal wall of the body cavity, and form on each side a ridge named the germinal ridge. Certain cells of this ridge are modified, constituting the primitive egg-cells. It is an interesting fact that these cells are at first of an indifferent order. While it is early known from their position that they will go to form germinal elements, it cannot, for a considerable time, be told whether they will be of the maternal or the paternal type. They have the possibility of taking either direction, and whether they become egg-cells or fertilizing agents depends apparently on external causes operating as stimuli.

Wilson, in his recently (1895) published *Atlas of the Fertilization and Karyokenesis of the Ovum*, gives such a clear and concise account of the essential feature of the germ-cells that I quote the following three paragraphs:

"Since the establishment of the cell-theory by Schleiden and Schwann in 1838–40, the animal ovum has been recognized as being morphologically a single cell, consisting essentially of a mass of protoplasm (cytoplasm) containing a nucleus, and hence morphologically equivalent to any one of the tissue-cells of which the body is composed. The multicellular body is derived from the ovum by a series of successive divisions or cleavages, the egg-cell dividing into two, four, eight, and so on, in more or less regular geometrical progression, until a very large number of cells are produced. These cells, known in their earlier stages as blastomeres, are ultimately differentiated into the elements of the tissues, and among their descendants a certain number assume the character of the original egg-cell, are converted into ova, and thus form the point of departure for the following generation. Every egg is therefore derived from a continuous and unbroken series of cell-divisions from the egg of the preceding generation, and so on backward through all preceding generations; it is normally destined to form the first term in series of cell-divisions extending indefinitely forward into the future."

"In some exceptional cases (parthenogenesis) the egg is capable of initiating this series of cell-divisions without the influence of a male element. In sexual reproduction, however, which includes all ordinary cases, both among plants and animals, the egg is incapable of division until it has been fertilized, that is, acted on by an element derived from the opposite sex, known as the sperm-cell, or spermatozoön. The spermatozoön differs very widely from the ovum in appearance, being extremely minute, and provided, in most cases, with a long vibratile tail, or flagellum, by means of which it swims rapidly about. For this latter reason it was long regarded as a parasitic animalcule or infusorian. Not long after the promulgation of the cell-theory, however, it was shown that the spermatozoön, like the ovum, is a single cell, consisting of nucleus and cytoplasm, and that it has a like origin, being derived by division from cells pre-exising in the parent body. Inheritance is therefore effected in both sexes by means of cells, and the mechanism of heredity transmission is to be sought in cell-structure."

"*Fertilization.* Broadly speaking, fertilization consists in the union of a single spermatozoön with a single ovum, after which the process of division or cleavage immediately begins. It is true that in many cases—for example, in the shark, the butterfly, the earthworm, the newt—two or more spermatozoa may enter the egg. All the evidence goes to show, however, that even in this case, if development be normal, only one spermatozoön plays an active part, while the others are passive, and sooner or later perish and are absorbed. The fertilized ovum, or oösperm, is therefore the result of the fusion of two germ-cells derived from the two respective sexes. And since each parent contributes a single germ-cell only to the formation of the embryo, it follows that a single cell is capable of carrying with it the potential sum-total of hereditary characteristics, or stirp, of the parents. The study of the internal changes accompanying fertilization therefore leads directly to an inquiry into the mechanism of inheritance, and our study of these changes cannot be too precise or detailed."

"The first discovery regarding the internal phenomena of fertilization was made by Oscar Hertwig in 1875, in the egg of the sea-urchin. Hertwig determined the fact, namely, that the nucleus of the spermatozoön, or 'sperm-nucleus,' unites with the 'egg-nucleus' to form a single 'cleavage-nucleus,' which is the parent of all the nuclei of the embryo. This discovery soon extended to other animals, and to plants as well, and gave rise to the view, advocated by Hertwig, Strassburger, Kölliker, Weismann and many others, that the nucleus substance, or chromatin (so named by Flemming), is the most essential element in the germ-cell, and must be regarded as the physical basis of inheritance."

"*Chromosomes.* The analysis was pushed a step further in the year 1883, by Edouard Van Beneden, whose discoveries, originally made in the case of the threadworm *Ascaris*, were confirmed and extended to many other animals by Boveri, Strassburger and others. These discoveries related to the internal structure of the nuclei themselves. In all cases the

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sperm-nucleus is at first very much smaller than the egg-nucleus, so that at first sight a marked inequality seems to exist between the two sexes in this respect. Van Beneden, however, determined the remarkable fact that during fertilization the inequality totally disappears, and the two nuclei finally exhibit a precise morphological similarity, as follows: Before or during their union each of them is transformed into a definite number of rodlike bodies, known as *chromosomes* (Waldeyer), *which are of the same form, size and number in the two sexes.* Both their form and their number differ in different species, but there is strong reason to believe that they are always constant in the same species throughout the animal kingdom."

"These facts justify the conclusion that the nuclei of the two germ-cells are, in a morphological sense, precisely equivalent, and they lend strong support to Hertwig's identification of the nucleus as the bearer of hereditary qualities. The precise equivalence of the chromosomes, contributed by the two sexes, is a physical correlative of the fact that the two sexes play, on the whole, equal parts in hereditary transmission, and it seems to show that the chromosomal substance, the chromatin, is to be regarded as the physical basis of inheritance."

Above, it was stated that the formation of egg-cells and sperm-cells is substantially the same. We shall now examine the formation of the sperm-cells, as described in 1892 by Vom Rath for the mole-cricket, and contrast this with the steps in the maturation of the egg-cell. The number of chromosomes in the nuclei of this animal is 12. Within the spermary are modified cells, called primitive sex-cells, which are destined to be converted into spermatozoa. They undergo repeated division, and the products are known as sperm mother-cells. In the process of forming the latter, the number of chromosomes has become doubled, so that in the case of the mole-cricket there are now 24 chromosomes in the nucleus of each sperm-mother-cell (Fig. X, B). The sperm-mother-cell now divides into two daughter-cells (C), but in this division the chromosomes are reduced to 12, the normal number characteristic of this species. The two daughter-cells immediately divide, giving rise to four sperm-cells (D), each containing six chromosomes. This reduction of chromosomes is very remarkable, and the process by means of which it is accomplished is called reducing-division. In ordinary cases of tissue-cell division it does not occur, but, on the contrary, the number of chromosomes is conserved by a longitudinal splitting of the rods, so that each nucleus contains the number characteristic of the species. It is to be noted that each sperm-mother-cell has given rise to four sperm-cells, and in the nucleus of each there is one half the number of chromosomes in the tissue-cells of the animal. These are immature sperms, and in the majority of cases the protoplasm of the cell becomes enormously elongated to form a vibratile thread, or tail, while the nucleus with the chromosomes becomes the head.

The formation of the egg in the same animal would embrace a similar series of steps. The starting-point, as in the case of the sperm, would be a primitive sex-cell, precisely similar to that giving rise to the sperm. This would be converted into an egg-mother-cell containing twenty-four chromosomes. "The egg-mother-cell does not immediately undergo division, but remains passive and increases, often enormously, in size by absorption of nutriment from surrounding parts; in this way each egg-mother-cell becomes an *ovum*. The ovum is therefore a modified cell, differing from others in size, due to the accumulation of non-living nutrient matter."

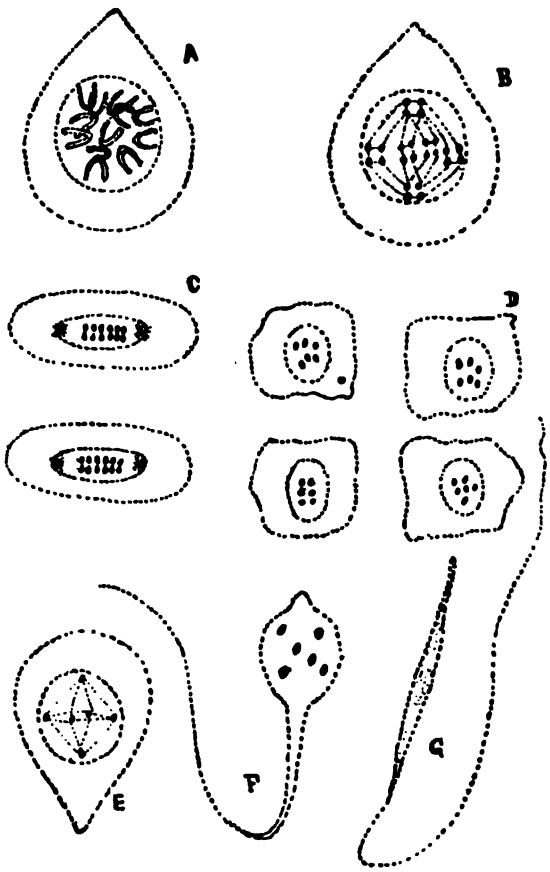

Fig. 1.

Fig. 1. Formation of sperm in the mole-cricket (after Vom Rath, from Parker's *Biology*). A. Primitive sex-cell, with twelve chromosomes. B. Sperm-mother-cell, with 24 chromosomes. C. Daughter-cells, each containing 12 chromosomes. D. Four sperm-cells, each with six chromosomes. E. A single sperm-cell about to elongate to form a sperm. F. Immature sperm, six chromosomes visible in the head. G. Fully formed sperm.

There follows now, in the history of the egg, a series of cell-divisions that correspond to those already described for the sperm. These are diagrammatically represented in Fig. 2. In the process of getting ripe or mature, the nucleus of the egg approaches the periphery, and undergoes division by the reducing process, leaving, on the outside, one half its chromatic substance, in the form of a globule, and retaining the other half within the egg (Fig. 2, C). In ordinary cases, this process is repeated on the part of the nucleus remaining within the egg, and a second globule is extruded. This is formed, also, by reducing-division, and there-

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fore, contains six chromosomes (D). This series of steps is called the extrusion of the polar bodies, and, at its completion, the nucleus of the egg contains six chromosomes—one half the number characteristic of the species. In some cases, the first-formed polar body undergoes division outside the egg, giving rise to two cells, each having six chromosomes (E). An examination of the diagrams (Fig. 2, C, D, E) will show us that there have been produced, by all these steps, four nuclei, each containing six chromosomes. Three of these are without the egg and the fourth is the internal nucleus of the egg, surrounded by a large quantity of non-essential yolk-material. The presence of yolk in the egg should not mask the fact that this is a case of unequal cell-division. The products are equivalent as far as chromatin is concerned, but one of the cells—the egg—is much larger than the others, on account of the accumulation of yolk. It is also to be noted that the egg-nucleus is now in the same condition as the sperm-nucleus, containing one half the number of chromosomes characteristic of the species. In fertilization the two come together and the normal number is restored.

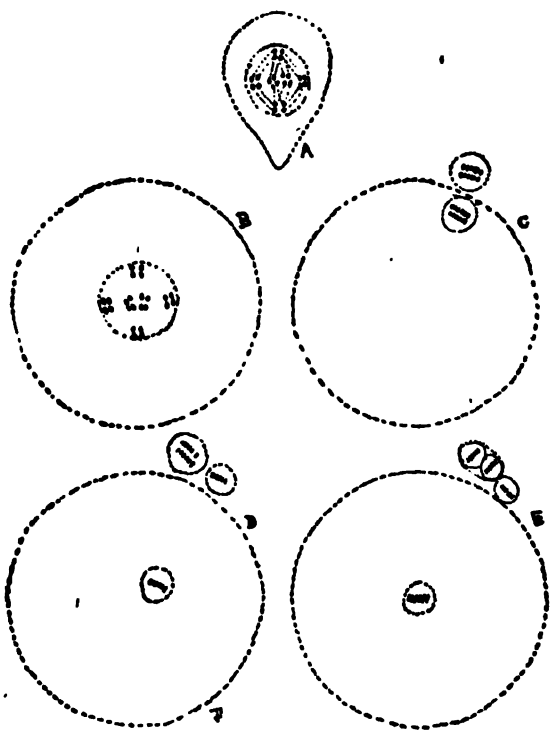

Fig. 2.

Fig. 2. Diagrammatic representation of the formation of an ovum in an animal with the same number of chromosomes as the mole-cricket. A. Egg-mother-cell corresponds to B in Fig. 1. B. Immature egg with nucleus containing 24 chromosomes surrounded by yolk-material; yolk not represented. C. Extrusion of first polar body, containing 12 chromosomes. D. After the formation of the second polar body, containing six chromosomes. E. The first polar body has divided, giving three nuclei, each containing six chromosomes outside the egg; the egg-nucleus likewise contains six chromosomes.

This extrusion of polar bodies has usually been regarded as a habit acquired by the egg-cell to prevent the occurrence of parthenogenesis, to render fertilization necessary and secure the benefits of cross-fertilization, which are known to be so advantageous to both animals and plants. A comprehensive examination of fertilization in plants and animals shows that it does not uniformly occur even in those eggs from which two polar globules are extruded. At first, parthenogenetic development was supposed to be confined to eggs in which the extrusion of a single polar body has been observed; but it is now known, by direct observation, that the eggs of the gipsy-moth and the drone bee are capable of independent development after two polar globules have been extruded. We are thus driven to modify our conceptions of fertilization. It conforms more with the known facts, to regard fertilization as highly advantageous, and occurring in the normal course of events, but not absolutely essential in all cases and in every generation, even in those eggs that extrude two polar bodies. The formation of the polar bodies is a case of repeated cell-division, and we may regard the nucleus as brought to a condition of exhaustion, making an accession of chromatin from an outside source necessary, in the majority of cases, in order to produce a rejuvenescence of the protoplasm and inaugurate segmentation. Maupas and others have shown, by experiments with protozoa, that cell-division cannot be kept up indefinitely. Although the nourishing material may be abundant and of the proper sort, after a succession of independent divisions the protoplasm begins to show signs of general weakness, and after a time further division becomes impossible without fortification, through conjugation and exchange of chromatin with another individual. This is very suggestive, in connection with the question of fertilization in higher animals. The most widely accepted view is, that the protoplasm of the nucleus has been brought to a state of exhaustion, the normal number of chromosomes has also been reduced, and the entrance of the spermatozoön effects a rejuvenescence as well as a restoration of the chromosomes to their normal number. This is the preliminary step to egg-cleavage.

Another very recent view regarding fertilization is that the centrosome, which is present in cells, is to be regarded as a dynamic element by means of which is originated the power of cell-division. There is considerable divergence of opinion regarding the nature and source of the centrosome. E. B. Wilson shows that in the sea-urchin's egg it is derived from the middle part of the spermatozoön. Other observers have traced its derivation to the ovum alone, or to both ovum and spermatozoön in different animals.

Since fertilization consists in the addition of the paternal element to the maternal cell, the transmission of parental characteristics presumably depends on this union, and fertilization is an extremely important factor in the discussion of heredity (q.v., in these Supplements).

Cell-Lineage. The lack of agreement in the observations of different investigators regarding the origin of the germ-layers, especially the mesoderm, made it necessary to study more closely the early developmental stages before the establishment of the germ-layers. The method of tracing cell-

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neage has been adopted as the only one that ɔuld lead to positive conclusions. In many in-ances the successive divisions of the egg have ɛen traced without losing sight of any of them, ıd a consecutive history of the individual cells ıs been followed from the beginning of seg-entation to the time when the germ-layers are tablished. Blochmann (1882) was a pioneer in is line of work. A number of American investi-ıtors have pursued studies in cell-lineage with great ccess. Whitman (1878 and 1887), *Clepsine;* Wil-n (1892 and 1893), *Nereis;* Conklin (1890 and 96), *Crepidula;* Kofoid (1894), *Limax;* Lillie 895), *Unionidæ;* Mead (1895), *Chætopterus;* Castle 896), *Ascidians, Cionia.*

Continued and critical studies have shown that ere is a lack of uniformity in the origin of at least e mesoderm. This makes it apparent that the ear-r generalizations of the germ-layer theory, re-rding uniformity of origin and homologies of the rm-layers, and consequently of their derivatives, re too sweeping. Lillie and Conklin have shown ıt the very early stages of two different mollusks *ıio* and *crepidula*) agree, and then suddenly and expectedly depart in the formation of the middle rm-layer. In *crepidula*, Conklin shows that the soderm arises from elements (mesentoblasts) that entodermal in nature. Lillie shows that the ıroblast in *unio* is traceable to a cell that is ecto-rmal in character. Castle, in his published studies cell-lineage in tunicates (1896), considers that h ectoderm and entoderm unite in giving origin the mesoderm, and these facts go to support view that there is no absolute homology be-ɛen the different layers. The question involves, course, not only the origin, but the homologies, the germ-layers, and therefore the germ-layer ory, which assumes a homology of the primary m-layers from cœlenterates to mammals is to taken with qualifications. It is doubtful ɛther there is a strict homology. Castle also ws that some of the longitudinal muscles ıally mesodermal derivatives) are derived from ɔderm along with the nervous system, while other ɜcles spring from entoderm. These studies in -lineage have thrown much light on the question origin of the germ-layers, showing that there ıot uniformity of origin of the middle germ-ɛr, and therefore no strict homology of its vatives.

Organogeny. That department of embryology ling with the development of organs (orga-eny) has been greatly extended. Among the nt advances in this line, only a few of the most ortant may be summarily mentioned. Those relate to the sense-organs and nervous system ɜ been especially suggestive.

he embryological study of the sense-organs has to the view that they are all derived from a ory basis of an indifferent order, but of com-origin (see SENSE-ORGANS, in these Supple-ts). There has also been discovered in verte-es a set of rudimentary segmental sense-organs are of transient existence, and the suggestion these represent segmental sense-organs of the invertebrates has been accepted by many morpholo-gists.

New and important discoveries have been made upon the development of nerve-fibers, that throw light on the physiology of nerves. His showed, in 1886, that the two sets of nerve-fibers in the spinal nerves have different origins. Those derived from the posterior root, or ganglionic nerve-fibers, arise in cells of the ganglia outside the central nervous system. These cells give rise to two nerve-fibers, one relatively short, passing inward to the central nervous system, and a longer one growing toward the periphery. The fibers of the anterior root arise from specialized cells (neuroblasts) within the central nervous axis, and grow outward. This shows that the physiological difference between the fibers of the posterior root and those of the anterior root has an anatomical basis in their different modes of origin. The nature of the ganglion ridge or neural crest, from which the fibers of the posterior root are developed, comes up in this connection. According to the hypothesis of Von Lenhossék, the ganglion ridge represents aggregations of primitively ecto-dermal cells that have migrated from the periphery.

The conception of the growth of the sensory nerves connected with peripheral sense-organs has been revolutionized. It has been shown, for instance, that the sensory fibers in the optic nerve arise in the retina and grow inward toward the brain, and that the fibers of the olfactory nerve have, likewise, their centers of nutrition (neuroblasts) in the periph-eral epithelium of the organ of smell, and grow inward to the central nervous system. In fact, in all carefully investigated cases, it would appear that the special nerves of a sensory organ arise in the cells of that organ and grow toward the central nervous axis.

Recent embryological studies on the eye of verte-brates have brought out the fact of its extremely early appearance (see SENSE-ORGANS, in these Sup-plements), and throw much light on its probable phylogenetic history.

The ear, by embryology, has been traced into con-nection with the sense-organs of the lateral, and is looked upon as a very much modified canal-organ.

Much new work regarding the embryonic history of the brain has been done. Important discoveries have been made regarding the primitive brain of vertebrates, that tend to show that it was origi-nally divided into similar segments, and that at least fourteen pairs of primary segments have been aggregated to make the brain of vertebrated ani-mals. (See PRIMITIVE VERTEBRATE BRAIN, in these Supplements.)

It has been pointed out by Minot and others that animals develop according to two types, appear-ing in their younger stages either as larvæ or as embryos. The larval development is primitive, and the embryonic development, which depends on a large quantity of food-yolk, is secondary, and pre-sents many modifications. Many questions of heredity and development can best be tested by study of larval forms, and the recognition of this point serves to indicate the importance of the study of larval forms, which has been too much neglected

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by embryologists. This offers a relatively new field for careful observation and experiment, and one from which much is to be hoped.

The account of the advances in embryology in the past ten years might be much extended and other topics treated, but the foregoing is sufficient to give some conception of the direction of progress, the characteristics of the science, and some of the more important topics that have been recently investigated. We observe that morphology owes many important discoveries to embryology. The tracing of organs in the process of becoming is very suggestive in elucidating their relations, and all of this study helps very much in coming nearer to a knowledge of vital processes and their relation to the external world, which is the aim of biological study.

Bibliography. The recent literature of embryology is very extended. Below is given a list of the best manuals and text-books in English, in which extended references will be found, and also the titles of papers especially referred to in this article. Lists of the pertinent literature will also be found in the papers mentioned. Dr. Minot's *Bibliography of Vertebrate Embryology* (1892) contains upward of three thousand titles. Balfour, *Comparative Embryology* (2 vols., 1880–85); Haddon, *Introduction to the Study of Embryology* (1887); Hertwig, *Text-Book of Embryology* (vertebrates), (trans. by Mark, 1892); Korschelt and Heider, *Text-Book of Embryology* (invertebrates), (Pt. I, trans. by Mark, 1895); Marshall, *Vertebrate Embryology* (1893). On methods: Whitman, *Methods in Microscopical Anatomy and Embryology* (1885); Lee, *The Microtomist's Vade-Mecum* (1892); Whitman, *Germ-Layers* (*Jour. Morph.*, 1887); *Morphology and Physiology* (*Amer. Nat.*, 1892); Wilson, *Cell-Lineage* (*Jour. Morph.*, 1892, 1893); *Embryology and Homology* (Biolog. Lects. Wood's Holl, 1894); Amphioxus, *Anat. Aps.* (1892); *Atlas of Fertilization* (1895); Andrews, *Reviews of Embryological Literature* (*Am. Nat.*, 1890–96); Pflüger, *Cleavage and Gravitation* (*Archiv. für Phys.*, 1883); *Relation of Embryo to Cleavage-Planes* (*Archiv. für Phys.*, 1884;) Born, *Gravitation and Cleavage* (*Archiv. für Mik. Anat.*, 1885); Roux, *Mechanism of Development* (*Bresl. Aps. Zeitschr.*, 1884); Mechanical injury: Virchow's *Archiv.* (1888); Hertwig, *Experimental Studies* (*Jen. Zeitschr.*, 1890); Vom Rath, *Spermatogenesis* (*Archiv. für Mik. Anat.*, 1892); Morgan, *Experimental Studies* (1895); Cunningham, *Influence of Light* (Fisheries of United Kingdom, 1894); Castle and Davenport, *Temperature* (*Archiv. für Entwick. Mechan. der Org.*, 1895); Wheeler, *Insect Embryology* (*Journ. Morph.*, 1893); Conklin, *Cleavage* (*Zoöl. Aps.*, 1890); Castle, *Germ-Layers, Ascidians*, (*Bull. Mus. Comp. Zoöl.*, 1896); Lillie, *Cell-Lineage* (1895); Kofoid, *Cell-Lineage* (*Proceed. Am. Academy*, 1894); Mead, *Cell-Lineage* (*Jour. Morph.*, 1895); His, *Nerve-Fibres* (*His's Archiv.*, 1878); *Neuroblasts* (*His's Archiv.*, 1889).

WILLIAM A. LOCY.

EMBRYO-SAC, in botany, a term applied to the cell of the ovule in which the embryo of the seed-plants develops. A study of the morphology of the lower plants has shown that the "embryo-sac" is a spore (macrospore), which is not shed from its sporangium (the ovule). The fact that the spore is not shed, but germinates within its sporangium, has led to the formation of "the seed." This macrospore (embryo-sac), in its germination, develops the female gametophyte, which is reduced so much that it does not leave the spore which produces it. Its normal embryogeny is as follows: The single nucleus of the macrospore divides, and the two resulting nuclei pass one to each end of the spore. These polar nuclei next pass through successive divisions, until four nuclei are formed in each end of the spore. One of these four polar nuclei in each end next moves toward the center and fuses with its fellow, forming the "endosperm nucleus." This ordinarily completes the structure of the gametophyte before fertilization, which, therefore, ordinarily consists of seven cells—three at the micropylar end, the central one being the *oösphere*, which is to be fertilized and form the embryo of the sporophyte, the other two the *synergidæ*, the three together constituting the "egg-apparatus"; three at the antipodal end, known as the *antipodal cells;* and one more or less centrally placed, the *endosperm nucleus*, which, by its subsequent divisions, gives rise to the endosperm of the seed. The accompanying figure clearly shows the relation of these parts.

Embryo-Sac of Lily (*Lilium philadelphicum*), showing two synergidæ, *a*, antipodal cells, *b*, endosperm nucleus, *c*, oösphere, and *d*, upper portion of pollen-tube. (From Strasburger.)

EMBURY, PHILIP, clergyman, was born in Ireland on September 21, 1729, of German ancestry, and became a carpenter. In 1752 he was led into the Methodist Church by John Wesley, and in 1758 became a preacher. He came to America and settled in New York in 1760, and six years later, under the influence of his cousin, Barbara Heck, preached and held the first Methodist services in America. He was the founder of the John Street Church in New York and built the pulpit with his own hands. In 1769 he went to Camden, N. Y., and organized a Methodist Church there. He died in August, 1775, from injuries received in an accident. W.P.]

EMERALD BIRD OF PARADISE (*Paradisea apoda*), the most beautiful of the birds of paradise. See BIRDS OF PARADISE, Vol. III, p. 675.

EMERSON, RALPH WALDO, an American essayist, poet and philosopher; born in Boston, Massachusetts, May 25, 1803; died in Concord, Massachusetts, April 27, 1882. For three generations his paternal ancestors were New England clergymen, and, after graduating at Harvard College in 1821, he himself entered the church, and for a brief time was pastor of the Second Unitarian Church, Boston. In consequence of holding views respecting the ordinance of the Lord's Supper at variance with those of his congregation, he sundered his connection with the church and, retiring to Concord, abandoned the church as a profession. In 1830 he married; but his wife died in the following year, and, his own health not being robust, he spent the next two years in Europe. In Britain he met Coleridge, Wordsworth, Landor, De Quincey, and formed with Carlyle one of the most interesting friendships in literary annals.

RALPH W. EMERSON.

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friendship that in many ways was an important epoch in the lives of the two men. In 1834 Emerson returned to the United States, and at once devoted himself to lecturing and to the varied life of a literary man. In the following year he again married, and settled down at Concord, Massachusetts, which was to become his permanent home, leaving it only occasionally on his lecturing tours, and, later in life, for a second visit to England. The themes of his lectures and addresses are varied, his prelections being on human life, culture, character, history, and the philosophy of history, the substance of not a little of which was afterward reproduced in his collected essays. (See AMERICAN LITERATURE, Vol. I, pp. 639–641, 643.)

In 1836 Emerson published *Nature: An Essay*, the first of a notable series of thoughtful, inspiring volumes, whose elevated tone and suggestive though somewhat desultory matter gave an impetus, among his admirers on both sides of the Atlantic, to pure living and high thinking. This was followed by two volumes of essays (first series, 1841; second series, 1847) and by a collection of poems. From the outset of his career he became an exponent of transcendentalist views, and early formed intimacies with William Ellery Channing, Theodore Parker, Bronson Alcott, Thoreau and Margaret Fuller. With the latter he was associated, from 1840 to 1844, in editing *The Dial*, a magazine of literature, transcendental philosophy and religion. In 1850 appeared *Representative Men*, in which he dealt with such class-types as Plato, Swedenborg, Montaigne, Shakespeare, Napoleon and Goethe. A *Memoir of Margaret Fuller*, Marchioness d' Ossoli, appeared in 1852, and *English Traits*, a series of impressions of English characteristics rather than of characters, with autobiographical fragments, in 1856. These were followed successively by *The Conduct of Life* (1860); an *Oration on the Death of President Lincoln* (1865); *May-Day, and Other Pieces*, in verse (1867); *Society and Solitude* (1870); and *Letters and Social Aims* (1875). A further collection of poems appeared in 1876, while at various times he issued many miscellaneous products of his pen, including *Parnassus*, an anthology of verse, and an introduction to Professor Goodwin's translation of *Plutarch's Morals*. To these must be added *Letters to Thomas Carlyle*, extending through many years, and posthumously published.

Emerson's collected writings embrace 12 volumes, including his poems and lectures, among the latter of which are several delivered during the Civil War, on the abolition of slavery. The authoritative biographies of Emerson are those by James Elliot Cabot, Emerson's literary executor, and Oliver Wendell Holmes.

Emerson's life was largely that of a literary recluse, if we except the occasions which called him to his public appearances in connection with lyceum lecturing. While possessing the keenest, most practical interest in public affairs, he knew comparatively little of the world of action, and his philosophy, often pantheistic in its form, if not in its tendency, and deeply tinged with mysticism, lacked the mundane robustness of thought which a bustling rather than a romantic age requires. His essays, though discursive, are uplifting and inspiring, their attractiveness consisting in their pure, exquisite diction, fine ethical beauty, charming idealism, quiet but rich wisdom, and noble serenity of mood. It is these qualities chiefly that have given distinction to Emerson's writings, and made him one of the most original and permanent forces in modern literature. His poetry has many of the characteristics of his prose, but should be read only in high and spiritually exalted moods. G. MERCER ADAM.

EMERTON, EPHRAIM, an American historian; born in Salem, Mass., Feb. 18, 1851. He was graduated from Harvard in 1871 and studied at Leipsic. He was an instructor in Harvard in 1876 and professor of ecclesiastical history there in 1882. His works include *Synopsis of History of Continental Europe; The Study of Church History; The Practical Method in Higher Historical Education; An Introduction to the Study of the Middle Ages; Mediæval Europe; Desidirus Erasmus; Heroes of the Reformation.* W.M.C.

EMIGRATION. See IMMIGRATION, these Supp's.

EMIGRÉS. See FRANCE, Vol. IX, pp. 529 et seq.

EMILIA, a department of northern Italy, lying almost entirely between 44° and 45° N. lat., and comprising the former duchies of Parma, Modena and Massa-e-Carrara. It takes its name from the Via Æmiliana, an important military road built by the Romans. Situated almost entirely in the basin of the Adriatic, its climate is temperate and healthful. The chief products are maize, wheat, tobacco, fruit, wine, honey, hemp, silk and flax. Vine-culture is increasing rapidly. Large quantities of salt are taken from the lagoon of Comacchio; sulphur and very beautiful marble are exported. Area, 7,967 square miles; population 1901, 2,451,752.

EMINENCE, a city of Henry County, Kentucky, in the northern part of the state, in a fine stock-raising region. It is forty-five miles northwest of Lexington and thirty-two miles east by north from Louisville, and is reached by the Louisville and Nashville railroad. Its population in 1900 was 1,018. W.F.J.

EMINENT DOMAIN, the sovereign right vested in the public, whereby private property may be taken or controlled for public use without the owner's consent. This right exists only when the property to be taken is necessary for public use or convenience. The right of eminent domain is vested in the state in which the property is situated, for all purposes except those for which the constitution of the United States confers the right upon the Federal government. The state has the power to delegate the right of eminent domain, and this power is exercised frequently by granting the right to railroad corporations and others engaged in work of public utility. The state legislature has sole power to determine the necessity of the improvement to be made, and for which the property is to be taken, and to designate the manner in which the right shall be exercised. The right may be delegated either by general act of the legislature conferring the right upon all persons and corporations engaged in business of a special public nature, or by special charter. But under no circumstances

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can private property be taken for public use without full and adequate compensation to the owner. It is also a general rule that the compensation must actually be paid or tendered before the property can be taken. In England property required for public purposes is condemned by act of Parliament, the compensation to be paid to the owner being fixed by a jury, assessors, or under the provisions of the Lands Clauses Consolidation Acts.

EMIN PASHA, a German, whose real name was Eduard Schnitzer; born in 1840 at Oppeln, Silesia; educated at Neisse, and studied medicine at Breslau and Berlin. In 1864 he went to Turkey, where he quickly established a reputation as a physician. He accompanied Hakki Pasha on his official journeys through Armenia, Syria and Arabia. He went with Ismail, governor of Scutari, in his exile to Trebizond. He knew the Turkish and Arabic languages well, and had adopted the habits and customs of the people so completely that he readily passed for one of them. He adopted the name Emin, "the Faithful One," and upon the death of Ismail (who had been restored to royal favor), he married his widow. In 1876 he joined the Egyptian service, and was ordered to Khartoum, and thence as chief medical officer to the Equatorial Province, of which, in 1878, he was appointed governor by General Gordon. Here he was isolated and shut off from the world, and harassed by the troops of the Mahdi and by revolts instigated in the interest of the slave trade. In 1886 news was received in England that he was still holding his post in Central Africa, and an expedition under Stanley was sent to his relief. The expedition reached Emin in May, 1888. In August, while the expedition was looking for its rear guard, he was imprisoned by the natives, but escaped in December, and in February, 1889, rejoined Stanley, with whom he reached Zanzibar in December. Many honors were bestowed on him in Europe, and in 1890 he organized an expedition and returned to Africa. After lingering in the neighborhood of Lake Victoria he endeavored to penetrate the regions to the northwest; in 1892 he started for the Congo with a band of natives, and was murdered, Oct. 20, 1892.

EMMA, formerly Queen Regent of the Netherlands (Adelaide Emma Wilhelmina Thérèse), was born Aug. 2, 1858, at Arolsen, capital of Waldeck. Was married Jan. 1, 1879, to William III of Holland, by whom she had one daughter. She accepted the regency a few days before her husband's death, Nov. 3, 1890, when a proclamation declaring her sense of responsibility was issued. In 1898 she resigned on Queen Wilhelmina coming of age.

EMMETSBURG, a city and the county seat of Palo Alto County, Iowa, in the northwestern part of the state. It lies between a small lake and the west fork of the Des Moines River, 122 miles northwest of Des Moines, at the intersection of the Chicago, Milwaukee and St. Paul and the Burlington, Cedar Rapids and Northern railroads. It has mills and packing houses. Its population in 1900 was 2,361. W.F.J.

EMMETT, DANIEL D., an American musician, noted as the author and composer of *Dixie*, the war-song of the South; born in Mount Vernon, Ohio, Oct. 29, 1815. His grandfather, an Irishman, served as chaplain and surgeon in the Revolutionary War. His father shouldered a musket in 1812 under General Hull, and later acted as an Indian scout in northern Ohio. Learning to play the violin and other instruments, Daniel Emmet, in 1843, organized the first minstrel troupe in the United States. His *Dixie Land*, which was to the gray-clad soldier what *John Brown's Body* was to his brother from the North, was written in 1859, when the author was a member of the then famous Bryant's Minstrels in New York. Emmett was asked one Saturday evening to compose a "hooray" chorus for the Monday performance. Sound and noise were the two desiderata, and from the first *Dixie* was a success. The keynote was love and longing for the Southland, and one bar of music set the key for the whole. Adopted as a march and war song in New Orleans, it was taken up by the populace and transferred to the battle-field. *Dixie* is as lively and popular an air to-day as when it was written, nor is its reputation confined to the American continent. It ranks with the finest of the world's simpler airs in touching the emotions. Died June 28, 1904.

EMITTSBURG, a town of Frederick County, Maryland, in the north-central part of the state, 50 miles northwest of Baltimore. It is the seat of Mount St. Mary's College and other institutions, and of the first house of Sisters of Charity in the United States. It is reached by the Western Maryland railroad. Its population, apart from the college and schools, in 1900, was 849. W.F.J.

EMMONS, GEORGE FOSTER, naval commander, was born at Clarendon, Vt., on August 23, 1811. He served on the Wilkes exploring expedition and in the survey of Oregon and northern California, and also in the Mexican War. In the Civil War he served in the West Gulf squadron, captured Pass Christian and Cedar Keys, was also at the siege of Charleston. He was made rear admiral in 1872, wrote a history of the navy, and died on July 2, 1884. W.F.J.

EMMONS, NATHANAEL, an American theologian; born in East Haddam, Conn., April 20, 1745. He graduated at Yale in 1767; was licensed to preach in 1769; and was ordained pastor at Franklin, Mass., in 1773, a charge which he kept for 54 years. He was one of the founders and first president of the Massachusetts Missionary Society, and an editor of the *Massachusetts Missionary Magazine* His completed works, in six volumes, were published in 1842. They contain over 220 sermons. He died in Franklin, Sept. 23, 1840. E.E.T.

EMMONS, SAMUEL FRANKLIN, geologist, was born in Boston on March 29, 1841, and was educated at Harvard (1861), Paris and Freiberg. In 1867 he entered the service of the United States geological survey, in which he has since remained with the exception of the years 1877–79, when he was engaged in cattle raising in Wyoming. He was president of the Geological Society of America in 1903. W.F.J.

EMORY, a village of Washington County, western Virginia, 10 miles N.E. of Abingdon, on the

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Norfolk and Western railroad. It was named after Bishop John Emory, and is the seat of Emory and Henry College. Population, 200.

EMORY, JOHN, an American clergyman; born in Spaniard's Neck, Md., April 11, 1789. He graduated at Washington College, Md., and after a short term of successful practice of law he entered the Philadelphia Methodist Episcopal Conference in 1810. Between 1813 and 1820 he filled pastorates in Philadelphia, Baltimore, Washington, and other large cities. In 1820 he represented the Methodist Church of America in the British Conference, and in 1824 was elected junior agent and in 1828 principal agent of the Methodist Book Concern. In 1832 he was elected bishop, and thereafter he was instrumental in organizing the New York University, Wesleyan University, and Dickinson College. He died in Baltimore County, Md., Dec. 16, 1835. E.E.T.

EMORY, WILLIAM HEMSLEY, soldier, was born in Maryland on September 9, 1811, and was graduated at West Point in 1831. He served at Fort McHenry and Fort Severn, and was at Charleston, S. C., during the "Nullification" episode. In the Mexican War he served under General Kearny in his California campaign, and in 1848, 1854, and 1857 was engaged in delimiting and marking the boundary between the United States and Texas. At the outbreak of the Civil War he entered active service, and was at the siege of Yorktown, and the battles of Williamsburg and Hanover Court House. He commanded the Nineteenth Army Corps, and was brevetted brigadier-general and major-general in the regular army. After the war he commanded the Department of Washington, and was a member and president of the army retiring board until 1876, when he was himself retired on the full rank of brigadier-general, U. S. A. He wrote *Notes of a Military Reconnoissance in Missouri and California*, a *Report of the United States Boundary Commission*, and other valuable works. He died on December 1, 1887. W.F.J.

EMORY AND HENRY COLLEGE, an institution of the Methodist Episcopal Church South, situated at Emory, Virginia. It was founded in 1837, is open to male students only, and has courses of study leading to the degrees of A.B., B.S., and A.M. It had at the close of 1904 a faculty of nine instructors, 143 students, and a library of 11,000 volumes. It had down to that time graduated a total of 631 students. W.F.J.

EMORY TESTING-MACHINES. See STRENGTH OF MATERIALS, in these Supplements.

EMPEROR GOOSE OR PAINTED GOOSE. See GOOSE, Vol. X, p. 692.

EMPEROR MOTH, (*Saturnia pavonia minor*), a moth of the same family (*Bombycidæ*) with the silkworm moth. Its expanse of wings is about three and a half inches. Each wing is ornamented with a large, eye-like, glassy and transparent spot, and such spots are exhibited by many of the genus. It is the largest British moth.

EMPHYTEUSIS OR JUS EMPHYTEUTICUM. See ENTAIL, Vol. VIII, p. 401.

EMPIRE CITY, the capital of Coos County, southwestern Oregon, on Coos Bay, 130 miles S.W. of Salem. It exports excellent lignitic coal. Population, 1900, 185.

EMPIRICAL FORMULÆ, symbols. See CHEMISTRY, Vol. V, p. 409.

EMPIRICISM, the dependence for knowledge or skill on experience or experiment, rather than on theory. See LOGIC, Vol. XIV, pp. 789, 800. For empiric school of medicine, see MEDICINE, Vol. XV, pp. 811 et seq.

EMPLOYERS' AND EMPLOYEES' LIABILITY. The relation of employer and employee is created by an agreement, either express or implied, that the employee shall render services for the employer under such circumstances as to be subject to the employer's control while engaged at his duties. If one engages to perform specified work for another without submitting himself to the control of the person for whom the work is done, but undertakes the responsibility himself of properly completing the work, the relation of employer and employee does not exist, and the party thus undertaking the performance of work is an independent contractor, and not an employee. This distinction is sometimes difficult to apply; but the general rule is, that the fact of control, or the right personally to direct the performance of the duties required, is the distinguishing mark of the relation of employer and employee. The law as to the liability of employer and employee frequently is conflicting and unsettled, and the reader must refer to some legal text-book on the subject of master and servant for a full discussion of any branch of the subject.

The law implies many duties of the employer in addition to those ordinarily expressed in a contract of employment, both in relation to the employee himself and to third persons. It may be stated as a general rule that the law will imply the duty on the part of the employer to furnish reasonably safe appliances for the use of his employees; to provide a reasonably safe place in which his work may be done; and to employ competent and skillful servants, and a sufficient number of them, so that the work may be done properly. A failure to use ordinary care in the performance of any of these duties is generally considered such negligence as will make the employer liable in damages to an employee who is thereby injured.

It is also a rule of law that the employer is bound to inform his employee of any dangers which may accompany the business for which he is employed, since the employer is presumed to know the dangers which attend such service. A mere general statement that the service is dangerous is not sufficient. But the employee is not bound to call attention to dangers which are the subject of common knowledge or could readily be seen by ordinary observation. If injury to an employee results from a latent defect in machinery or appliances which the employer could have observed by having proper inspections made, he will be held responsible therefor, even though he had no knowledge of such defect. These duties which the law imposes upon an employer cannot, as a rule, be delegated to another

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The fact that an employer engages a competent manager or superintendent, whom he instructs to perform these duties, generally does not relieve the employer in case such duties are not performed. There is, however, much conflict among the decisions on this question, and in some states it is held that certain of these duties are not personal to the employer, as, for example, in case the employer engages a competent superintendent whom he instructs to keep all machinery in good repair. In such cases it is held that if the superintendent fails to make needed repairs, whereby an employee is injured, the employer will not be held responsible for the default in duty. Before an employee can hold his employer liable for injury resulting from defect in machinery or appliances or some danger accompanying the work at which he is employed, he must use ordinary care to avoid the dangers which he knows to exist, and to ascertain the dangers which attend his work. He is obliged to report any defects which may come under his observation, and if within the line of his duties, make necessary repairs. He must use his senses; and if a defect is obvious or suggestive of danger, he will be presumed to have observed it, and under such circumstances will generally be required to use special precaution before he can hold his employer liable for resulting injury to him.

There is also a rule of law seriously affecting the question of liability of employers for injury occurring to an employee, known as the doctrine of common employment. The general rule is, that an employer is not responsible to his employees for injuries which they may sustain while engaged in his service, if such injury was caused by the neglect of a fellow servant or employee—that is, by an employee who is engaged in the same common or general employment. The principle upon which this rule is based is, that inasmuch as such employees have opportunity to advise and confer with each other as to the danger of neglecting their duty, and to report to their employer any tendency of any fellow-employee to neglect his duty, they therefore have the opportunity to prevent neglect, and cannot hold the employer responsible for injury sustained on that account. The application of the rule, however, is very difficult, because of confusion of the decisions of the courts in determining who are fellow-servants. It is not difficult to see that two brakemen on a train are fellow-servants, and therefore, if one is injured through the neglect of another, the employer is not liable. But as to whether a superintendent in a factory and a workman are fellow-servants within the meaning of this rule, the difficulty is greater. The superintendent in some respects represents the employer; and in so far as he acts in that capacity, he is not a fellow-servant, and the neglect of any duty delegated to him by the employer will not come under the rule of fellow-servants. If his neglect is of a duty which he performs in the capacity of a workman, the rule will apply. It can readily be seen that many fine distinctions arise under a rule of this kind, and reference must be made to a treatise on this subject for a full discussion.

The rule as to contributory negligence has an important bearing upon the right of an employee to demand compensation for damages sustained on account of injury. The rule generally stated is, that if an employee is injured by reason of a default of the employer in some of the duties which the law imposes upon him, as through failure to make proper repairs of defective machinery, yet if the employee contributes to the cause of the injury, through his failure to use ordinary care and caution, or by his willful wrong, so that the injury would not have occurred but for the combined fault of both, then the employee cannot recover any compensation for this injury.

As a general rule, a contract expressly relieving an employer from liability for failure to comply with the duties which the law imposes upon him is held to be against public policy, and is not enforceable. An employee is liable to his employer in case he makes contracts for his employer without authority, or exceeds the scope of his authority, and must pay the damages which result from his default in duty. He is also liable for damages resulting from his wrongful acts or neglect of duty. Many states have modified the rules as to the liability of employers and employees by statute, and such statutes, and the decisions of the courts of the state, must be consulted for accurate information as to the law of any particular state governing this subject.

EMPLOYERS' LIABILITY INSURANCE. See ACCIDENT AND CASUALTY INSURANCE IN THE UNITED STATES, in these Supplements.

EMPORIA, Kansas, the seat of Lyon County, a city and railroad junction on the Neosho River, 60 miles southwest of Topeka on divisions of the Atchison, Topeka & Santa Fé, and the Missouri, Kansas & Texas railroads. It is the seat of the College of Emporia and of a state normal school, and is the commercial center of a considerable agricultural and stock-raising region. The river affords good water power for flouring and other milling industries, canning, and carriage factories. Population, 1890, 7,551; 1900, 8,223. C.L.S.

EMPORIUM, a borough and the county seat of Cameron County, Pennsylvania, in the northwest-central part of the state. It is on West Creek, a tributary of the Susquehanna River, and has a large salt and lumber trade. It is reached by the Pennsylvania railroad. Its population in 1900 was 2,463. W.F.J.

EMPSON, SIR RICHARD, the unpopular agent of Henry VII. In 1491 he became Speaker of the House of Commons, and in 1504 was knighted, having been high steward of Cambridge University and chancellor of the duchy of Lancaster. Throughout Henry's reign he was employed with Edmund Dudley (q.v., in these Supplements) in exacting taxes and penalties due to the crown. His conduct was regarded as infamous, and in the second year of Henry VIII's reign he was convicted of treason, attainted and beheaded on Tower Hill, Aug. 17, 1510.

EMS, a river which drains into the Dollart Zee (q. v.), northwest Germany, after a northern course of 160 miles from its source near Paderborn in Westphalia. Its principal tributaries are the Werse, Haase and Leda, and Wahrendorf; Rheine,

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Lingen, Meppen, Papenburg and Emden are the chief towns along its course. C.L.S.

EMU. See EMEU, Vol. VIII, pp. 157–159.

EMU-WREN, an Australian bird (*Stipiturus malachurus*) belonging to the warbler group and somewhat resembling the wren. It has an elongated, loose-webbed emu-like structure of the three central pairs of tail feathers. R.W.C.

EMYDIDÆ, a family of turtles, which includes all of the so-called fresh-water forms. It is the largest family of the order *Chelonia*. Some of the species are almost as terrestrial as the land-turtles. Many of the species are of great value as food.

ENALIOSAURIANS, an order of marine reptiles which existed from Carboniferous through Cretaceous times. In general form they probably resembled the existing cetaceous mammals. The feet were paddle-like. Some animals reached a length of forty feet. The *Ichthyosaurus*, *Plesiosaurus* and *Nothosaurus* are typical representatives of the three families of the order.

ENAMELED LEATHER. See LEATHER, Vol. XIV, p. 388.

ENAREA, a country of Africa, south of Abyssinia, situated within lat. 7° to 9° N., long. 36° to 38° E., but its limits have not yet been ascertained definitely. It is inhabited by a portion of the Gallas tribes, who, owing to the continued communication which they keep up with Abyssinia, and also to the residence of many Mohammedan merchants among them, are civilized much more than the Gallas usually are. Their government is a hereditary and absolute monarchy. The principal rivers of Enarea are the Gibbe and the Dodesa. Its coffee-plantations are extensive. It is remarkable for its manufactures of ornamented arms, and of cloths with embroidered borders. Besides these, it exports slaves, gold, ivory, civet and skins into Abyssinia. The king and a small portion of the population are Mohammedans, and it is said that native Christians have been found in Enarea. The capital is Saka, near the river Gibbe. See also AFRICA, in these Supplements.

ENCALADA, MANUEL BLANCO, soldier and statesman, was born in Buenos Ayres in 1790, and was educated in Spain, but devoted practically all of his active life to Chili. He was one of the heroes of the Chilian War for independence, serving as rear admiral, second in command to the illustrious Admiral Cochrane (Dundonald) and also as major-general in the army. In 1825 he was commander-in-chief of the army, and for two months in 1826 he was president of the republic. Later he was governor of Valparaiso and minister to France. He died in 1876. His name and fame have been perpetuated in the name of one of the vessels of the Chilian navy. W.F.J.

ENCHORIAL OR DEMOTIC WRITING. See EGYPT, Vol. VII, p. 625.

ENCRATITES, a sect. See AQUARIANS, Vol. II, p. 189.

ENCRINAL OR ENCRINITAL LIMESTONE, a name given to some Carboniferous limestones, from the great abundance in them of the calcareous skeletons of encrinites. See also *Crinoidal Limestone*, under GEOLOGY, Vol. X, p. 213.

ENCRINITES, fossil crinoids, often known as stone-lilies. See *Crinoidea*, under ECHINODERMATA, Vol. VII, pp. 550–552; and *Crinoidal Limestone*, under GEOLOGY, Vol. X, p. 213.

ENDEMIC, a term-meaning peculiar to a certain region or people. It finds its most general application in the case of diseases which affect numbers of persons simultaneously, but so as to show a connection with localities as well as with their inhabitants. Endemic diseases are usually spoken of as contrasted with epidemic and sporadic, the first term indicating that a disease infects habitually the population within certain geographical limits, and also that it is incapable of being transferred or communicated beyond those limits; while, on the other hand, a disease is termed epidemic if it is transmitted without reference to locality, and sporadic if it occurs in isolated instances only. The most marked type of an endemic disease is ague, which has the characteristics mentioned above, and is to such a degree a denizen of particular tracts of country as to lead to their being, in some instances, almost depopulated. The term is also used of animals or plants, as opposed to exotic, that are peculiar to a certain region or country.

ENDICOTT, JOHN, an American Colonial governor; born in Dorchester, England, in 1589. He was sent to America by the Massachusetts Company to carry on the plantation at Naumkeag (Salem), where he arrived Sept. 6, 1628. In April, 1629, he was chosen governor of "London's Plantation," but in August his office was superseded by the inauguration of Winthrop as governor of New England. In 1636, with Captain Underhill, he engaged in the campaign against the Pequots. He was deputy-governor of the Massachusetts Colony in 1641–44, 1650, and 1654, and governor, 1644, 1649, 1651–54, and 1655–65. He was a zealous Puritan, and severe against those who differed from the religion of the Colony. In 1659 four Quakers were put to death in Boston. He opposed long hair, ordered that women be veiled in public assemblies, and, in hatred of "popery," cut the cross from the flag. He died in Boston, March 15, 1665. E.E.T.

ENDICOTT, WILLIAM CROWNINSHIELD, statesman; was born at Salem, Mass., on Nov. 19, 1826, and was graduated from Harvard College in 1847. He became a practicing lawyer in 1850. From 1872 to 1882 he was a justice of the supreme court of Massachusetts. In 1884 he was a defeated candidate for the governorship of the state, and from 1885 to 1889 he was Secretary of War under President Cleveland. He was president of the Peabody Academy of Science at Salem. His daughter was married to Joseph Chamberlain, the eminent British statesman. He died on May 6, 1900. W.F.J.

WILLIAM C. ENDICOTT.

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ENDLESS SCREWS. See *Screw*, under MECHANICS, Vol. XV, p. 769.

ENDLICHER, STEPHEN LADISLAUS, a botanist and philologist; born at Pressburg, June 24, 1804, entered in 1822 on a clerical career, which he gave up in 1826 to devote himself to the study of physics, botany and Chinese. Intrusted with editing the catalogue of manuscripts contained in the Imperial Library in 1828, he in 1836 became keeper of the Imperial Museum, and in 1840 professor of botany at the University of Vienna and director of the botanical gardens, which post he held to the time of his death, March 28, 1849. His chief works are *Genera Plantarum* (1836–50); *Grundzüge einer neuen Theorie der Pflanzenerzeugung* (1838); *Grundzüge der Botanik* (1843); *Aufangsgründe der Chinesischen Grammatik* (1845); *Die Medizinalpflanzen der Œstreichischen Pharmakopoë* (1842). G.A.S.

ENDOGENS, a name formerly applied to the great group of plants now known as monocotyledons. The name was given upon the supposition that the stem increased in diameter by the addition of new material within, in distinction to the "exogens" (dicotyledons), whose stems increased in diameter by the addition of material without, thus forming rings of growth. The name has been abandoned in this application, but the term *endogenous* is applied to a plant part or organ which originates within, rather than upon, another structure. For examples, root-branches are, as a rule, endogenous.

ENDOPHYTIC, a term applied to certain low plants that inhabit the tissues of higher plants, notably the *Cyanophyceæ*, or "blue-green algæ." Thus species of *Nostoc* are found in the tissues of certain liverworts, in the leaves of *sphagnum* mosses, and even in the stems of certain dicotyledons.

ENDOSMOSE AND EXOSMOSE. See OSMOSE, in these Supplements.

ENDOSPERM, a name applied to the nutritive tissue of the seed developed within the embryo-sac and outside of the embryo. In gymnosperms the endosperm is developed abundantly before fertilization; in angiosperms its development follows the act of fertilization; and in both cases it is considered to be the vegetative development of the female gametophyte, which thus nourishes the young sporophyte (the embryo). Similar nutritive tissue sometimes is developed within the seed outside of the embryo-sac, in which case it is known as *perisperm*. In the angiosperms there is the greatest diversity in the amount of endosperm, dependent on the size of the embryo, which may completely fill the embryo-sac, in which case the seeds are often called *exalbuminous*, "albumen" being the old name applied to endosperm. In case the embryo but partially fills the embryo-sac, the endosperm is developed around it, and the seed is said to be *albuminous*. The largest embryo-sac known is that found in the cocoanut, the "meat" of the nut being the endosperm, in which the embryo is imbedded, and which does not fill up the great sac with firm tissue, the rest of the space being filled with "milk." See also BOTANY, Vol. IV, p. 132.

ENEMY, as used in international law, means a citizen or subject of a foreign state with which war exists. The term is also applied to the hostile foreign state itself, and sometimes to a war-vessel of such state. A contract made with an enemy cannot be enforced, except when a state gives its citizens permission to enter into such contracts. There are, perhaps, other exceptions to the rule, as in case a citizen is in the territory of the enemy and makes a contract for necessities, or for money with which to return home.

ENERGY, DISSIPATION OF. While it is true that the total amount of energy in the universe is constant, and that any form of energy may be transformed into any other, it can be shown that the changes take place in some cases with greater ease than in others; hence, in time, all energy will be changed into that form which is the most difficult to transform, namely, the energy of molecular motion or heat. The availability of heat to do mechanical work depends upon a difference of temperature, and as all bodies must eventually come to the same temperature, the amount of available energy in the universe is decreasing gradually. This loss of availability is usually spoken of as the dissipation or degradation of energy.

Many illustrations occur in nature. An electric current has some of its energy transformed into heat, on account of the resistance of the conductor, which heat is radiated to the surrounding objects, and very little of it finds its way back into the original form of energy.

A falling body, upon striking an object, has its kinetic energy transformed into heat. This heat might be used to lift other bodies, but with a perfect engine all of it would not be transformed.

ENERGY EXPENDED IN CHARGING A CONDUCTOR. See ELECTRICITY, § 29, in these Supplements.

ENFIELD, a town of Hartford County, northern central Connecticut, on the Connecticut River, and on the New York, New Haven and Hartford railroad, 10 miles S. of Springfield, Massachusetts. Here is situated the great Thompsonville carpet factory, which has over 300 looms, and a capacity of manufacturing nearly six million yards annually; also the Hazardville powder-mills, one of the largest in the world. Other manufactories are those of sewing-machines, plows, carriages, sashes and blinds, hats, brick and harness. Population 1890, 7,199; 1900, 6,699.

ENFIELD, a village of Grafton County, central eastern New Hampshire, 42 miles N.W. of Concord, on the Mascoma Lake, and on the Boston and Maine railroad. The place is a summer resort, and a portion of the inhabitants are members of the United Society of Shakers. They manufacture pails, tubs and brooms, and raise garden-seeds. There are also manufactories of furniture, leather, knit goods and carriages. Pop. 1890, 1,439; 1900, 1,845.

ENFIELD, a village of Halifax County, northeastern North Carolina, 62 miles N.E. of Raleigh, on the Atlantic Coast Line railroad. It exports large quantities of cotton, lumber, staves, peaches, wine, shingles and brick. There is a gold-mine in the vicinity. Population 1900, 361.

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ENFILADE FIRE AND DEFENSE. See FORTIFICATION, Vol. IX, p. 375.

ENGANO, Dutch East Indies, an elevated and well-wooded island of the Malay Archipelago, 100 miles distant from the southwest coast of Sumatra. Of volcanic formation it is about 30 miles in circuit, with an area of 130 square miles, and is surrounded by coral reefs. The natives, a Malay race, are rapidly dying out. C.L.S.

EN-GEDI OR AIN-JIDY, Palestine, the Biblical "Well of the Goat," on the west shore of the Dead Sea, 18 miles S.E. of El Khulli, the ancient Hebron. The well stood in a populated oasis surrounded by a wilderness, in which were the caves and strongholds where David hid from Saul, as mentioned in 1 Samuel xxiii, 29, and xxiv, 1, "And David went up from thence, and dwelt in the strongholds of En-gedi. . . . It was told him, saying, Behold David is in the wilderness of En-gedi." C.L.S.

ENGEL, ERNST, a German statistician; born at Dresden, March 26, 1821, devoted himself to the study of mining at Freiberg and traveled from 1840–43 in Germany, Belgium and France. In 1848 he became secretary, and, in 1849, president of the commission for industrial and labor affairs in Saxony, and was from 1850–58 president of the Saxon Bureau of Statistics, and from 1860–82 director of the Bureau of Statistics at Berlin, and received the title of secret supreme counsellor of state. He died at Oberlössnitz, December 8, 1896. His chief works are *The Methods of Census* (1861); *Country and People of the Prussian State* (1863); *The Reform of Trade Statistics in the German Empire and the Other States of Europe and North America* (1872). G.A.S.

ENGEL, JOSEPH, an Austrian anatomist; born in Vienna, Jan. 29, 1816; studied medicine at Vienna, and became, in 1844, professor of pathological anatomy, and later of physiology at Zurich, from 1849–54 at Prague, and from 1854–74 professor of pathological and topographical anatomy at the Joseph's Academy of Vienna. He advanced anatomy in all its branches by establishing a scientific terminology and a characteristic of the anatomical properties of healthy and diseased organisms. Among his works are *Entwurf einer Pathologisch-Anatomischen Propädeutik* and *Compendium der Topographischen Anatomy*. Died at Vienna, April 3, 1899. G.A.S.

ENGELMANN, GEORGE, a German-American botanist; born in Frankfort-on-the-Main, February 2, 1809. He studied at Heidelberg, Berlin and Würzburg and for a short time was an instructor at the University of Berlin. He removed to the United States in 1832, and in 1835 he began the practice of medicine at St. Louis, Mo. He established *Das Westland*, a German newspaper, in St. Louis in 1836, which gained a wide circulation in the United States and Europe. He devoted much of his attention to the study of botany and became a regular and valued contributor to the *Proceedings of the American Academy of Natural Sciences*. He made many original researches, especially in pines and cacti and published over one hundred monographs and reports on American botany. These papers were afterward published collectively in a limited edition as the *Botanical Works of George Engelmann*. He was the first president of the St. Louis Academy of Science and his exhaustive botanical collection was presented at his death to the Shaw Botanical Garden, at St. Louis. He died in St. Louis, February 4, 1884. W.M.C.

ENGINEERING SCHOOL. See TECHNICAL SCHOOLS, in these Supplements.

ENGINEERING SOCIETIES OF THE UNITED STATES, organizations formed for mutual benefit, and for learned investigation on topics of direct interest to the members. The following are among the most important of these societies:

American Institute of Mining Engineers, with headquarters in New York City, has a membership of 2,900. It has been established more than 25 years, and is the leading one of the American societies. The secretary maintains a permanent office at 99 John Street, New York.

The American Society of Mechanical Engineers was incorporated Dec. 27, 1881, and had, in November, 1901, a total membership of 2,064, of whom 16 were honorary members, 101 associate members, 294 junior members, and 1,637 active members. Included in the above are 64 life members. The permanent home of the society is at 12 West Thirty-first Street, New York City, where a four-story building is owned and occupied. The initiation fee is $15 for juniors and $25 for members and associates, with annual dues of $10 and $15, respectively. Two annual meetings are held, in spring and autumn, for the reading and discussion of technical papers and for professional and social intercourse, the proceedings of which meetings are published in an annual volume, containing from 600 to 1,000 pages of valuable engineering literature.

The American Institute of Electrical Engineers maintains its executive offices, library and reading-rooms at 26 Cortland Street, New York City. Monthly meetings are held at 12 West Thirty-first Street, New York, and at 1737 Monadnock Building, Chicago, Illinois, and the proceedings are printed monthly. The membership is not limited, and in August, 1901, consisted of 1,350 members of all classes. The entrance fee is $5 and the yearly dues $10.

The American Society of Civil Engineers was instituted Nov. 5, 1852, and has a total membership, 1902, of 2,500. This includes 1,940 active members, 243 associate members and 279 juniors, in addition to whom there are honorary members, corresponding members, associates and fellows. The entrance fee for ordinary members is $30, with yearly assessments of $25. The other fees and dues are fixed by a scale, according to the class of membership. The fellowship fee is $250, in one payment, and is for life. The annual meeting is held on the third Wednesday of January. A yearly convention is held at the time and place fixed by the society. Publication is made of all the transactions of the society. The permanent home of the association is at 220 West Fifty-seventh Street, New York City.

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The Western Society of Engineers was organized in 1869, and incorporated in 1880. The total membership is 414, in classes as follows: One honorary member, 382 active members, 26 associate members and 5 junior members. The entrance fee is $10. Regular meetings are held monthly, the proceedings of which are published. A bimonthly journal is also published. The office of the society is at 1736 to 1739 Monadnock Block, Chicago, Illinois.

There are a number of engineering societies in addition to those named, with memberships ranging from 50 to 250. They are instrumental in influencing legislation in matters pertaining to engineering interests, and their members are selected for service on legal boards, where their knowledge and skill avail in matters of water-supply, sewage disposal and construction.

ENGINEERS, CORPS OF. See ARMY, Vol. II, pp. 507, 527, 531, 533, 541.

ENGLAND. See ENGLAND, Vol. VIII, pp. 195–341; and GREAT BRITAIN, in these Supplements.

ENGLAND, JOHN, an Irish-American prelate; born in Cork, Ireland, September 23, 1786. He studied for the Roman Catholic priesthood, and was graduated from the Carlow Divinity School with high honors. He was ordained a priest in 1808 and was given a small parish in Cork, where he preached in North Chapel. In the following year he began the publication of a weekly newspaper, *The Religious Repertory*. He was radical in his writings and was arrested by the government and sentenced to pay a fine of $2,500. In 1820 he was consecrated at Cork Cathedral as the first Roman Catholic bishop for Charleston, South Carolina, and removed to his new field of labor, where his diocese included North Carolina, South Carolina and Georgia, with over 10,000 communicants under his charge. He founded the *United States Catholic Miscellany*, the first Roman Catholic periodical established in the United States. He was celebrated for his eloquence and his philanthropy and was devoted to the people of his diocese, exposing himself to epidemics of yellow fever and performing many acts of heroic charity. He died in Charleston, South Carolina, April 11, 1842. W.M.C.

ENGLEWOOD, a city of Bergen County, New Jersey, in the northeastern part of the state. It is just back of the palisades of the Hudson, on the Northern railroad of New Jersey, and is a favorite place of suburban residence. Its population in 1900 was 6,253. W.F.J.

ENGLISH, GEORGE BETHUNE, an American adventurer; born in Cambridge, Massachusetts, March 7, 1787. He studied law in Boston, and was admitted to the Suffolk bar, but never engaged in practice. Instead he went to Cambridge and became a student in divinity; and three years after commenced preaching, but never was a candidate for any parish. In 1813 he published *The Grounds of Christianity Examined*, a work in favor of Judaism. This work shut him out from every employment that depended on public opinion. He applied in vain for a commission in the army. He spent some time in the Western country as an editor of a paper, and succeeded at last in obtaining the appointment of lieutenancy in the marine corps. In this capacity he sailed to the Mediterranean; but from offers made him by Ibrahim Pacha, he resigned his commission in the marine corps, and accepted a command in the Egyptian army then preparing for the conquest of Abyssinia. In 1827 he returned to America. He died in Washington, September 20, 1828. W.M.C.

ENGLISH, JAMES EDWARD, manufacturer and politician; was born at New Haven, Conn., on March 13, 1812. In 1837 he became a shipping merchant and later became the head of great industrial establishments. He served in the State Legislature and as a representative in Congress, was governor of Connecticut in 1868, 1869 and 1871, and U. S. Senator in 1875–77. He was a benefactor of Yale University. He died on March 2, 1890. W.F.J.

ENGLISH, THOMAS DUNN, an American author; born in Philadelphia, Pennsylvania, June 29, 1819, of Quaker ancestry. He was graduated in medicine from the University of Pennsylvania in 1839; studied law and was admitted to the bar in 1842. He edited a daily paper in New York in 1844, and in 1845 began the publication of a literary magazine, *The Aristidean*. In 1848 he edited a humorous periodical entitled *John Donkey*, and in 1859 he removed to Newark, New Jersey, where he became actively engaged in politics and served in the New Jersey legislature in 1863–64. He wrote *Ben Bolt*, a popular song, which first appeared in the New York *Mirror* in 1843 and which was revived fifty years later by Du Maurier in his novel *Trilby*. His other works include *Walter Woolfe* (1842); *Ambrose Fecit or the Peer and the Painter* (1869); *American Ballads* (1882); *Book of Battle Lyrics* (1886); *Jacob Schuyler's Millions* (1886), and *Old Glory*, song (1898). He was a member of Congress from 1891 to 1895. He died in Newark, New Jersey, April 1, 1902. W.M.C.

ENGLISH, WILLIAM HAYDEN, an American capitalist and legislator; born in Lexington, Indiana, August 27, 1822. He was educated at Hanover College, studied law and was elected to Congress in 1852. He strongly opposed secession. In 1880 he was the Democratic nominee for Vice-President on the ticket with General Hancock. He died in Indianapolis, Indiana, February 7, 1896. W.M.C.

ENGLISH CHANNEL, a large body of water which separates England from France, and connects the North Sea with the Atlantic Ocean. It is about 100 miles wide at its western end, and its eastern end forms the Strait of Dover (Fr., *Pas de Calais*), which is 21 miles wide. There is a strong current, which passes through the channel, running eastward. The water is often very rough and tumultuous.

ENGLISH HARBOR, West Indies, an imperial naval station on the south coast of Antigua, one of the Leeward Islands belonging to Great Britain. The spacious land-locked harbor is one

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of the best in the Caribbean Sea. The town of Falmouth is on the north shore. C. L. S.

ENGLISH PALE OR THE PALE. See IRELAND, Vol. XIII, p. 268.

ENGLISH RIVER, a South African estuary. See DELAGOA BAY, Vol. VII, p. 36.

*ENGRAVING. A review of engraving as practiced at the end of the nineteenth century must necessarily deal largely, if not wholly, with the photomechanical processes. Progress in the art of illustration has superseded many of the processes described in ENGRAVING, Vol. VIII, pp. 388–397, for commercial use, though it cannot impair their art value.

The history of photomechanical processes dates back to the year 1813, when Niepce began experimenting with resinous substances, and produced, after a time, engraved plates from his method. But not until the year 1839, when Ponton successfully applied potassium bichromate to "process," was the foundation laid for modern methods of photomechanical reproduction. In the year 1852, in both France and England, processes involving the use of asphaltum and bichromatized gelatine as "resists" for both relief and intaglio engraving were successfully worked, though in a small way. All of these processes were designed to produce "half-tone" on stone, but were short-lived, as they proved to be commercially impracticable. Since 1870 the amount of activity and research looking toward the invention of a commercially practical "process" has been marvelous, the more important improvements being due to the invention of "half-tone" screens or "tints," for which Frederick E. Ives, an American (1881), and the Meisenbach Company (1882) stand credited. The demand for engraved blocks that would give in reproduction artistic and faithful results led to the evolution of the modern "process." True it is that the processes have their limitations, but they are relatively unimportant, especially when "process" blocks receive the supplementary attention now much in vogue.

The use of the modern photo-mechanical "process" is for the reproduction of wash-drawings, paintings, pen-and-ink drawings, and occasionally scenes from nature directly, for general illustrative purposes.

The photo-engraving processes to which this review is limited owe their birth to the demand for a process which, from any scene in nature, or stationary or moving object, or work of art of any kind, will produce a block or engraved plate printable in ordinary printer's ink on a printing-press, and at the same time reliable in the rendering of detail, of the general effect of light and shade, and of the relative value of all colors or gradations of color involved. This may be termed the ideal of "process."

The modern processes greatly depend on the skill and judgment of the artisan. This is due, in part, to photography itself, which produces negatives of varying degrees of perfection, consequently requiring correction, but more largely to the succeeding operations at the hands of the various artisans in the workshop. Doubtless an early day will show a satisfactory development of engraving by scientific methods. It may be stated that already the reproductions from nature and works of art by modern processes are marvelously faithful as to detail.

The photomechanical processes in successful operation are based upon the properties of three resinous and glutinous substances, and the changes which they experience when subjected to light. These substances are asphaltum, albumen and gelatine.

If asphaltum, properly prepared by washing in ether, dissolved in benzole, and stained black to make it easily visible on the plate, is thinly spread on a plate and exposed to light for a time, it becomes impervious to its usual solvents, such as turpentine and benzine. If, therefore, such a plate as is usually employed in process-work is so coated and then dried in the dark room, and finally exposed under a printing-screen, the parts of the coating under the clear portion of the screen will become impervious to the solvent employed, since they will have been subjected to light, while those parts under the dense portions of the screen, having been protected from the light, will remain soluble. If the plate be then treated with a solvent, those parts of the asphaltum remaining soluble will be removed, while the impervious parts will remain. It can now be easily understood that if the plate be etched, a printing block or engraving will result. If the plate be exposed under a negative, a relief-block will be the result; if under a positive, so that the whites have been hardened, an intaglio plate will be obtained.

Albumen may be treated in much the same way as asphaltum, if mixed with a solution of potassium bichromate, the chief difference being in certain modifications of manipulation. The solvent of albumen is cold water.

The uses of gelatine are more complex. Gelatine, which is glue in a purified form, swells in cold and dissolves in hot water. Upon cooling it assumes the consistency of jelly, and finally dries out and hardens again. There are various gelatines, some hard, some soft, which differ in properties, and the kind of gelatine used must be adapted to the work. If gelatine is mixed with potassium bichromate, it retains its original qualities while wet, and also after drying, if kept in the dark. On exposure to light, however, it will no longer swell in cold or dissolve in hot water. From this change in the nature of the gelatine, various other results follow. For instance, in its normal state, if made to adhere to an unyielding surface and then swell, gelatine assumes a reticulated grain, but it loses the faculty of reticulating in exact proportion to the degree of exposure to light to which it may be subjected. Again, unchanged gelatine has no power of resistance to etching-mordants, but bichromatized and exposed to lights, it acquires this power. Finally, it becomes capable of resisting the impact of sharp bodies, like grains of sand in the sand-blast, the degree of resistance again corresponding to the degree of exposure to the light. All these peculiarities are made use of in modern "process." The chemical process involved in the action of light on the three substances mentioned above, when mixed with a chromate, is one of oxidation, the asphaltum appropriating oxygen from the air, the glutinous

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substances being affected by the oxygen liberated by the reduction of chromic acid to chromic oxide, which takes place when a chromate is exposed to light in the presence of organic substances. Potassium bichromate is commonly used, but any other chromate, the base of which will not precipitate gelatine, will serve.

To produce a "half-tone" block, the tints of the "original" must be converted into corresponding masses of lines or dots in the negative. To accomplish this, a screen is interposed between the "original" and a sensitive plate in photographing. The screen used may be grained or lined. The processes now chiefly used involve the use of a screen or "tint" made of two plates of glass, a set of fine black lines being ruled diagonally across each, and the two being so cemented together that the lines cross at right angles. This style of screen was first used in the "Ives process" about 1881, and has since been generally adopted in America. About the time Mr. Ives put out his screen the Meisenbach screen was also invented. This screen has diagonal lines ruled in parallel, in but one direction, on the glass plate. There are no cross-lines whatever, and the practice is, after a short exposure, to turn the screen in the camera, so that the lines run in a directly opposite direction, after which a second exposure is made.

Following photographing, in "process," comes the etching used for the production of blocks. In this, the problem is to etch the closer as well as the more open work to a depth which will prevent the ink from filling up the spaces between the lines in the process of printing, and at the same time to leave each line with a foot increasing in thickness downward, so that the line will not break under reasonable pressure when on the printing-press. The present method of etching is practically the same as that invented by Gillot of Paris in 1850. It requires great care and skill, and upon the etcher, more than any other artisan employed in the production of a process-block, depends the success of the block in printing. Good or poor "printing quality" has made or marred the reputation of many a process house. In the etching process, the sides as well as the surface of each line must be carefully protected—the sides in progression as the etching deepens. To insure this protection, the plates are powdered, from time to time, with "dragon's blood"—a resinous vegetable product of the West Indies and South America—which is melted on, thus gradually coating the sides downward and filling up the finer parts of the plate as completed.

The "Half-tone" Process chiefly in vogue is a screen process for the production of relief-blocks, the photo-aquatint and mezzotint methods of producing "half-tone" for commercial use having been almost entirely superseded. In the "half-tone" screen process, the first and most important step is the making of a black and white negative, in which the tints or gradations of color of the "original" are converted into masses of black dots in the negative, preserving in the negative the gradations of color of the "original" which is to be reproduced. To produce this negative, a wet collodion or gelatine dry plate is placed in the camera, and before it, at a slight distance, is placed the screen or "tint" to be used. The light reflected from the "original" then passes through the clear spaces of the screen to the sensitive plate, the black lines of this screen, of course, shutting off such rays as are reflected against them. Thus the effect on the sensitive plate is an image of the "original," consisting of isolated dots, the size and density of which determine the color in the negative. The negative once produced, it is the privilege of the operator to use the etching, the swell gelatine or the wash-out process for the production of the block. The etching process is so generally used that a description of the other two is needless. In the etching process the negative is reversed and printed upon the metal plate to be etched. After etching, a rough or "flat" proof of the plate is taken, and passed with the plate to an engraver, who inspects the plate with a glass, for portions needing retouching. All needed corrections having been made, the plate is passed along for artist's proofs, thence to the routing and blocking rooms to be prepared and mounted "type-high" for the printer.

The size of the negative, hence that of the plate, is determined by the distance of the "original" from the lens in the camera during photographing; the greater the distance, the smaller the negative. Negatives may be successfully made any size, from the size of the "original" downward. It is well to plan for reduction in size, however, and most drawings are made with a view to reduction of one fourth to one third in the reproduction.

The metals used in the process are copper and zinc, as a rule, although occasionally other metals are seen. In America, copper is chiefly used, as its texture and degree of hardness are found to be more even than in zinc. Copper also lends itself to the supplementary treatment of the hand-engraver, now so much in vogue, far better than zinc, and does not corrode in the block, like zinc. Zinc is chiefly used when economy of production is desired.

In the "half-tone" process, as indeed in "process" generally, the use of the electric-lamp is superseding sunlight photography. In these days of large plants and keen competition, a house must always be sure of its "sun"; and the modern high-power, steady-burning and economical electric lamp supplies the need.

The screen or "tint" used in "half-tone" varies in the number of cross-lines to the square inch, according to the use to which the engraved plate is finally to be put. The screens most used vary in size from 133 to 150 lines to the square inch. These sizes are adopted as best suited for printing upon the clay-coated or machine-finished papers ordinarily used for book-work. For printing upon news or low-finished paper, with cheap ink, a screen smaller than 133 lines must be used for success in printing. When a "half-tone" block is to receive supplementary or wood-engraving treatment, a fine screen should be used. Experience has shown 175 lines to be about the proper size, as rows of dots may then be taken out of the plate by the hand-engraver, without fear of producing patches of solid white, so fatal to artistic effect.

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Supplementary Treatment of "Half-tone" Plates. The last-described process produces a straight commercial "half-tone," easily identified, as a rule, by its rectangular outline and general screen effect throughout its area. A recent demand upon the process engraver is for a "half-tone" which is stronger in light and shade and artistic effect than that which the regular screen process can produce. This has given rise to supplementary treatment, or retouching, which is of growing importance. Retouching came into practice from the fact that a negative, even after skillful manipulation, is frequently unsuccessful, necessitating manual treatment of the plate after etching, in order to secure desired results. Then, too, the interposition of the lined screen used in making a "half-tone" lowers the key of a picture, and, although producing a soft effect, has a tendency toward flatness and lack of contrast. At first the roulette-wheel was used to lighten tints, but was shortly abandoned, because of injury to the plate, and the practice of re-etching to obtain delicacy in the lights came into vogue. If a tint comes too dark, it is subjected to further biting, the rest of the plate being stopped out. This makes the dots sharper, and gives relief. A very light tone can be obtained when required, by taking out every other line of dots by hand. The easiest direction to follow is that made by the lines of the screen, which cross the plate diagonally, although there is a secondary series crossing the plate horizontally. Although the lights are apt to suffer most in "half-tone" productions, much of the flatness is due to loss of color in the shadows. This defect can be somewhat overcome by burnishing the surface. In these ways it will be seen that much can be done to increase the brilliancy and contrast of a "half-tone" plate. The better class of work demanded by the best magazines involves greater freedom in handling the plate than has here been outlined. The method is practically the same as that of the modern wood-engraver in producing his block for the printer.

The Line-Relief Process varies from the "half-tone" process immaterially. This process is chiefly used for reproducing pen-and-ink drawings and relief-prints. No screen is used in the camera when photographing, and there is, obviously, rarely any need of supplementary treatment after the process of etching. Zinc is the metal chiefly employed for economical reasons, as it answers every purpose. Copper is sometimes used, however, to gain especial effects. Many houses in this process coat the zinc plates with a deep copper-colored enamel, the formula for which probably varies with each establishment, and is supposed to be secret. The purpose of the enamel is to preserve integrity of line and to insure a better printed result. It may fortify the zinc, but it rarely lasts beyond a good "run" on a printing-press. The line-relief process is the most scientific and satisfactory reproductive process of our time, for by it, with proper attention to details, perfect reproductions of almost any original may be made. This process is used for the illustration of the larger newspapers, by reason of its general accuracy and quickness, as well as the cheapness with which a finished plate may be produced.

Intaglio-Engraving. To produce a photogravure from an "original" in pure black lines to be printed on a hand-press, a metal plate coated with asphaltum or bichromatized albumen is exposed under a black and white positive. Treating the plate after exposure with a solvent leaves the metal bare under the lines of the positive, and the plate is then ready for etching, the hardened coating under the lights of the positive acting as a "resist" to the mordant. This process is used to a limited extent only.

Photo-aquatints or half-tone intaglio plates from paintings and photographs are made as follows: A dry aquatint ground is laid on a metal plate, following which a gelatine negative film is mounted over the aquatint ground. To obtain the negative, a reversed positive on glass must first be made. The film must be made by what is known as the pigment-printing process, and is a wash-out relief, thickest in those parts which are to show white in an impression from the plate, and thinning out toward the dark areas. The film, in etching, acts as a "resist" to the perchloride of iron, almost invariably used as a mordant, as a "still mordant" is very necessary in the process, that the film may not be torn up. In etching, successive baths with the mordant are used to get desired results. After etching, the plate is usually treated by hand, the lights being burnished by a burnisher and the darks being strengthened where necessary. Another photo-aquatint process involves the use of a swell-gelatine relief film, instead of the hardened wash-out gelatine film of the first-described process. In this latter process, the aquatint ground is laid on the plate *over* the film, and three or more repetitions of the first treatment are given the plate, a coarser aquatint ground being used each time, and solutions of increasing strength as well, the whole process being a gradual development of the blacks in the result. From an artistic point of view, intaglio half-tone photogravure, is superior to the screen process.

Chalk-Plate Relief-Engraving is simplicity itself. A metal plate is first evenly covered with a "chalk" or china clay composition, to the depth of about one sixteenth of an inch. In this coating the drawing to be reproduced is made with tools down to the surface of the metal plate. The printing-plate is then furnished by the stereotype process. The rapidity of the process makes it well adapted to newspaper-work, where cuts required are not large. The United States government uses a chalk-plate process at some stations for the production of weather maps.

The Wax Process is utilized for making railroad, geographical, state, county and town maps, mechanical and architectural diagrams and fine script. By it are produced plates which cannot be surpassed in beauty, clearness of line and good printing quality. In this process, a polished copper plate is stained black by a chemical solution. It is coated with a thin composition of wax and resin rendered opaque by the addition of mineral coloring, and a photograph of the "copy" is made on the surface of the wax; the lines and shading forming the picture are then cut through the film of the wax to the surface

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of the plate with steel tools. Letters or figures are usually set up in type and pressed into the wax. Open spaces are then filled with bees-wax to give the necessary relief, defects are corrected and the plate coated with plumbago and electrotyped.

ALBERT G. GLOVER.

ENGROSSING, a commercial term of English statute law. See *Engrossing* and *Forestalling*, under CORN LAWS, Vol. VI, p. 365. The term is also used by lawyers, scriveners and law-stationers in England to denote the fair copying of a deed upon parchment or stout paper ready for signature.

ENGSTLIGEN THAL, Switzerland, a beautiful valley and tourist resort of the Bernese Oberland, in the Canton of Bern, 30 miles S.W. by rail of Bern. The Engstligen River flows through the valley north to Lake Thun, and the Niesen peak at the northern entrance rises to a height of 7,763 feet. Frutigen, a small town of 5,000 inhabitants, occupies the center of the valley at an altitude above sea-level of 2,600 to 2,712 feet. C.L.S.

ENHARMONIC, in music, intervals less than a semitone. See MUSIC, Vol. XVII, pp. 86, 98.

ENNA, a noted ancient city. See CASTRO, GIOVANNI, Vol. V, p. 175.

ENNEKING, JOHN J., an American artist; born in Minster, Ohio, in 1841. He attended St. Mary's College, Cincinnati, where he studied drawing under Bishop Rosencranz. He entered the army in 1861, but was wounded severely, and was mustered out after a year's service. In 1865, having recovered, he went to Boston, engaged in mercantile life, and then turned his attention to art, studying in pastel at first. He went to Europe for study in 1872, and worked in Paris two years under Bonnat, devoting himself to the figure mainly. Daubigny advised him to study landscape, however, which he did. He returned home in 1874, and has devoted himself since to autumnal and sunset subjects, many of his pictures being full of brilliancy and subtle atmospheric effects. Among his important pictures may be mentioned *Moonlight on the Gindecca, Venice; Drove of Cattle on a November Day;* and *The Obersee.*

ENNEMOSER, JOSEPH, a medico-philosophic writer, born at Hintersee, in the Tyrol, Nov. 15, 1787. He commenced his academic studies at Innsbruck in 1806. On the rising of the Tyrolese against the French in 1809, Ennemoser honorably distinguished himself in battle on several occasions. In 1816 he took the degree of doctor of medicine, and in 1819–37 was professor of medicine at the new University of Bonn, and then practiced at Innsbruck. In 1841 he went to Munich, where he obtained a great reputation by the application of mesmerism as a curative power. He wrote a number of books, of which the *History of Animal Magnetism* is most widely known. He died at Egern, Bavaria, Sept. 19, 1854.

ENNERDALE WATER, England, a picturesque lake in the Cumbrian Mountains, Cumberland, 7 miles N.E. of Egremont. It is formed by the Eken River, is 2½ miles long and nearly a mile wide, and is noted for its scenic beauties.

C.L.S.

ENNIS, a city of Ellis County, northeastern central Texas; 35 miles S.S.W. of Dallas, on the Houston and Texas Central railroad. Its business is cotton-compressing, manufacturing and trading. Population 1890, 2,171; 1900, 4,919.

ENNS, Austria, a town in the province of Upper Austria, at the confluence of the Enns River with the Danube, 11 miles S.E. of Linz. It is the outlet of an iron-mining and lumbering region, and manufactures steel and textiles. The river which is navigable to Steyr, 20 miles south of Enns, has a length of over 150 miles; it rises in the Niedere Tauern on the borders of Salzburg and Styria, flows N.E. through Styria to Hieflau, then continues with a northwestern trend through Upper Austria to its junction with the Danube at Enns. C.L.S.

ENSILAGE. See SILO, Vol. XXII, p. 73.

ENTABLATURE. See ARCHITECTURE, Vol. II, p. 407.

ENTADA, a genus of tropical leguminous climbing shrubs (suborder *Mimoseæ*) having pinnate or bipinnate leaves, and being remarkable for their great pods, in which the egg-sized seeds lie amid a gelatinous substance. These pods are sometimes fully five feet long and six inches broad.

ENTELLUS MONKEY OR HANUMAN (*Semnopithecus entellus*), a monkey found in great numbers in India, especially near the temples. The Hindoos believe them to be the embodiment of the souls of deceased ancestors, and carefully protect them. They often commit great depredations in the fields and gardens. See APE, Vol. II, pp. 132, 133.

ENTERITIS, inflammation of the small intestines, and especially of their muscular and serous coats, leading to constipation and pain, with colic, and sometimes intestinal obstruction. Enteritis is distinguished from these last affections indeed only by the presence of inflammatory symptoms—that is, pain, tenderness, fever, etc.—from a very early stage of the disease, and in so decided a form as to require special attention. The disease is one of great danger, and should never be incautiously treated with domestic remedies. It is closely allied to peritonitis, and often depends upon internal mechanical causes, or on external injury. See SURGERY, AMERICAN, in these Supplements.

ENTEROPNEUSTA, a group of worm-like animals composed of Balanoglossus and its allies. See BALANOGLOSSUS, in these Supplements.

ENTERPRISE, a winter resort and the capital of Volusia County, central eastern Florida, situated at the head of steamboat navigation on St. Johns River, 80 miles S. of St. Augustine, and on the Jacksonville, Tampa and Key West railroad. Green Spring, a noted sulphur-spring, 80 feet in diameter and 100 feet deep, is located here. Permanent population in 1896, about 200.

ENTERPRISE, a city of Dickinson County, eastern central Kansas, very favorably situated on the Smoky Hill River, and on the Atchison, Topeka and Santa Fé and Chicago, Rock Island and Pacific railroads, 77 miles W. of Topeka, in a

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fertile prairie country. Grain of various kinds are raised in the vicinity, and the city has flouring-mills, a machine-shop and a foundry. Population 1900, 798.

ENTHYMEME, a term in rhetoric. See RHETORIC, Vol. XX, p. 525.

ENTOMOLOGY, the systematic study of insect-life. See INSECTS, Vol. XIII, pp. 147–161.

ENTOMOPHAGA, a group of insect parasites. See INSECTS, Vol. XIII, p. 154. Also a family of insect-eaters. See MAMMALIA, Vol. XV, p. 387.

ENTOMOSTRACA, same as Gnathopoda. See CRUSTACEA, Vol. VI, pp. 585 et seq.

ENTOPHYTES. See *Vegetable Parasitism*, under PARASITISM, Vol. XVIII, p. 268.

ENTRE RIOS, a province of the Argentine Republic, South America, which takes its name from its occupying the space between the Paraná and the Uruguay rivers, immediately above the point where they unite to form the Rio de la Plata. The area is estimated at 28,784 square miles. In 1900 there were 4,100,000 head of cattle, 4,900,000 sheep and 720,000 horses in the province. The chief industry is raising cattle, horses and sheep. There are also numerous meat-drying and packing establishments and many tanneries. Population, 1900, 343,684. The capital is Paraná; pop., 25,000.

ENTRY, the act of going in or upon property. Entry upon real estate is the act of going upon the lands of another, or lands claimed by the party entering, ostensibly for the purpose of taking possession. A party has the right of entry upon land when he has the right to possession, and may enter, provided he can do so peaceably, without the aid of legal proceedings, and after possession is thus obtained may retain possession and set up his title thereto. See FORCIBLE ENTRY AND DETAINER, in these Supplements.

ENUCLEATOR, an instrument for removing internal tumors, consisting of a circular blade, with the cutting edge on the inner side, and attached to a form of thimble, which may be placed on the tip of the surgeon's finger. The name is also applied to an instrument for grasping and extracting the eyeball in the operation of extirpation.

C. H. COCHRANE.

EOCENE AGE. See GEOLOGY, Vol. X, pp. 320, 321.

EOHIPPUS, a genus of small extinct quadrupeds, found in the Eocene formations of the western United States. Its members were about as large as rabbits, and possessed four toes in front and three behind. It is regarded as having a place in the direct ancestral line of the horse. See HORSE, Vol. XII, p. 177.

EOPHONE, a device which enables one to hear sounds from a greater distance than with the ear alone, and to perceive, rapidly and precisely, the location of their source. A funnel, varying in size with the power of the instrument, is directed toward any point in the arc of probable sound, and by it the sound-waves are caught and reflected back into two rubber tubes, which terminate in ear-pieces. The sound becomes stronger as the funnel is directed more nearly in the direction of the sounding object, whose location may be accurately determined by this means. The eophone has been found to be of much value on shipboard, for, by its aid, ships running in a fog are enabled to promptly detect, at considerable distance, the approach of any sounding object. The instrument is usually arranged on vessels so that the sound-catching and dividing part extends above the top of the charthouse, while the tubes are brought within and the receiver turned in any desired direction by the operator in the charthouse. The inventor of the eophone, who spent several years in its perfection, was Frank de la Torre, of Baltimore, Maryland. For description of a similar instrument for examining the thorax, see STETHOSCOPE, Vol. III, p. 87.

EOSINE, a tetrabromated potassium salt; one of the phthalic acid colors. It is a reddish coloring matter, and is usually obtained from coal-tar. It is also called methyl-eosin and ethyl-eosin; has value as a fabric dye, but is more important as a nuclear stain in both plant and animal histology. Its symbol is $C^{20}H^8Br^4O^5$. See also DYEING, Vol. VII, p. 497.

EOZOON. See GEOLOGY, Vol. X, p. 290.

EPACRIDACEÆ, a family of exogenous plants, consisting of shrubs and small trees, which, both in appearance and in botanical character, much resemble the *Ericaceæ*, or heath family. The most important distinguishing structural character is found in the simplicity of the anthers, which are one-celled, open longitudinally, and are destitute of appendages. The flowers of the *Epacridaceæ* have generally a tubular corolla, dividing into five segments, which sometimes become separate petals. The calyx is persistent, often colored, has the same number of segments with the corolla, and is surrounded with small bracts. The stamens are fewer than in the *Ericaceæ*, usually equal in number to the segments of the corolla, and alternate with them. The fruit is sometimes a capsule, sometimes a berry, sometimes a drupe. The leaves are simple, generally alternate, often crowded; tne flowers in spikes, terminal racemes, or axillary and solitary. About 400 species of the *Epacridaceæ* are known, all natives of the Indian Archipelago, the South Sea Islands and Australia.

EPACT. See CALENDAR, Vol. IV, p. 596.

EPAULEMENT. See FORTIFICATION, Vol. IX, pp. 374, 375.

EPËIRA, a genus of spiders belonging to the widely distributed family *Epëiridæ*. Their snares consist of an elastic spiral thread thickly studded with minute globules of gum, crossed by radii converging toward a common center, and are constructed in trees and coarse herbage. R. W. C.

EPHEMERIS, astronomical tables giving the daily places of the sun, moon and planets, and other phenomena of the heavens. See NAVIGATION, Vol. XVII, p. 268.

EPHOD, a vestment worn by the Jewish priests. It consisted of two shoulder-pieces, one

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covering the back, the other the breast and upper part of the body. Two onyx stones set in gold fastened it on the shoulders, and on each of the stones were engraved the names of six tribes, according to their order. A girdle or band, of one piece with the ephod, fastened it around the body. Just above this girdle, in the middle of the ephod, and joined to it by little gold chains, rings and strings, the high-priest wore the square oracular breastplate with the mysterious *Urim* and *Thummim*.

EPIC POETRY. See POETRY, Vol. XIX, pp. 278–281.

EPICYCLOID, the name of a peculiar curve. When a circle rolls upon a straight line, any point in its circumference describes a cycloid; but if the circle moves on the convex circumference of another circle, every point in the plane of the first circle describes an epicycloid, and if on the concave circumference, a hypocycloid. The circle that moves is the generating circle; the other the base. The principle of the epicycloid is utilized in the arts in the construction of toothed wheels. A small toothed wheel that travels about the inner circumference of a larger toothed wheel is an epicycloid wheel. The epicycloid curve applied to the teeth of wheels reduces friction to a minimum.

EPIDENDRUM (Gr., *epi*, upon, *dendron*, a tree), a genus of tropical and temperate epiphytic orchids. Many are highly deserving of culture either for the bizarre beauty, or delicious fragrance of their flowers. They are in no sense parasitic, they do not draw any nourishment from the trees they grow upon, but live upon moisture, sunlight and air. Orchids are so highly prized that single specimens are sometimes worth $500. W.R.B.

EPIDOTE. See MINERALOGY, Vol. XVI, p. 427.

EPIGÆA (Gr., *epi*, upon, and *gaia*, the earth), a genus of plants belonging to the *Ericaceæ* known as "trailing arbutus," "trailing heath," or "mayflower," a low trailing plant with a reddish woody stem found chiefly in New England. It bears rose-colored fragrant flowers, which appear in early spring and are much sought for. It grows in pine woods, on sandy or rocky soil. *Erica arborea* or "briar-root" and *Erica vulgaris*, belong to the same family. W.R.B.

EPIGLOTTIS. See VOICE, Vol. XXIV, p. 293.

EPIGYNOUS (Gr., *epi*, upon, *gune*, woman), in botany, the fusion of the calyx, corolla and stamen-bearing tube with the gynœcium, so that the ovule-bearing portion of the latter is below the rest of the flower; hence the perianth and stamens are said to be epigynous. W.R.B.

EPILOBIUM, a genus of plants of the family *Onagraceæ*, having four sepals, four petals, a much elongated, four-sided, four-celled, four-valved, many-seeded capsule, and seeds tufted with hairs at one end. The species are herbaceous perennials, natives of temperate and cold countries, and very widely diffused both in the northern and southern hemispheres. The best-known species of the United States is *E. angustifolium*, the "great willow-herb," or "fire-weed," being one of the plants that spring up abundantly, in the north, in burned-over forest clearings. It is five to ten feet high, with simple stems, an abundance of lanceolate leaves, and a showy raceme of pink-purple flowers.

EPIMACHIDÆ. See BIRDS OF PARADISE, Vol. III, pp. 675, 676.

EPIPHANIA, same as HAMAH; q. v., Vol. XI, p. 358.

EPIPHEGUS, a genus of the family *Orobanchaceæ*, or "broom rapes," a name for a certain class of plants growing on the roots of others and therefore termed parasitical. The most conspicuous is *Orobanche major*, which grows upon the roots of broom, throwing up a fleshy stem a foot or more in height with scales instead of leaves. Other species grow on the roots of flax, clover, wild carrot, etc., doing great mischief. W.R.B.

EPIPHYTES, a name applied in general to air-plants; that is, those which have no connection with the soil, and absorb all their food-supply from the air. Many Orchids and Bromelias are notable illustrations.

EPISCOPAL CHURCH, PROTESTANT. See PROTESTANT EPISCOPAL CHURCH, in these Supplements.

EPISTOLÆ OBSCURORUM VIRORUM. See REFORMATION, Vol. XX, p. 338; XI, 375.

EPITHELIOMA. See PATHOLOGY, Vol. XVIII, p. 389.

EPITHELIUM. See ANATOMY, Vol. I, pp. 743, 744.

EPIZOÖTY, a general term applied to epidemic diseases among animals lower than man. See also MURRAIN, Vol. XVII, pp. 63–68.

EPODE, the last part of the chorus of the ancient Greeks, which they sang after the strophe and antistrophe, when the singers had returned to their original place; also, a variety of lyric poetry, in which a longer verse is followed by a shorter one. See HORACE, Vol. XII, pp. 163–169.

EPPING, a market town of east Essex, 16 miles northeast of London, on a branch line of the Great Eastern railway. It is the seat of extensive vegetable gardening and dairying interests for the metropolitan markets. In the vicinity are the remains of the famous royal Epping Forest divided by the Roding River from the former forest of Hainault. Since 1882 part of the forest has been made one of the public pleasure grounds of the London County park system, and is a favorite picnic resort of city residents. Queen Elizabeth's hunting lodge is still shown in the forest. For many centuries a fair was annually held under the gigantic Fairlop oak now cut down; and until recent years Epping Hunt was a feature of each May Day, when a stag was turned out in the forest for the amusement of Cockney sportsmen. C.L.S.

EPROUVETTE, a machine for testing the strength of gunpowder. Several varieties of eprouvette are in use. The one most common is shaped like a small pistol without a barrel, and has its breech-chamber closed by a flat plate, connected with a strong spring. On the explosion of

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the powder against the plate, the latter is driven back an indexed distance, which is proportionate to the strength of the powder. The plate is retained at its extreme state of propulsion by a ratchet-wheel.

EPWORTH, a town in the northwest of Lincolnshire, eastern England, 30 miles N.N.W. of Lincoln, distinguished as the birthplace of John Wesley, the founder of Methodism, as also of Kilham, founder of the Methodist New Connection. Population, about 2,300.

EPWORTH LEAGUE, a young people's society connected with the Methodist Episcopal Church. The Epworth League originated in a conference of all the general young people's societies of the Methodist Episcopal Church, assembled in Cleveland, Ohio, May 14 and 15, 1889. Accredited delegates were present from the Young People's Methodist Alliance, the Oxford League, the Young People's Christian League, the Young People's Methodist Union, and the Young People's Methodist Alliance of the North Ohio Conference. The result of this meeting was the merging of these societies into one new organization, to be called the Epworth League, with the stated object "to promote an earnest, intelligent, practical and loyal spiritual life in the young people of the church; to aid them in constant growth in grace and in the attainment of purity of heart." The essential features of the organization are the weekly prayer-meeting, and the "intellectual" and "mercy and help" departments. The growth of the organization has been remarkable. In 1904 there were 30,755 enrolled chapters, and more than 2,000,000 members. The general organization includes district, annual conference, and general conference district leagues. The management rests with a board of control, five of whom are chosen by the bishops, five by the managers of the Tract Society, five by the managers of the Sunday School Union, and two are elected by each general conference district. The president must be a member of the Methodist Episcopal Church, and the remaining officers are to be of good moral character, but all must be approved by the quarterly conference. A pledge is provided, but its adoption by local chapters is made altogether voluntary. At the Methodist General Conference in Omaha, May, 1892, the Epworth League was adopted and indorsed officially by the church. The *Epworth Herald* is the official organ of the league. The central office is located at 57 Washington street, Chicago, Ill. See METHODIST CHURCHES, in these Supplements.

EQUATOR, the great circle of the earth, whose plane is perpendicular to the axis of rotation. It divides the earth into the northern and southern hemispheres. See ASTRONOMY, Vol. II, p. 667.

EQUESTRIAN ORDER. See EQUITES, Vol. VIII, pp. 451, 452.

EQUESTRIANISM. See HORSEMANSHIP, Vol. XII, pp. 199–203.

EQUIDÆ. See MAMMALIA, Vol. XV, p. 434.

EQUILIBRIUM, of fluids. See HYDROMECHANICS, Vol. XII, pp. 456–461, of particles, see MECHANICS, Vol. XV, pp. 729, 730; of rigid solid, see MECHANICS, Vol. XV, p. 736; electrical, see ELECTRICITY, Vol. VIII, pp. 22–34.

EQUIPOTENTIAL SURFACES. See ELECTRICITY, § 26, in these Supplements.

EQUISETACEÆ, the only existing family of plants of the group *Equisetineæ*, a group largely represented in a fossil state by much more highly organized and more gigantic forms than exist now. The Equisetums of to-day are represented by a single genus, *Equisetum*, containing about twenty species, known as "horse-tails" or "scouring rushes." They are recognized by their jointed and fluted stems, leaves reduced to a whorl of brownish or blackish coalescent bracts, usually whorls of branches, and a terminal cone of sporangia. An abundant deposit of silica in the epidermis is one of the characteristics of the group, and has given to the species the use and name of "scouring rushes." Among ancient giant forms were the *Calamites* of the Carboniferous. See also HORSETAIL, Vol. XII, p. 212.

EQUITY OF REDEMPTION. See MORTGAGE, Vol. XVI. pp. 875, 876.

EQUUS PREZEWALSKII, the name of a new species of horse first discovered by and named after the Russian traveler Prejevalsky, and inhabiting the Dzungarian desert, between the Altai and Tianshan Mountains. The animal was described by the Russian naturalist Poliakof, in the proceedings of the Russian Geographical Society for January, 1881. Poliakof distinguishes the animal from the tarpans of Tatary, main-

EQUUS PREZEWALSKII.

taining that it is a distinct species. It is described as being so intermediate between the equine and the asinine group of *Equidæ* that it breaks down the generic distinctions which some zoölogists have thought fit to establish between them. It has callosities on all the four limbs, as has the horse; but only the lower half of the tail is provided with long hairs, in which latter respect it resembles the ass. Its general color is dun, with a yellowish tinge on the back, becom

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ing lighter toward the flanks, and almost white under the belly. There is no dark dorsal stripe, or "list." The mane is dark brown, short and erect, or "hogged." There is no forelock. The hair is long and wavy on the head, cheeks and jaws. The skull and the hoofs are more equine than asinine. In general shape it takes after the horse. There seems to be no possibility of its being a hybrid between the ass and the horse. Sir W. H. Flower is unable to resist altogether the suspicion that it may be a mule; but W. B. Tegetmeier regards the latter supposition as unlikely, because so many specimens could not have been obtained. Hybrids very rarely occur in nature; but the capture of a female specimen in foal would settle this interesting point, equine mules being invariably barren.

ERCKMANN-CHATRIAN, the compound name of two French romancists whose stories of Alsatian peasant-life are known the whole world over. A literary partnership was formed in 1848 between Erckmann and Chatrian, both natives of Lorraine. Émile Erckmann was born in Phalsbourg, Lorraine, May 20, 1822; studied law in Paris in 1842–48; returned to Phalsbourg in 1848, and for a time attempted to earn a living by literary work, but was soon obliged to return to the practice of law. He died in Lunéville, France, March 14, 1899. Louis Gratien Charles Alexandre Chatrian was born in Soldatenthal, Lorraine, Dec. 18, 1826; was educated at Phalsbourg College; spent a few years in his father's glass factory; returned to Phalsbourg College as an instructor; left the college to engage in literary work; but was forced to seek better paying employment in the railway service, where he remained until his death, in Villemomble, near Paris, Sept. 3, 1890.

The return of Chatrian to Phalsbourg found Erckmann there, and immediately the friendship which was to endure for over forty years began. Each desired to engage in literary pursuits, and together they published their first work in 1848, *Alsace en 1814*, a drama. A few months of precarious living convinced them both that they must each seek other employment, and so the one returned to his law and the other found a place with the Eastern railroad. But their literary partnership continued until the friends were famous, and the works of Erckmann-Chatrian were eagerly read in all Europe. *Alsace en 1814*, was played but once, being prohibited by the prefect of Phalsbourg. For a time they wrote stories and novels, which appeared in 1859 as *L'Illustre Docteur Mathéus*. After this they returned to dramas for a time, but it is for their descriptions of the pure Alsatian peasant-life that Erckmann-Chatrian will be long remembered. Their tales are realistic, but the realism embodies a patriotism which portrays the countryman in all his simplicity and honesty, not the realism which is flavored with degeneracy. Examples of this work are *Le Joueur de Clarinette* (1863), and *Madame Thérèse, ou les Volontaires de 92* (1863). In later life these tales gave place to historical romances, which, by their anti-German sentiment, caused general discussion. The work of writing is said to have been divided; with Erckmann doing the original work of blocking out the work and writing the first draft, and Chatrian doing the correcting and polishing. But it mattered little how the work was done, for such a unity of thought and expression was evident, that many thought it the labor of one mind. They thus worked together until 1889, when a quarrel arose over the division of the profits, and for a time the life-long friends were against each other. Before Chatrian's death they were reunited, but the survivor produced few works after the dispute. Among their works are *Contes Fantastiques* (1860); *L'Ami Fritz* (1864); *Histoire d'un Conscrit de 1813* (1864); *L'Invasion, Waterloo* (1866); *Le Juif Polonais* (1869); *Histoire d'un Paysan* (1868–70); *Histoire du Plébiscite Racontée par un des 7,500,000 Oui* (1872); *Contes Vosgiens* (1877); *Le Banni* (1882); *L'Art et les Grands Idéalistes* (1885); and *Pour les Enfants* (1888).

ERDMANN, Johann Eduard, a philosopher of Hegels school; born June 1, 1805, at Wolmar, Livonia, studied theology at Dorpat and philosophy at Berlin, and was professor of philosophy at Halle from 1834 to the time of his death, June 12, 1892. Among his writings are to be mentioned *Grundriss der Geschichte der Philosophy* (2 vols., 1865); translated into English by Hough (3 vols., London, 1895–96); *Natur oder Schöpfung* (1840); *Leib und Seele* (1837); *Vorlesungen über Glaube und Wissenschaft* (1837).

G.A.S.

EREBUS, Mount, and TERROR, Mount, two volcanos, on South Victoria Land, in lat. 78° 10′ S., long. 169° 45′ E., rising 12,367, and 10,900 feet above the sea, respectively. They were discovered in 1841 by Sir James Ross, in command of the *Erebus* and *Terror*, who named them after his vessels.

ERECHTHEUM. See Athens, Vol. III, p. 7; also Architecture, Vol. II, p. 361.

EREMACAUSIS. See Fermentation, Vol. IX, p. 86.

ERETRIA. See Eubœa, Vol. VIII, p. 570.

ERG. See Energy, Vol. VIII, p. 187.

ERGASTERIA, a mining town of eastern Greece, near Cape Colonna, with ancient lead and silver works, reopened in 1864. The scoriæ or refuse heaps from the mines at Laurium are brought here and resmelted, yielding annually more than ten thousand tons of lead and a large amount of silver. The smelting-works give employment to more than three thousand operatives. Population, 6,500.

ERGOTISM. See Pathology, Vol. XVIII, p. 417.

ERIC, a name of a series of kings of Sweden who ruled at intervals from 1154 to 1568. See Sweden, Vol. XXII, pp. 783–786.

ERICACEÆ or HEATHS, a large, widely distributed order of corallifloral dicotyledons, chiefly small shrubs, of the species *Erica*. See Horticulture, Vol. XII, p. 272.

ERICHSEN, John Eric, an English surgeon;

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born July 19, 1818; was educated at the Mansion House, Hammersmith, and University College, London. In 1850 he was appointed professor of surgery at University College, later became surgeon-extraordinary to the Queen, and in 1887 president of University College. Dr. Erichsen became connected with various medical societies, both in Europe and America, and wrote a number of works; among them, *Experimental Inquiry into the Nature and Treatment of Asphyxia* (1845) and *Science and Art of Surgery*, which has gone through nine large editions in England and America, and was translated into many languages. He died in Folkestone, Eng., September 23, 1896.

ERICSSON, JOHN, engineer and inventor, was born in Sweden on January 31, 1802, and was educated as a civil and military engineer. After serving in the Swedish army he went to England in 1826 and devoted himself to mechanical engineering. His first important invention was a "flame engine," which was not highly successful. In 1829 he invented a locomotive which ran fifty miles an hour, and in which was first used the artificial draft which has since been used in all such engines. In 1833 he perfected his caloric engine, which attained much success. Next he turned his attention to steam navigation, and invented the screw propeller which has since come into universal use. The British admiralty regarded it with incredulity, and declined to adopt it, whereupon he came to America in 1839 and in 1841 equipped the warship *Princeton* with a screw propeller, first of all ships in the world. He also introduced into her other improvements, such as smokestack with telescopic slides, and gun carriages with mechanical devices for checking the recoil. Other inventions of this mechanical genius were a distance measurer for use at sea, the hydrostatic gauge, the alarm barometer, the pyrometer, the fluid meter, and a device for taking soundings at sea. In 1852 he successfully equipped a ship with a caloric engine, and was made by King Oscar of Sweden a knight of the Order of Vasa. He had revolutionized steam navigation with his screw propeller, and in 1861–2 he revolutionized naval warfare with his famous *Monitor* and other vessels of similar type. He continued his inventive career for many years thereafter, and was regarded with all possible honor the world around. Two nations, Sweden and America, claimed him as their own, the one as the land of his birth and the other as the land of his adoption and that in which his greatest works were done, but the whole world has profited and forever will profit from his genius. He died in New York on March 8, 1889, and the next year his body was borne home to Sweden by an American ship of war. A monument to his memory has been raised in New York City. W.F.J.

JOHN ERICSSON

ERICSSON, NILS, a Swedish engineer, brother of John Ericsson, was born at Långbanshyttan, Jan. 31, 1802. In 1832 he became major in the engineering corps of the Swedish army; was afterward head of the mechanical corps in the navy, and from 1855 to 1863 had charge of the construction of Swedish railroads. He was also engineer of the Saima canal, in Finland, and of the locks near Stockholm and at Trollhättan. In recognition of his services he was knighted in 1854, and in 1862 was made a baron. He was for a time a member of the Swedish Diet. He died in Stockholm, Sept. 8, 1870.

ERIE, a city and the capital of Neosho Co., Kansas, on the Neosho River, and on the Atchison, Topeka and Santa Fé, and Missouri, Kansas and Texas railroads, 33 miles S.E. of Fort Scott. The river supplies ample water-power, which is used in running lumber and flour mills. It ships large quantities of grain and live-stock. Pop. 1900, 1,111.

ERIE, a city and the county seat of Erie County, Pennsylvania, at the northwestern corner of the state. It lies on Presque Isle Bay, on Lake Erie, and is the only important lake port possessed by Pennsylvania. Its harbor is admirably sheltered, and is the center of extensive commerce on the great lakes in both directions. Through lines of vessels make it a stopping point, and it is the terminus of an important line running to the upper lakes. It became a port of entry under the act of March 2, 1799, and has considerable though greatly fluctuating foreign commerce. Its largest exports were in 1903, amounting to $72,837, and its largest imports in 1900, amounting to $595,312, on which duties were $75,764. Its railroad facilities are also excellent, the Lake Shore and Michigan Southern and the New York, Chicago and St. Louis railroads passing through it, and a branch of the Pennsylvania railroad making Erie its terminal. The city has important industries, embracing iron foundries and machine shops, flour mills, brick and lumber yards, and printing houses, and it has a large export trade in its products, and an import trade in the agricultural and mineral products of the northwestern states. The city is well laid out and handsomely built. The Federal Building, City Hall, County Court House, and Central High School are the most notable public buildings. They are of modern construction and imposing character. Other institutions are a Soldiers' and Sailors' Home, and several asylums and hospitals, an Art School, a business college of high rank, and several academies or seminaries. The residence streets of the city are attractive, with wide roadways and sidewalks and an abundance of shade. The water supply, lighting and other equipments of the city are of the best character. Besides its manufacturing and shipping industries, Erie is the center and market of the rich agricultural districts of Pennsylvania, Ohio and New York lying near it. It is eighty miles from Buffalo, N. Y., and 100 miles from

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Cleveland, Ohio, but only twenty miles from the New York line and twenty-five from the Ohio line. It is 110 miles north of Pittsburg, with which it has direct railroad connection. Its population in 1890 was 40,634, and in 1900, 52,733. (See ERIE, Vol. VIII, p. 462.) W.F.J.

ERIE, BATTLE OF LAKE. See PERRY, OLIVER HAZARD, in these Supplements.

ERIE, LAKE. See LAKE, Vol. XIV, p. 218; and ST. LAWRENCE, Vol. XXI, pp. 188, 191.

ERIE CANAL. Among the canals of the United States, the Erie Canal, running from Buffalo, on Lake Erie, to Albany, on the Hudson River, a distance of 352 miles, is the largest and most important.

The question of building a canal which would connect the newly opened Western territory with the Atlantic seaboard was widely discussed in New York during the early years of our national existence, and in 1810 a commission of seven members, with Gouverneur Morris, to whom is attributed the first suggestion of the Erie Canal, at the head, was appointed by the New York legislature.

Several reports were made by this commission, but the outbreak of the War of 1812 caused a suspension of operations until 1815, when De Witt Clinton, who had been a member of the commission of 1810, memorialized the legislature in favor of the construction of the Erie Canal, and in 1817 a bill was passed authorizing the undertaking. On July 3, 1817, ground for the new canal was broken, by James Richardson, near Rome, New York, and on Nov. 4, 1825, the first fleet of canal-boats came through from Buffalo, Governor Clinton being on the first boat.

The canal, opened as it was at a time when railroad transportation was unknown, began at once to revolutionize the internal trade of America, and gave an impetus to the commercial enterprises of New York City, which in a few years placed her at the head of American cities. The reduction, both in time of travel and cost of transportation, was large, the time from Buffalo to Albany being shortened from twenty days to ten days, and the cost of carrying freight from Buffalo to New York was reduced from $100 per ton to $10, and later to $3.

As originally constructed, the canal had a surface width of 40 feet and a depth of four feet, and cost $7,602,000, but subsequent enlargements gave it an average surface width of 70 feet and a depth of 7 feet.

It is structurally one of the most scientific canals in the world, having, in its course, 57 double and 15 single locks; is carried over the Mohawk River twice on stone aqueducts; crosses a ridge 188 feet high at West Troy by means of 16 double lift-locks; and is raised 20 feet at Albany by means of two double locks, each 110 by 18 feet.

The propelling power for the boats consisted almost entirely of horses until 1871, when a number of steam-propelled boats were introduced, and from that time gradually increased in number.

The organization of the Niagara Falls Electric Power Company brought about an attempt to navigate the canal-boats by electric motive power, the experiments proving fairly successful. (See also ST. LAWRENCE, Vol. XXI, p. 188, and CANALS in these Supplements.)

ERIGERON, a genus of plants of the family *Compositæ*, having heads of many florets, the rays numerous, in several rows, of a different color from those of the disk. *E. Philadelphicum*, native of North America, with pale purple rays and a fetid smell, is valued in the United States as a diuretic. *E. Canadense*, the "horseweed" or "butterweed," with inconspicuous rays, is one of our worst weeds. The species are known, in general, as "fleabanes," and are very closely allied to the asters.

ERIK THE RED, and his son LEIF ERIKSON. See GREENLAND, Vol. XI, p. 153; and LEIF ERIKSON, in these Supplements.

ERIN, a town and the capital of Houston County, northwestern Tennessee, 52 miles W. of Nashville, on the Louisville and Nashville railroad. It has considerable manufacturing activity, producing staves, lumber and shingles, flour and machine-shop work. Population 1900, 800.

ERINACEIDÆ. See MAMMALIA, Vol. XV, p. 406.

ERIOCAULONACEÆ, a family of monocotyledonous plants, and containing about 300 known species, many of which are aquatic or marsh plants. They are chiefly tropical; but the genera *Eriocaulon*, *Pæpalanthus*, etc., have representatives in the temperate regions of both hemispheres. They are plants with a cluster of root-leaves and a slender scape bearing a head of white-bearded flowers, and are popularly known as "pipeworts."

ERIODENDRON, a genus of tree of the order *Malvaceæ* (mallows). It is commonly known as "the wool tree" of which there are eight species natives of America. The woolly coat of the seeds is used for stuffing cushions. W.R.L.

ERITH, a town of Kent, on the banks of the Thames, 14 miles by rail S.W. of London. It was once a summer resort for Londoners, and is now the headquarters of several of the leading yacht clubs. It has a much-restored church rich in brasses. After the signing of the Magna Charta, the barons met Hubert de Burgh at the old church of Erith and arranged the conditions of peace. Here the *Grace de Dieu*, a fine battleship, was built by Henry VIII in 1515. Population, 13,414.

ERITREA. See AFRICA, in these Supplements, p. 67.

ERMELAND OR ERMLAND, one of the eleven districts of the old province of Prussia, extending inland from the Frisches Haff. In 1250 it was created one of the four bishoprics of the country of the Teutonic Knights. In 13[illegible] the bishop of Ermeland, who had been subject to the archbishop of Riga, was made directly dependent upon the pope, and elevated to the position of a prince of the empire. In 1466 West Prus-

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ras transferred to Poland, and the bishop of Ermeand became a member of the Polish senate. Since 722 Ermeland has again been Prussian. It is now a Königsberg province, and is a Roman Catholic liocese, with the bishop's see at Frauenberg.

ERMENONVILLE, a village in Oise department, France, celebrated for its beautiful and extensive parks, and as being the burial-place of Rousseau. It was purchased by Stanislaus de Girardin, and is preserved for lovers of art, nature, nd historical monuments.

ERNE, Ireland, a river and two loughs or lakes n the province of Ulster. The river rises in County Cavan, flows W. into Lough Gowna, whence flowing N. it expands into Lough Oughter, Upper and Lower Lough Erne, and with a northwestern trend drains into Donegal Bay at Ballyhannon, after a course of 80 miles. Upper Lough Erne is 12 miles long and 3 miles wide. Lower Lough Erne is 20 miles long, 7 miles wide, 200 feet deep, and 148 feet above the level of Donegal Bay. Steamers navigate the rivers and lakes which a canal connects with Lough Neagh. C.L.S.

ERNE OR EARN. See EAGLE, Vol. VII, 509–511.

ERNEST, OR ERNST, I, called for his virtues The Pious, soldier and statesman, Duke of Saxe-Gotha-Altenburg, and founder of the ducal House of Gotha, was born at Altenburg in 1601. He was one of a family of ten brothers, the youngest of whom was that Duke Bernhard of Saxe-Weimar who was one of the most brilliant nd engaging figures in the Thirty Years' War. Duke Ernest was devoted to the Protestant cause, nd was one of its chief bulwarks. He entered he army of Gustavus Adolphus, and it was he who ade the victory of Lutzen complete after the fall f the king. After 1634, however, he withdrew rom the army and gave himself to civil rule. He ied in 1675. W.F.J.

ERNEST II (ERNST), AUGUSTUS CHARLES OHN LEOPOLD ALEXANDER EDWARD, DUKE OF axe-Coburg and Gotha; born in Coburg, June 1, 1818; succeeding his father to the throne anuary 29, 1844. He was a brother of Prince lbert, consort of Queen Victoria, of England, nd seems to have resembled him in tastes and haracter. He was instrumental in winning the attle of Eckeonporde in the war against Denark and fought on the side of Prussia in the ustro-Prussian and Franco-Prussian wars. He as favorably known as a musician and wrote everal successful operas, including *Zaïrè Casilda; Diane de Solowges;* and *Sainte Claire*. He ied August 22, 1893. W.M.C.

ERNST, OSWALD HUBERT, soldier, was born t Cincinnati, Ohio, on June 27, 1842, and was raduated from West Point in 1864. He was with he army of the Tennessee (Sherman's) in the Atnta campaign. After the war he was engaged n constructing fortifications on the Pacific coast; s instructor at West Point in 1871–78; as engineer in charge of river improvements in the rest, and as engineer in charge of the deepening f Galveston harbor. In 1893–98 he was in command of West Point: he served in the Spanish War, and since 1899 has been a member of the Isthmian Canal Commission. His present rank is that of brigadier-general. W.F.J.

ERNEST AUGUSTUS, kings of Hanover. See HANOVER, Vol. XI, p. 400.

ERNESTINE HOUSE. See SAXONY, Vol. XXI, p. 369.

EROS, a remarkable minor planet discovered at Berlin by Herr G. Witt, Aug. 13, 1898, and at first named DQ. After its discovery it was found registered on several photographs taken at Harvard since 1893. Its mean distance from the sun is 1.460, that of the Earth being unity, and that of Mars 1.524; eccentricity 0.22865, its orbit lying partly within and partly outside that of Mars; period of revolution 644.7 days, that of Mars being 687. Its diameter is probably less than 20 miles. Every 30 years it approaches the earth within 14,000,000 miles, and it will then afford the most accurate known means of measuring the sun's distance. It will then be of about the sixth or seventh magnitude, and almost visible to the naked eye. One of these close approaches occurred in 1894; the next will occur early in 1903. In Nov., 1900, a favorable opposition took place, the planet being about 31,000,000 miles distant, or nearly 4,000,000 less than the distance of Mars at its closest approach.

EROSION. See GEOLOGY, Vol. X, 250, 252, 331.

ERROR, WRIT OF, a judicial writ issued by a court of superior jurisdiction, directed to a court of record which has entered final judgment in some legal proceeding, requiring such court to examine the record in such proceeding, or to send the record to some court of appellate jurisdiction therein named, in order that some alleged error in the proceedings may be corrected. Its object is to correct errors of law committed by the trial court, and it can be used only when the error appears in the record. It is in the nature of a new action commenced in the higher court. See WRIT, Vol. XXIV, p. 728.

ERSE. See GAELIC LANGUAGE, Vol. X, pp. 7–9.

ERYNGIUM, a genus of plants of the family *Umbelliferæ*, having heads instead of umbels, a leafy involucre, and scaly or bristly fruit. The species are numerous, mostly natives of the warmer temperate parts of the world, with simple or divided leaves, which are usually more or less spiny. In the United States two species, *E. yuccæfolium* and *E. Virginianum*, are found in the northern states east of the Mississippi; but the large display of the genus is in the Mexican border region.

ERYSIMUM, a genus of plants of the family *Cruciferæ*. The pod is four-sided. *E. cheiranthoides*, a branching annual, about eighteen inches high, with lanceolate, scarcely toothed leaves, and small yellow flowers, is found in North America and many parts of Europe. *E. asperum*, the Western wallflower, is the most abundant and showy species of the United States, with large, bright yellow or orange flowers, varying to purple.

ERYX, the typical genus of the family of sand-snakes. It is found in Europe and Asia. The species kept in confinement by the serpent-charm-

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ers of India is perfectly harmless, but is considered dangerous by the ignorant natives.

ESBJERG, a port of Denmark, 56 miles W. of Fredericia, with a large export trade in cattle, mostly to England. Its harbor, the only important one on the W. coast of Jutland, was constructed by the state at great expense in 1868–74. Pop. 4,111.

ESBJÖRN, LARS P., Swedish Lutheran theologian; was a native of Sweden, who came to the United States about the middle of the last century, and did much for the organization of the Lutheran Church among Swedish settlers here. He filled various pastorates, east and west, and for some years was a college professor. In 1860 he founded the Augustana Theological Seminary of the Swedish Lutheran Church, and was its president for three years. W.F.J.

ESCALADE (Latin, *scala*, a ladder), in siege operations, a mode of assault in which ladders are made use of to surmount the difficulties offered by the ditch of a fortification with its scarp and counter-scarp, rampart and parapet. The ladders are usually 12 feet long and fit on other ladders by means of sockets. The escaladers constitute "the forlorn hope" of the besiegers, as the enterprise is one of extreme danger. A firing party is told off to keep down the fire of the enemy on the escaladers. The attempt to capture Geneva in 1602 is known in history as "The Escalade." W.R.B.

ESCANABA, a city, the capital of Delta Co., Mich., at the north end of Green Bay; has a good harbor, and does a large shipping business, sending out annually 500,000 tons of Lake Superior iron ores. Pop. 1890, 6,808; 1900, 9,549.

ESCAPE, in law, the evasion of legal restraint; departure from the custody of a sheriff or other officer, or transcending the limits of confinement without due process of law; also the liability of a sheriff for suffering a prisoner to escape.

ESCAPEMENT. See CLOCKS, Vol. VI, pp. 17–29; and WATCH, Vol. XXIV, pp. 417–419.

ESCARPMENT, a long line of cliff formed by the outcrop of a relatively hard stratum of rock imbedded among more yielding strata. See SCOTLAND, Vol. XXI, p. 548.

ESCARS OR ESKERS, large heaps of gravel, consisting chiefly of Carboniferous limestone, which were accumulated during the Pleistocene period. The gravel is often heaped into narrow ridges, 40 to 80 feet high and from one to 20 miles long. See GEOLOGY, Vol. X, p. 327.

ESCHEAT, the reverting of lands to their original owner, caused by some unforseen contingency. In the United States escheat can only arise upon the death of the owner intestate and without heirs, or, in some states, where the owner is an alien. The subject of escheat is governed by statute; but, as a rule, land escheats to the state, generally to some purpose specified in the statutes. In some states escheated estates go into the school fund.

ESCHENBACH, WOLFRAM VON. See GERMANY, Vol. X. p. 470.

ESCHOLTZ BAY, a portion of the Arctic Ocean, in Alaska, forming the innermost part of Kotzebue Sound, the first great inlet to the northeast of Bering Strait. It is about long. 161° W. lat. 66° N., being barely on the outside of the polar circle; the Buckland River flows into it. It is worthy of notice on account of its fossil remains, which, though common on the northern coast of Siberia, are rare on that of the New Continent.

ESCHSCHOLTZIA, a small genus of *Papaveraceæ* or "poppies," natives of the California region. *E. Californica*, well known in cultivation, is an annual, with pale dissected leaves and long peduncles, bearing large flowers, which are various shades of yellow, or even white. The calyx is like an extinguisher, which rests upon a top-shaped dilatation at the base of the flower, and is forced off as the petals unfold.

ESCOBEDO, MARIANO, soldier, was born in Mexico on January 12, 1827, and in early life was a petty merchant, which calling he abandoned for the profession of arms. He was a soldier in the war between Mexico and the United States over Texas and California, and also in the civil war in Mexico in 1858–61, when he was a partisan of Benito Juarez. Upon the temporary fall of Juarez and the establishment of the ephemeral Franco-Austrian empire of Maximilian, he retired beyond the Texan frontier, but soon organized a force and entered the campaign against Maximilian. He became, indeed, the chief commander of the Republican or Juarist army, defeated Miramon, besieged Queratero and captured it through the treachery of some imperialists. He took Maximilian prisoner, and approved the warrant which sent that unfortunate prince to his death. Thereafter Escobedo was a staunch lieutenant of Juarez, and after him of Lerdo, in whose cabinet he became minister of war. He was an opponent of Porfirio Diaz, and upon the latter's accession to the presidency left the country and spent some time in exile. Later under a proclamation of amnesty, he returned to Mexico, but in 1883 retired from all participation in public affairs. Escobedo came of a prominent and wealthy family, but was only little educated in the schools. He had much native executive ability, however, and a genius for military command. He was intrepid and resolute in a high degree. He lacked, however, the quality of mercy, and was accused of being none too scrupulous in matters of honor. It is supposed that he personally negotiated with Lopez, the betrayer of Maximilian, and he has been charged with making and breaking a pledge that Maximilian should be treated as a prisoner of war. Nevertheless he performed some valuable services for Mexico, and his name has a lasting place in the history of that republic. W.F.J.

ESCOSURA, PATRICIO DE LA, a Spanish statesman and author; born at Madrid, Nov. 5, 1807. He was for political reasons banished in 1824, 1834 and 1840; served in the army in 1833; was under-secretary of state in 1843 and 1874; ambassador at Lisbon in 1855; minister of the interior in 1856; ambassador at Berlin from 1873–74. Died Jan. 22, 1878. He wrote the text to *España Artistica y Monumental;* the drama

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Las Mocedades de Hernan Cortés and *Barbara Blomberg* and the novels *El Patriarca de Valle* and *Ny Rey, Ny Roque*. G.A.S.

ESCROW, a deed or other obligation in writing, delivered to a third person, to be held by him and delivered to the person in whose favor the obligation is made, upon the happening of a certain contingency. An instrument delivered as an escrow does not become operative until conditions are complied with, but takes effect only upon the final delivery.

ESDRAELON, PLAIN OF, also known as valley of Jezreel. See PALESTINE, Vol. XVIII, pp. 175–76.

ESK, four Scotch rivers. 1. Rises in Forfarshire, flows east, becomes the boundary between that and Kincardineshire, and enters the North Sea a little above Charlton. 2. Rises in the same county, flows east into the Montrose Basin, three miles south of the preceding. 3. A small stream of Midlothian, which rises in the western part, flows northeast, and enters the Firth of Forth at Musselburgh; length about 25 miles. 4. Rises in Dumfriesshire, on the south slope of Wind Fell, and flows south-southeast into the Liddel, eight miles above its mouth. Length 40 miles. The first two rise in the Binchinnin Mountains, and are about 50 miles long. They flow through picturesque scenery, and afford good fishing.

ESKILSTUNA, a town in Södermanland province, Sweden, noted for its steel and iron manufactures, copper and brass wares, etc. Pop. about 14,000.

ESMARCH, JOHANNES FRIEDRICH AUGUST, a German surgeon; born in Tönning, in Schleswig-Holstein, January 9, 1823. He was graduated at the Rendsburg Gymnasium and received his medical and surgical education at the University of Kiel and Göttingen. In 1848 he served in the Danish War as assistant surgeon and in 1850 was made chief surgeon of the army. In 1857 he was appointed professor at Kiel University and was made director of the Kiel Hospital in 1860. In 1866 he was a member of the hospital commission at Berlin. During the Franco-Prussian War in 1870 he was a member of the hospital commission of the Prussian army and introduced a system of bloodless operation on the extremities. He was later made surgeon-general of the army. In the autumn of 1888 he made a visit to the United States and inspected the leading medical colleges and hospitals in this country, and in Canada. He was an authority especially on gunshot wounds and was celebrated throughout the world. He was twice married, his second wife being the Princess Henrietta of Schleswig-Holstein. His published works include numerous treatises on surgery and two volumes on gunshot wounds. W.M.C.

ESMERALDAS, the name of a province of Ecuador, and of its capital and principal river. The province lies in the northwestern corner of the republic. It is a country rich in soil and natural resources; has a large ocean front with many ports. Its rivers, which are many, and navigable for long distances, often carry gold in their sands. Its forests contain the finest timber, and its plains cotton, sugar-cane and other products. Its tobacco is of a superior quality. The Esmeraldas River, formed in the eastern part of the province by the confluence of the Gualtabamba and the Toachi, flows north into the Pacific Ocean. It is navigable for 60 miles, almost its whole length. At its mouth is the capital of the province, a small town of 800 inhabitants.

ESOCIDÆ, a family of fishes. See PIKE, Vol. XIX, p. 97.

ESPARTERO, DON BALDOMERO, DUKE OF VITTORIA, a Spanish general and statesman; born at Granatula, in Mancha, February 27, 1792. He entered the army in 1808 and served in Peru from 1815–24. On his return he fought in the civil war from 1832–39 for the cause of Isabella against Don Carlos, and was at the end of the war created commander-in-chief, a grandee and count of Luchana. In 1840 he was appointed premier, and in 1841, regent and guardian of Queen Isabella. In 1843, when the Junta of Barcelona declared the queen of age and Narvaez became the head of the opposition, he departed for England. Having returned on his pardon, in 1848, he was created chief of the government and generalissimo and in 1854 premier, resigning in 1856. The crown which was repeatedly offered to him after the Revolution of 1848, he refused. He died Jan. 10, 1879, at Logroño. G.A.S.

ESPINASSE, JULIE JEANNE ELÉONORE, born Nov. 19, 1732, at Lyons, as an illegitimate child of the Countess of Albon. She became governess in the family of Vichy-Chamrond and in 1754 lady companion of the Marquise du Deffaud. Both women lived in perfect harmony till it was interrupted by the homage done to her by leading spirits, among them the famous D'Alembert. In 1764 the marquise severed all connections with her. The king having bestowed an annuity on her, she entered the fashionable world and the greatest men of France sought her acquaintance. She died May 23, 1776. Her *Lettres* (new edition by Isambert, 1877), *Nouvelles Lettres* (1820), and *Lettres Inedites* (edited by Henry in 1887) give testimony of great sentiment and romantic enthusiasm. G.A.S.

ESPIRITO SANTO, a province, bay and city. See VICTORIA, Vol. XXIV, p. 236.

ESPLANADE, the open space intentionally left between the houses of a city and the glacis of its citadel. It requires to be at least 800 paces broad, that the enemy, in case of getting possession of the town, may not be able to assail the citadel under cover of the nearest houses. The citadel must therefore command the esplanade, and be able to send a direct fire into the streets opening upon it. In the older usage of the term, it is often applied to the glacis of the counterscarp, or the slope of the parapet of the covered way toward the country.

ESPY, JAMES POLLARD, an American meteorologist; born in Washington County, Pennsylvania, May 9, 1785. He was graduated from the Transylvania University in 1808, became principal of the Cumberland Academy; then studied

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law and was admitted to the bar. While a professor at Franklin Institute in 1817, he began the study of meteorological science and after some years of investigation announced a theory of the origin and causes of storms, which led to protracted discussions in the scientific journals. In 1841 his *Philosophy of Storms* was published simultaneously in Boston and London. He had previously communicated to the British association a paper on the *Four Daily Fluctuations of the Barometer*. In 1843 he was assigned by the War Department at Washington to a position in connection with the observatory. His principal contribution to practical meteorology was his institution of a system of telegraphic weather bulletins. He laid the foundation of the present system of government weather prediction. He died in Cincinnati, Ohio, Jan. 24, 1860. W.M.C.

ESQUIMAULT, a harbor and naval station on the southeast of VANCOUVER ISLAND; which see, Vol. XXIV, p. 64.

ESSAYS AND REVIEWS, the title of a remarkable volume published in 1860, containing the following seven papers. (1) *The Education of the World*, by Dr. Temple; (2) *Bunsen's Biblical Researches*, by Dr. Rowland Williams; (3) *On the Study of the Evidences of Christianity*, by Professor Baden Powell; (4) *The National Church*, by H. B. Wilson; (5) *The Mosaic Cosmogony*, by C. W. Goodwin; (6) *Tendencies of Religious Thought in England, 1688–1750*, by Mark Pattison; (7) *The Interpretation of Scripture*, by Prof. B. Jowett. The articles were all in more or less opposition to the tractarian principle of Oxford, and may be deemed representatives of the "Broad Church" views. All the writers, except Mr. Goodwin, were clergymen of the Church of England; and their work, which was censured for its heterodox views by nearly all the bishops, and formally condemned by convocation in 1864, caused much excitement and controversy. Prominent among the accused for assailing orthodox doctrine were Dr. Williams, Mr. Wilson and Dr. Temple, but they were promptly acquitted and in due time vindicated.

ESSEN, a town of Prussia (see VIII, 486). Essen has a modern mining school and well appointed deaf and dumb asylum. Some recent improvements are new churches, and monuments to Emperor William I., Alfred Krupp and Bismarck. The Krupp iron and steel works employed over 25,000 men in 1900. Pop. 1900, 118,862.

ESSENTIAL OILS. See OILS, XVII, p. 769.

ESSEQUIBO. See GUIANA, Vol. XI, p. 221.

ESSEX, a manufacturing town of Middlesex County, south-central Connecticut, on the Connecticut River, and on the New York, New Haven and Hartford railroad. Carriages are its chief manufactures. Pop. 1890, 2,035; 1900, 2,530.

ESSEX JUNTO, THE, in American history, a name applied in 1781 by John Hancock, to a party of politicians in Essex County, Massachusetts, who were in favor of a protective tariff and a development of the commercial interests of the country. Among the leading members of the "Junto" were Fisher Ames, George Cabot, Timothy Pickering, Benjamin Goodhue, Stephen Higginson and Theophilus Parsons. These men and their adherents became prominent members of the Federalist party upon its organization. In 1799 President John Adams declared they were in league to force a war with France. The power of these New England enthusiasts waned after the failure of the embargo policy. W.M.C.

ESSLING, Austria, a village on the Danube, seven miles E. of Vienna, with ASPERN (q. v.), the scene of the battles of May 21 and 22, 1809, between the French and Austrians. C.L.S.

ESSONITE. See GARNET, Vol. X, p. 74.

ESZTERHÁZY FAMILY. See ESZTERHÁZY, Vol. VIII, p. 498.

ESTHERVILLE, a city and the county seat of Emmet County, Iowa, in the northwestern part of the state. It lies among a group of lakes, on the west fork of the Des Moines River, and is reached by the Burlington, Cedar Rapids and Northern railroad. Its population in 1900 was 3,237. W.F.J.

ESTRAY, a domestic animal of value found wandering on land not belonging to its owner. Formerly in England and the United States a public enclosure or "pound" was maintained in each parish or town, where animals that had strayed from home might be retained until claimed by their owners. If the estray had damaged property, its owner could not take it from the pound until compensation had been made. R.W.C.

ESTRÉES, GABRIELLE D', born about 1571; mistress of Henry IV of France, with whom she became acquainted in 1590. She was married to a gentleman of Picardy named Liancourt, from whom she soon separated. She acquired the titles of Marquise de Monceaux and Duchesse de Beaufort. The king was so fond of her that, in spite of the opposition of Sully, he was about to divorce his consort, Marguerite de Valois, that he might marry Mme. de Liancourt, when the latter suddenly died at Paris, April 10, 1599.

ESTUARY. See RIVER-ENGINEERING, Vol. XX, p. 591.

ETANG DE BERRE, a salt lake of southeastern France, in the south of the department of Bouches-du-Rhone, communicating with the sea by a narrow channel, called Port-de-Bouc. It is 11 miles long by 9 broad at its widest part. This lake contains great quantities of eels and other fish. Salt-works are in operation on its banks.

ETCHING. See ENGRAVING, Vol. VIII, p. 394.

ETESIAN WINDS. See GREECE, Vol. XI, p. 75.

ÉTEX, ANTOINE, a French artist; born at Paris, March 20, 1808. He early devoted himself to art, receiving instruction from Ingres and Duban, and in 1828 he secured the second *prix de Rome* by his *Hyacinthus Slain by Apollo*. His statue of Cain, exhibited at the Salon of 1833, secured him a commission for two groups for the Arc de l'Étoile, and in 1841 his *Tomb of Géricault* won the decoration of the Legion of Honor. Among his statues are *Hero and Leander*, at the museum

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of Caen; *Blanche of Castile*, at Versailles; *Charlemagne*, at the Luxembourg; *Shipwrecked*, exhibited at the Exposition of 1867; *Susanna Surprised at the Bath.* Among his paintings are *Romeo and Juliet; Dante and Beatrice; The Great Men of the United States* (now in city hall, New York); *The Flight to Egypt.* He executed designs for monuments and public works, and engraved a series of ideals from the Greek tragic poets. He died July 17, 1888.

ETHAN ALLEN, FORT, a new army post for the United States army, in the Department of the East, situated 5 miles from Burlington, Vermont. It was named in honor of Ethan Allen, the commander of the "Green Mountain Boys" of the Revolutionary War; was completed in 1895, and garrisoned by four troops of cavalry. The nearest post-office and railway station is at Essex Junction, Vermont, distant two miles from the post.

ETHELREDA, SAINT, a daughter of the king of the East Angles, canonized in the seventh century for her saintly virtues. She was the first abbess of Ely, and was noted for her skill in embroidery. Her festival in the calendar is October 17th. Her name was abbreviated popularly or corrupted into St. Audrey.

ETHICAL CULTURE, SOCIETY FOR, a body founded, in 1876, by Felix Adler of New York, to institute a new religion of morality, whose God should be the good, its church the universe, and its heaven to be sought on earth. Its objects are: 1. To teach the supremacy of the morals over all other human ends and interests; 2. To teach that the moral law has an immediate authority, not contingent on the truth of religious beliefs or of philosophical theories; 3. To advance right living. Meetings are held at the usual time of church services. Societies have been formed in New York, Chicago, Philadelphia and St. Louis. In 1886 a convention was held in New York City, and an organization formed, known as the "Union of the Societies for Ethical Culture." The body is numerically small, and has no ecclesiastical polity.

ETHIOPIC LANGUAGE. See SEMITIC LANGUAGES, Vol. XXI, pp. 686, 687.

ETHIOPIC LITERATURE. See ETHIOPIA, Vol. VIII, pp. 538, 539.

ETHMOID BONE, one of the eight bones which collectively form the cranium. See ANATOMY, Vol. I, p. 722.

ETHYLAMINE, a substance strongly resembling ordinary ammonia in odor and other properties. It is found in coal-tar, in the oil obtained during the destructive distillation of bones, in the gases evolved during putrefaction, and may be produced by certain complicated chemical processes. Ethylamine is a mobile liquid of specific gravity 696 (water=1000), and boils at 66° F. It has an alkaline action with coloring matters, forms white fumes with strong acids, and in composition is analogous to gaseous ammonia (NH^3 or NHHH), with one of the atoms of hydrogen replaced by ethyl (C^2H^5), and is represented by the symbol C^2H^7N or $NH^2(C^2H^5)$.

ETHYLENE OR OLEFIANT GAS, a variety of carbureted hydrogen obtained by heating a mixture of two measures of sulphuric acid and one of alcohol, its composition being two atoms of hydrogen to one of carbon (CH_2). It burns with a bright white flame, and is of less specific gravity than the atmosphere. W.R.B.

ETIVE, a sea-loch in the north of Argyleshire, central western Scotland, running inland from the Firth of Lorn, 20 miles E., then N.E., with a width of from a quarter of a mile to three miles. It is bordered by granite in its upper part, and by trap in its lower. Near its mouth there is mica-slate on the north side, and Permian strata on the south. The loch abounds in seals, salmon, porpoises and cod, and is navigable for vessels of one hundred tons. At the south side of the mouth of Loch Etive, on a projecting conglomerate rock 10 to 30 feet high, are the ruins of Dunstaffnage Castle, the ancient stronghold of the Macdougals, in the Edwardian style, with walls 400 feet in circumference, 30 to 50 feet high and 10 feet thick, and with three round towers.

ETNA, a town in Allegheny County, Pa., on the Allegheny River, opposite Pittsburg. Pop. 1900, 5,384.

ETRUSCAN LANGUAGE. See ETRURIA, Vol. VIII, p. 560.

ETTRICK, a vale, town and river of Scotland. On the banks of the river, James Hogg, the "Ettrick Shepherd," was born. See SELKIRK, Vol. XXI, p. 670.

EU, COMTE D', PRINCE LOUIS PHILIPPE FERDINAND GASTON D'ORLÉANS, a French nobleman and soldier; born in Seine, April 28, 1842. He is the eldest son of the Duc de Nemours and a grandson of King Louis Philippe. Having been in exile with his father, he was educated in England and in Madrid. In 1859 he entered the military service of Spain and was graduated from the artillery college in 1863. He saw active service in Algiers and other parts of northern Africa. He was married in June, 1864, to the eldest daughter of Dom Pedro II, of Brazil, and removed at once to Rio de Janeiro, where, in the following year, he was made field-marshal of the Brazilian army. In 1869 he was appointed commander-in-chief of the combined military and naval forces of Brazil. He held many civil offices, was president of various commissions and was virtually the ruler of Brazil and a director of the royal policy during the absences of Dom Pedro from the empire. During these occasions when Dom Pedro was abroad, his daughter, Isabella, the wife of Comte d'Eu, acted as regent. She was known to be under the influence of the Jesuits which made her very unpopular with the people. The fact also that her husband was a foreigner, made her still more unpopular, and as a result the revolution of 1899 was unavoidable and the republic of Brazil was ultimately established. When Dom Pedro departed for Portugal he was accompanied by the Prince and his wife. His son, Prince Augustus, who was the favorite grandson of Dom Pedro, went insane as a result of the overthrow of the empire. W.M.C.

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EUCHLORINE. See CHEMISTRY, Vol. V, p. 429.

EUCLASE. See MINERALOGY, Vol. XVI, p. 426.

EUDEMIAN ETHICS. See PERIPATETICS, Vol. XVIII, p. 556.

EUDIOMETER, a graduated glass tube closed at the upper end and open below. Near the upper end two platinum wires are sealed in, which project into the tube and serve as electrodes. The instrument is used to study the combination of oxygen and hydrogen by collecting the gases above mercury and exploding the mixture with the discharge from a Leyden jar or an induction coil.

EUFAULA, a city of Barbour County, Alabama, on the eastern border of the state, on the Chattahoochee River and the Central railroad of Georgia. It is a great cotton center, has several manufactories, a women's college, and several winter health resorts. Its population was 4,394 in 1890 and 4,532 in 1900. W.F.J.

EUGANEAN HILLS, a range of well-wooded hills, with a north and south axis, lying southwest of Padua, in northern Italy. They owe their origin to eruptions of trachyte during the Jurassic period. See ITALY, Vol. XIII, p. 452.

EUGENE, a city and the county seat of Lane County, Oregon, in the west-central part of the state. It is the seat of the State University and of important manufacturing industries, in iron, lumber, leather and flour. It is at the head of navigation on the Willamette River, and is reached by the Southern Pacific railroad, and has an extensive commerce by both rail and water. It is 107 miles south of Portland. Its population was 3,236 in 1900. W.F.J.

EUGENIA, a large genus of plants of the family *Myrtaceæ*, or "myrtles," having a four-parted calyx, four petals and one or two celled berry, with one seed in each cell. The species are trees and shrubs, natives chiefly of tropical and subtropical countries.

EUGÉNIE, DE MONTIJO, ex-empress of the French, whose maiden name was Eugénia Maria de Guzman, was born on May 5, 1826, in the old city of Granada, Spain. Her father was the Count de Montijo, a Spanish army officer, her mother was Maria Manuela Kirkpatrick, the daughter of a Scotchman who was British consul at Malaga, and she herself was in girlhood styled the Countess de Teba. She was finely educated in Spain, France and England. During her life in London, as a schoolgirl and visitor, she made the acquaintance of Louis Napoleon, who was then an exile from France, and upon his accession to the Presidency of the French Republic she went to Paris with her mother, and there the acquaintance was renewed. The "Prince-President" was much attracted by her charms, and upon his seizure of the imperial crown, and upon his failure to secure a royal princess for his bride, he married her, exploiting the fact that as a "man of the people" he was taking for his consort a "woman of the people." The marriage occurred on January 30, 1853. Eugénie became at once the world's leader of fashion, maintaining at the Tuileries a court of brilliant splendor, and amid all its scandals keeping her own name above reproach. Indeed, her character was one of almost austere piety and virtue. Her incursions into the field of politics were unfortunate, especially when she promoted the disastrous Mexican venture which ended in the death of Maximilian. Her noblest work was her patronage of the Suez Canal, and it was she above all others who made that enterprise a success. She served as regent on several occasions during her husband's absence. Upon the downfall of the empire after Sedan she fled, on September 4, 1870, to England, and has since made her home there. Her only son, the Prince Imperial, was born on March 16, 1856, was educated for the army in England, and was killed by Zulus in South Africa in 1879. W.F.J.

EX-EMPRESS EUGÉNIE.

EUHEMEROS. See EVEMERUS, Vol. VIII, p. 644.

EUMENIDES. See ERINYES, Vol. VIII, p. 464.

EUMOLPUS, son of Posidon and Chione, the progenitor of the Eumolpides of Athens. See MYSTERIES, Vol. XVII, p. 134. G.A.S.

EUOMPHALUS, a large genus of fossil gasteropodous shells, characterized by depressed and discoidal shell, with angled or coronated whorls, five-sided mouth, and very large umbilicus. These mollusks appear in the Silurian, and range through all formations until they disappear in the Triassic. A large number of species have been recognized.

EUONYMUS, a genus of the order *Celastraceæ*, consisting of small trees and shrubs, often climbing, bearing serrated, usually alternate, leaves. There are about 400 species, natives of temperate and tropical regions. The spindle tree (*Euonymus europæus*) is a good example. It is a native of Britain and grows in hedges or on the margins of woods. The wood is compact and is used for shoe pegs, skewers and the like. *Euonymous atropurpureus* is the Burning Bush of the eastern United States. From the leaves of *Catha edulis*, an East African shrub, a decoction is made which produces an agreeable excitement. W.R.B.

EUPATORIUM, a genus of plants of the family *Compositæ*, having small heads in corymbs, flowers all tubular, club-shaped stigmas, imbricated bracts, a naked receptacle and a hairy pappus. The species are numerous, and mostly American. Thoroughwort (*E. perfoliatum*), a species having the opposite leaves joined at the base, is used as a medicine.

EUPHORBIACEÆ, a very extensive family of dicotyledons, containing over three thousand five hundred known species—trees, shrubs and herbaceous plants—of the most extraordinarily varied, often even cactus-like, habit. They abound in warm countries, and mostly in tropical America. The few species found in the colder parts of the world are all herbaceous. The *Euphorbiaceæ* usu-

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ally abound in an acrid and poisonous milky juice; although there are species whose juice is bland, or becomes so through the application of heat. Many of them are valued for their medicinal properties. "Cascarilla-bark" is obtained from *Croton elateria;* "croton-oil" from the seeds of *C. tiglium;* "castor-oil" from the seeds of *Ricinus communis.* Certain farinaceous roots yield "cassava-flour," "tapioca" or "Brazilian arrow-root"; and "caoutchouc" is obtained from *Siphonia elastica.* Many species of *Acalypha, Croton,* etc., are used as ornamental plants; and the garden "Poinsettia" is a species of *Euphorbia.*

EUPHRASY, the popular name of *Euphrasia,* a genus of plants of the family *Scrophulariaceæ,* or "figworts." The common species, *E. officinalis,* or "eyebright," is a low plant, with dense spikes of small flowers, and once was used in diseases of the eye.

EUPHROSYNE, a Greek goddess. See GRACES, Vol. XI, p. 24.

EURASIA (an abbreviation of Europe and Asia), is a term applied to both as one continent by those who do not take Europe as an independent continent. G.A.S.

EURASIANS (an abbreviation of Europeans and Asiatics), or half-castes, a term applied in East India to the offspring of European fathers and Hindu mothers. Their number is estimated in Bengal at about 20,000, and in entire Hindustan at more than 100,000. Many of them receive a good education and speak a correct English, though with a peculiar accent. The girls are, in spite of their dark color, as a rule, handsome and well-built, while the young men are employed as petty officers and clerks. They are generally despised by the Europeans. G.A.S.

EUREKA, California, a city and the county seat of Humboldt County, in the northwestern part of the state. It lies on Humboldt Bay, on the Pacific coast, between Mad and Eel rivers, and has a large trade in redwood and other lumber. Its population in 1900 was 7,327. W.F.J.

EUREKA, Illinois, a city of Woodford County, in the north-central part of the state. It contains a college and other educational institutions conducted by the Disciples of Christ, and some brick-yards and other industries. It lies 18 miles east of Peoria and 115 miles southwest of Chicago, and is reached by the Atchison, Topeka and Santa Fé railroad. Its population in 1900 was 1,661. W.F.J.

EUREKA, a city and the capital of Greenwood County, southeastern Kansas, on the Fall River, and on the Atchison, Topeka and Santa Fé and Missouri Pacific railroads. Grain, live-stock and general produce are shipped from here. Population, 1900, 2,091.

EUREKA, Nevada, a town and the county seat of Eureka County, in the east-central part of the state. It lies south of Alkali Flat and the Diamond Range, in a lead and silver mining region, and is connected with the Southern Pacific railroad by the Eureka and Palisade railroad. Its population in 1900 was 785. W.F.J.

EUREKA, a mining town of Juab County, central Utah, in the East Tintic valley, on the Union Pacific railroad. It is situated in a cañon of Oquirrh Mountains, among a group of valuable silver-mines. Population, 1900, 3,085.

EUREKA SPRINGS, a city and the capital of Carroll County, northwestern Arkansas, situated in the White River Mountains, on the White River, and a terminus of Eureka Springs railroad. Its medicinal springs attract thousands of health-seekers. Pop., 1890, 3,706; 1900, 3,572.

EURHIPIDURA, a word used by Gill to include all living forms of birds as distinguished from the extinct types. As sometimes used it is nearly synonymous with the *Ornithuræ,* and contradistinctive to the *Sauriuræ,* of Häckel. In most of the *Eurhipiduræ* the last six or seven caudal vertebræ coalesce into a plate called the pygostyle, which bears the tail-feathers. R.W.C.

EURIC, a king of the West Goths, son of Theodoric I, removed in 466 B.C., his older brother, Theodoric II. He was the first to give written laws to his subjects, conquered the Roman domains in Gaul, and from 468–70, Spain. He was the mightiest ruler of his time in the Occident. Several times he had to resort to extreme measures with his Catholic bishops of the Gallic nobility. He died in 484, and was succeeded by his son, Alaric II. G.A.S.

EURIPTERIDA. See CRUSTACEA, Vol. VI, pp. 585, 586.

EUROCLYDON, a tempestuous wind which is encountered upon the Mediterranean. The name is thought to be a corruption from *Εὐραχύλων,* the term given in the best Sinaitic, Vatican and Alexandrian manuscripts. In the Revised Version, in the account of the Apostle Paul's shipwreck (Acts xxvii, 14), the more commonly accepted reading, *Eurokylon* (Lat., *Euraquila*), is adopted. The storm probably corresponded to the modern "Levanter."

EURYDICE, in Grecian mythology, the wife of ORPHEUS; q.v., Vol. XVIII, p. 54.

EUSTACHIAN TUBE. See ANATOMY, Vol. I, p. 783.

EUSTIS, JAMES B., jurist, statesman and diplomat, was born at New Orleans, La., Aug. 27, 1834. He received a classical education, studied law at the Law School of Harvard University, and was admitted to the bar of his native state in 1856. At the outbreak of the Civil War he entered the Confederate army, in which he served as judge advocate on the staff of Gen. Magruder, and afterward on that of Gen. "Joe" Johnston. After the war he resumed his legal practice, was elected to the state legislature before the reconstruction acts were passed, and was a member of a com-

JAMES B. EUSTIS.

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mittee sent to Washington to consult President Johnson about Louisiana affairs. In 1874 he was elected to the state senate, and in 1877 to the U. S. Senate. After the expiration of his term he filled the chair of Civil Law in the University of Louisiana until again elected to the U. S. Senate in 1885. Although a Democrat he was a frequent critic of the course of President Cleveland, of whom afterward he became a close friend, and who appointed him Ambassador to France in 1893. On his return he became prominent at the New York bar and in society, through his attainments, culture and courtly manner. He died at Newport, R. I., Sept. 9, 1899. J.H.

EUTAW, a town and the capital of Greene County, central western Alabama, 32 miles S.W. of Birmingham, on the Alabama Great Southern railroad. It has a women's college, and products of lumber, gin and flour. Population 1900, 884.

EUTAW SPRINGS, in Berkeley County, South Carolina, near Black Oak Island and on the Santee River, 65 miles north by west from Charleston, was the scene of an American victory over the British in the Revolution, on September 8, 1781. It is reached by the Atlantic Coast Line railroad. W.F.J.

EUTERPE, a genus of American palms, having staminate and pistillate flowers intermingled on the same spadix, the spadices springing from beneath the leaves; the spathe entire, membranaceous and deciduous. They are very elegant, with lofty, slender, smooth, faintly fringed stems and pinnate leaves, forming a graceful feathery plume, the base of the leaf-stalk sheathing far down the stem, and so forming a thick column, several feet in length at its summit. The young buds are used as cabbage.

EUTHERIA. See MAMMALIA, Vol. XV, pp. 374, 386.

EUTHYNEURA. See MOLLUSCA, Vol. XVI, p. 678.

EUTYCHIANS OR MONOPHYSITES. See EUTYCHES, Vol. VIII, p. 635; and JACOBITE CHURCH, Vol. XIII, p. 548.

EUXINE SEA. See BLACK SEA, Vol. III, pp. 690–694.

EVANGELICAL ASSOCIATION, a body of Christians in the United States, commonly, though erroneously, known as German Methodists, and sometimes as Albrights. It was founded by Jacob Albright or Albrecht (1759–1808), a native of Pottstown, Pennsylvania, a tile-burner who, dissatisfied with the lax morality of the neighboring German churches, began to preach in 1790, and in 1800 established a church, and was elected pastor or bishop of the various stations where he had made converts. The name *Evangelical* was adopted, and in 1816 the first annual conference was held. They accept the Bible as their only rule of faith, interpret it according to the teachings of Arminius, but deny the doctrine of original sin. Their church polity is similar to that of the Methodists, including itinerant preachers. They were from the beginning unalterably opposed to slavery, and forbade the use of liquor as a beverage, dealers in liquor being excluded from all church fellowship. Annual conferences are held, and delegates from these meet every fourth year in general conference, which is the highest ecclesiastical court in the denomination. The presiding elders and bishops are elected for a term of four years, but may be re-elected, their authority ceasing unless so re-elected. In January, 1891, there were 26 conferences, 2,062 churches, 1,227 itinerant preachers, 619 local pastors and a total membership of 150,234. In 1890 a serious dispute arose, which resulted in a disruption of the body and the formation of a separate organization, under the name of United Evangelical Church. The cause of the trouble was an unfavorable report by Bishop Escher in regard to the superintendent of the mission in Japan. This resulted in a quarrel, during which formal charges were brought against Bishops Bowman and Escher, who secured trial by a court of three elders, and were by them exonerated. Their opponents, not satisfied, secured a second, fuller trial, and Bishop Bowman was declared suspended by a court sitting in Chicago, March 7, 1890, and Bishop Escher was similarly sentenced by a court at Reading, Pennsylvania, March 21st. The bishops, however, claiming that their case was closed at the first trial, refused to acknowledge the finding of the later courts, and continued to exercise episcopal authority. In this they were sustained by the majority and by the general conference which met at Indianapolis in 1891. The same general conference also declared Bishop Rudolph Dubs, who had opposed the other bishops in the Japan mission matter, deposed from his office and expelled from the church. The minority, which upheld Bishop Dubs, met in general conference in October at Philadelphia, and declared Bishops Bowman and Escher deposed and expelled. The general conference was split. Difficulties soon arose over the ownership of church property, which culminated in an appeal to the civil courts in the case of Immanuel Church at Reading, Pennsylvania, claimed by both factions. The supreme court of the state finally decided in favor of the majority, declaring the general conference at Indianapolis to be the only regular successor of former conferences, and the minority to be in rebellion. The minority met in general conference at Naperville, Illinois, in November, 1894, six conferences being represented, and completed their organization as the UNITED EVANGELICAL CHURCH.

The Evangelical Association publishes six periodicals, three in German and three in English, issued from the publishing house of the denomination at Cleveland, Ohio. The educational institutions include Union Seminary at New Berlin, Pennsylvania; a seminary at Blairstown, Iowa; and Northwestern College at Naperville, Illinois, which in 1895 had 15 instructors, 335 students and a library of 3,200 volumes. The foreign missions supported by the denomination included, in 1895, 84 stations, 119 missionaries and 11,829 members. The home missions included 497 stations, with 39,609 members. In connection with

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the church is a Young People's Alliance, which in 1895 had a membership of 28,743, represented in 19 conference branches. See Vol. VIII, p. 636.

EVANGELICAL CHURCH CONFERENCE, the English designation for the meetings of the National Protestant Church of Germany, held biennially at Eisenach since the second conference of 1852. The plan was suggested by King William of Württemberg in 1815, but was not acted upon until 1846, when representatives from nearly every German state assembled. At the second conference an official journal was founded now published at Stuttgart. See UNITED EVANGELICAL CHURCH, in these Supplements. C.L.S.

EVANGELICAL COUNSELS, same as counsels to perfection in the Roman Church.

EVANS, ARTHUR JOHN, English traveler and archæologist; born at Nash Mills, Herts, in 1851, received his education at Harrow School and Brasenose College, Oxford, and pursued historical studies at Göttingen. With Professor Balfour, he explored the Finnish and Lapp countries between the Arctic and the Baltic. In 1875–82 he traveled through the Slavonic parts of southeastern Europe, exploring the antiquities and studying the ethnology and language. He also followed the revolutionary movement then going on, and described the course of events from the camps of the insurgents. Some criticism of the action of the Austrian government in south Dalmatia in 1882 resulted in his arrest and expulsion from Austrian dominions. On his return to England he settled at Oxford, where he was chosen lecturer in 1883, and in 1884 keeper of the Ashmolean Museum. He wrote *Antiquarian Researches in Illyricum; The Horsemen of Tarentum* (1889), a monograph on the coinage of that city; *Syracusan Medallions and Their Engravers* (1892).

EVANS, AUGUSTA JANE. See WILSON, MRS. A., in these Supplements.

EVANS, FREDERICK WILLIAM, best known as "Elder Evans," was born in England on June 9, 1808, and came to America in 1820. Ten years later he joined the United Society of Believers, commonly known as "Shakers," and was for many years the foremost member of the community at New Lebanon, New York. He lectured, and wrote a number of books, including a *Compendium of the Origin, History and Doctrines of Shakers*, *Autobiography of a Shaker*, and *Shaker Communism*, and frequently contributed to the periodical press. He died on March 6, 1893. W.F.J.

EVANS, HENRY CLAY, statesman; was born in Juniata County, Pennsylvania, on June 18, 1843, served in the army in the Civil War, and became a manufacturer at Chattanooga, Tennessee. He was twice elected mayor of that city, was a representative in Congress in 1889–91, and assistant Postmaster-General in 1891–93. In 1894 he was elected governor of Tennessee, upon the face of the vote, but was counted out because of alleged irregularities. He was commissioner of pensions in 1897–1902, and since 1902 has been United States consul-general in London. W.F.J.

EVANS, OLIVER, an American inventor; born in Newport, Del., in 1755. He was apprenticed to a wheelwright, and among his inventions were a machine for making card-teeth and several devises for the improvement of flour-milling machinery. About 1800 he attempted to perfect a horseless-carriage scheme, but, finding his ideas more applicable to mills, he successfully turned his efforts in that direction. In 1804 he constructed the first steam dredging-machine used in America. He died in New York, April 21, 1819. E.E.T.

EVANS, ROBLEY DUNGLISON, an American naval officer; was born in Floyd County, Va., Aug. 18, 1846. He went to reside in Washington, D. C., from whence he removed to Utah in order to secure an appointment to Annapolis, entering the Academy in 1860. He graduated in 1863, and was made ensign. At the outbreak of the war his mother hurriedly sent in his resignation, which was accepted, but Evans promptly repudiated it and was restored to the service. At Fort Fisher he was shot in the leg and at Fort Sumter he was hit on the knee-cap. He rose from lieutenant (1866) through the various grades of lieutenant-commander (1868) to captain (1893). In 1891 he was assigned to the *Yorktown* and entered the harbor of Valparaiso, when war seemed imminent between this country and Chile, on account of a street-fight, in which two men of the U. S. S. *Baltimore* were killed. He anchored his ship in front of the batteries, which made her a practice target for the torpedo boats. Evans cleared for action, went ashore, sought the post-commander and insisted that the bay be cleared of torpedoes, which was done. From this incident he got his popular name, "Fighting Bob." His first important command, however, was the *Indiana*, in 1895. In 1898 he was given the command of the *Iowa*, and assigned to Sampson's fleet, off Santiago, where, in the "captains' fight," he distinguished himself. He was appointed rear-admiral in 1901 and commander-in-chief of the Asiatic Station in 1902. He took command of the North Atlantic Fleet, in 1905, succeeding Rear-Admiral Barker. He has detailed his career in *A Sailor's Log*, 1901. R.C.A.

EVANSTON, a city of Cook County, Illinois, immediately north of Chicago, on the shore of Lake Michigan. It is the seat of the Northwestern University and other institutions. Its population in 1900 was 19,259. W.F.J.

EVANSTON, a city and the county seat of Uinta County, Wyoming, in the southwest corner of the state, on the Union Pacific railroad, 60 miles east of Ogden, Utah. It is the seat of railroad car shops. Its population in 1900 was 2,110. W.F.J.

EVANSVILLE, a city, capital of Vanderburg Co., Ind. (see EVANSVILLE, Vol. VIII); has ten railway and eight steamboat lines; is built over two veins of soft coal, and within a radius of 30 miles 60 coal shafts are in operation. Has separate high schools for negroes and whites. There is a fine public library and art gallery. There were, in 1900, 705

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manufacturing establishments, employing, on an average, 7,279 hands, and producing annually nearly $14,200,000 worth of manufactured articles. The hardwood lumber trade is important, and is said to be the largest in the State, amounting in 1900 to $1,620,321. The production of flour reaches 630,000 barrels annually, and 15,000,000 brick are yearly manufactured within the city limits. Evansville has grown rapidly during the last decade. Population 1890, 50,756; 1900, 59,007.

EVANSVILLE, a city of Rock County, Wisconsin, in the southern tier of that state. It contains iron foundries, machine shops, furniture factories, and other works, and a large academy. It lies seventy miles from Milwaukee, on the Chicago and Northwestern railroad. Its population in 1900 was 1,864. W.F.J.

EVART, a village of Osceola County, Michigan, in the northwest-central part of the state, on the Muskegon River and the Flint and Pere Marquette railroad. It has extensive lumber interests, and manufacturing industries. Its population in 1900 was 1,360. W.F.J.

EVARTS, JEREMIAH, religious editor; born in Sunderland, Vt., Feb. 3, 1781; was educated at Yale College and began the practice of law in New Haven in 1806. He settled in Charlestown, Mass., in 1810, and there throughout his life devoted himself entirely to religious work. In 1810–20 he edited the *Panoplist*, a religious monthly, and in 1820–31 conducted the *Missionary Herald*, the organ of the American Board of Commissioners for Foreign Missions. In 1812 he became treasurer of the board, in the following year a member of its prudential committee, and in 1821 its corresponding secretary. His great exertion in the interests of missionary work is supposed to have hastened his death. He died in Charleston, S. C., May 10, 1831. G.J.H.

EVARTS, WILLIAM MAXWELL, lawyer and statesman, was born in Boston on February 6, 1818, was graduated from Yale College in 1837, studied law at Harvard, and was admitted to the New York bar in 1841. He soon attained eminence in his profession and also became an influential political leader, being among the first members of the Republican party. He was the chief counsel for the defense of President Johnson in the impeachment trial in 1868, and conducted that important case with masterly skill. Soon afterward he was appointed Attorney-General of the United States, and served from August, 1868, to March, 1869. He was one of the United States counsel before the Geneva Court of Arbitration for the settlement of the Alabama claims, in 1872, and was counsel for Henry Ward Beecher in his trial in 1875. He was the orator at the national centennial celebration at Philadelphia on July 4, 1876, and in the following winter argued the case for President Hayes before the Electoral Commission. He was Secretary of State during the Hayes administration, and was United States Senator from New York from 1885 to 1891. He was connected with many other great law cases, was a public orator on various occasions, and was greatly esteemed for his high scholarship, persuasive eloquence, rare wit, and eminent public services. He was the recipient of the honorary degree of LL.D. from Union College in 1857, from Yale College in 1865, and from Harvard College in 1870. For some years he was president of the Union League Club in New York, and was both in and out of public office an influential political leader. He died in New York on February 28, 1901. W.F.J.

WILLIAM M. EVARTS.

EVE, PAUL FITZSIMMONS, physician and educator, was born at Augusta, Ga., on June 27, 1806, and was educated at the University of Georgia and the medical department of the University of Pennsylvania, and also under eminent physicians in Europe. He was a surgeon of the Polish army in the struggle of 1830–31, then came home, and in 1832 organized the Medical College of Georgia and was its professor of surgery for seventeen years. After a short term as professor of surgery at the University of Louisville he took a like place in the University of Nashville and filled it from 1851 to 1861. In 1868 he filled the same chair in the Missouri Medical College, and then returned to Nashville to serve for the rest of his life. He wrote many standard works, and was esteemed in America and Europe as one of the ablest operating surgeons of his time. He died on November 3, 1877. W.F.J.

EVELYN COLLEGE, an educational institution for young ladies at Princeton, New Jersey, established in 1877. The college is under the direct management of a board of trustees selected from the trustees and faculty of Princeton University and of Princeton Theological Seminary. The libraries and scientific collections of these institutions are placed at the disposal of Evelyn students. There are general classical and scientific courses of study and since 1889 the college is authorized to confer degrees. W.M.C.

EVENER SYSTEM. See RAILROADS, XXVIII.

EVENTS, NOTABLE. See CHRONOLOGY, XXVI.

EVEREST, HARVEY, an American clergyman and educator; born in Hudson, New York, May 10, 1831. He was graduated from Oberlin College and studied at the Geauga Seminary and Bethany College. He was a professor at the Kentucky University, and was later president of Eureka College and Butler University. In 1875 he became chancellor of the Garfield University at Wichita, Kansas, and in 1884 became pastor of the Christian Church at Hutchinson, Kansas. He has written several theological works. W.M.C.

EVEREST, MOUNT. See HIMALAYA, Vol. XI. p. 737.

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EVERETT, a city of Massachusetts, located in Middlesex County, in the extreme eastern portion of the state. It adjoins Boston, with which it is connected by the Eastern railroad. It is supplied with water from the Mystic Water Works of Boston. Prior to 1870 it formed a part of Malden. It has good public schools, a school library, chemical works, and other manufactories. Pop. 1890, 11,068; 1900, 24,336.

EVERETT, a borough of Bedford County, Pa., 9 m. E. of Bedford, on the Huntingdon and Broad Top Ry. It has an iron furnace, glass-works, tanneries, etc. Pop. 1900, 1,864.

EVERETT, a young city in Snohomish County, Washington, situated on Puget Sound and the Great Northern Ry. It has a good harbor, lumber mills and an ore smelter. Pop. 1900, 7,838.

EVERETT, CHARLES CARROLL, clergyman, was born at Brunswick, Maine, on June 19, 1829, and was educated at Bowdoin College and the University of Berlin. He was tutor, librarian and professor of modern languages at Bowdoin; became a Congregational minister in 1859, and in 1869 became professor of theology in the Harvard Divinity School, of which school he was dean from 1879 until his death. He was the author of numerous books, including *The Science of Thought*, *Religion before Christianity*, and *Fichte's Science of Knowledge*. He died on October 17, 1900. W.F.J.

EVERETT, JOSEPH DAVID, mathematician and engineer; was born near Ipswich, England, son of a small farmer, on September 11, 1831, and was educated at Glasgow University. He was for thirty years a professor in Queen's College, Belfast, and was long engaged in scientific investigations for the British Association. He is the author of many books and papers on electricity, temperature, vibration and sound, and other departments of natural philosophy, and of a shorthand system known by his name. W.F.J.

EVERETT, ROBERT W., an American public man and Confederate soldier, born near Hayneville, Georgia, March 3, 1839. He was educated at Mercer University, Georgia, graduating in 1859, and became a teacher. He entered the confederate army as a sergeant under Gen. N. B. Forrest, and was in service till the close of the war. He served two years as a commissioner of revenues and twelve years as a member of the board of education, being its chairman four years. He was elected a member of the state house of representatives in 1882, and served four years, being chairman of the committee on agriculture in 1884 and 1885. In 1890 he was elected a Representative from the seventh Congressional district of Georgia to the Fifty-second Congress.

EVERETT, WILLIAM, an American author and educator; born in Watertown, Massachusetts, October 10, 1839. He was a son of Edward Everett, the orator. He was graduated from Harvard and studied at Cambridge, England. From 1870 to 1877 he was assistant professor of Latin at Harvard. He has been master of Adams Academy at Quincy, Mass., since 1897. He was elected to Congress in 1893. He has written *On the Cam* (1865); *Changing Base* (1868); *Double Play* (1870); *Hesione, or Europe Unchained* (1876); and *School Sermons* (1881). W.M.C.

EVERGLADES. See FLORIDA, Vol. IX, p. 296.

EVERGREEN, Alabama, the seat of Conecuh County, 80 miles south of Montgomery, on the Louisville and Nashville railroad. Its institutions include an agricultural and mechanical college, and a Baptist orphan asylum. It is a farming trade center with market-gardening interests, and also a winter health resort frequented by Northerners. Population, 1900, 1,277. C.L.S.

EVERGREENS. See ARBORICULTURE, Vol. II, pp. 276, 280.

EVERLASTING FLOWERS. See IMMORTELLE, Vol. XII, p. 755.

EVERSLEY, a village of northeast Hampshire, southern England, 13 miles N.E. of Basingstoke. Charles Kingsley was rector of the parish from 1842 until his death, in January, 1875, and is buried in the churchyard.

EVICTION, in the sense in which it is used generally, is the act of depriving a person of the possession of land. Technically, the term denotes only the act of dispossessing another under process of law, and an expulsion without legal process is an ouster. An eviction may be total or partial. Constructive eviction may arise from acts of a landlord tending to diminish the tenant's enjoyment of the premises, as by preventing an undertenant from paying rent, or in any other manner interfering with the tenant's quiet enjoyment of the premises. Constructive eviction will not excuse the tenant from paying rent while he continues in possession, but gives him the right to abandon the premises and treat his lease as at an end. See IRELAND, Vol. XIII, p. 233; also RENT, Vol. XX, p. 415, and HOME RULE in these Supplements.

EVIDENCES OF CHRISTIANITY. In America it is usual to consider apologetics and the evidences of Christianity as two distinct but closely related subjects.

Apologetics is a discussion of the presuppositions on which the evidences of Christianity must rest. Is there a God? If so, is he a person? Is it to be expected that a personal God will reveal himself to man in some special way? Does man need such a revelation? By what evidences could it be attested, if given? Are miracles possible? Can any evidence prove the miraculous? Such are some of the chief questions discussed by writers on apologetics.

The evidences of Christianity are, then, presented in the light of this discussion.

The field of apologetics and Christian evidences was cultivated but little for twelve hundred years after Constantine, who made Christianity the religion of the Roman Empire, defended it with the sword, and thus relieved its professors from the necessity of providing a literary defense for it. Not until the Protestant revolt from the papacy, and the general establishment of freedom of opinion, do we find the writ-

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ings of opponents stirring up the advocates of Christianity to answer objections and confute gainsayers. But since that time Christian scholars have been busy, now against deism, now against pantheism, now against materialism, now against agnosticism, and now against an unbelieving literary criticism. The discussion has proved of great value, bringing out a thousand new truths, diminishing the forces of argument available for skepticism, greatly enlarging the forces of argument available for the defense of Christianity, strengthening Christians, and leading them to a more intelligent, and hence a more victorious, faith.

Both apologetics and the evidences of Christianity have assumed many different phases in order to meet these various kinds of assault. In the first three centuries the apologists were much concerned with the slanderous accusations of Jewish and pagan opponents, and hence gave much emphasis to the innocent and beneficent lives of those whom they defended. They also retorted by exhibiting the wickedness of the Jews and the shameless depravity of the pagans, both well known. While the Greek and Latin apologists occupied this field jointly, the Greek went further, considered Christianity as adapted to the intellect of man, and laid down the rudiments of a philosophy of religion. Modern writers on apologetics and the evidences of Christianity have covered, in succession, every part of the field of research opened to them by the theoretical doubts of men.

Turning now to the evidences of Christianity, as distinct from apologetics, it is to be observed that these evidences are of two classes, the internal and the external.

The internal evidences consist of the Christian experience in its various phases. He who accepts the offers made by God in the Gospel verifies them for himself. He observes the work of God in his character and life. He enters into a new state, in which he perceives that his sins are forgiven, that his heart is changed from the predominant love of self to the predominant love of God and man, and that God is present with him in infinite compassion, wisdom and power, to sustain him in his struggle against sin, and to comfort him in disappointment and grief. He knows that God is moved by his prayers. He knows that the Bible is the revelation of God. He knows that Christ is the son of God. He does not need to solve all the difficulties and objections which may be presented to his mind from within and from without, for he is made certain of the great truths of Christianity by his immediate consciousness, as he is made certain that the sun shines by his immediate perception of its light.

While these evidences are internal to the Christian, they may be classed among the external for those who are not Christians, but who are sincere inquirers. Such persons should weigh carefully the testimony of Christians concerning their inner experiences. They will find that this testimony comes not alone from the fanciful, the light, the uneducated, but equally from the least emotional, the calmest, the wisest, the most judicious, the most learned. It is essentially the same in all ages, all countries and all classes. It must be explained. It cannot be explained as a product of human nature: it is peculiar to Christianity; it is supernatural.

The evidences of Christianity usually classed as external are those derived from the character of Christ, from his miracles, from prophecy, from the moral system of the New Testament, and from the achievements of Christianity. It may be said that each of these arguments is stronger to-day than at any preceding period.

The character of Christ has been studied in recent years as never before. The study has been conducted not alone by Christians, but also by the opponents of Christianity. The result is seen in the profound reverence with which unbelievers now always speak of the marvelous teacher of Galilee, and the more intelligent adoration paid to him by his followers. The argument has always impressed deeply those who have considered it; and familiar examples of the impression are found in the utterances of Napoleon and John Stuart Mill. It has acquired additional impressiveness by the fuller and clearer light in which it stands to-day.

During the first half of this century the argument from the miracles of Christ was passing through a stage of weakness. It was assailed first by unbelieving critics, who taught that the Gospels are comparatively late productions, and that their narratives of miracles are myths. It was assailed still more cogently by the theory of mechanical evolution, whose advocates pronounced miracles to be impossible. But the Gospels are now admitted by the best of even the skeptical critics to be products of the apostolic age, and hence the testimony of eye-witnesses. The theory of mechanical evolution has been examined, and rejected as both inadequate and degrading, by the great mass of cultivated persons. Christians no longer apologize for the miracles of the New Testament, but rather hold them forth as proofs of the unique revelaion of God in Christ.

The argument from prophecy also has passed through a phase of weakness. It was once pushed too far, and minute predictions and fulfillments were matched together in a mechanical manner, and with doubtful success. The prophets were made to say many things which they never intended to say. The opponents of Christianity assailed this argument by refuting many of these teasing mathematical interpretations, and by endeavoring to reduce all the predictions of the Old Testament to two elements, that is, to shrewd guesses and to the errors into which the shrewdest men will fall when they try to forecast the uncertain future. The assault has led to a profounder study of prophecy. Many unwarranted interpretations have been abandoned. And now that these mistakes of interpretation are cleared

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away, the noble structure of prophecy stands out in fuller and larger proportions than ever before. The grand figure of the Messiah, in his suffering and his glory, is seen more clearly. All the chief events of his earthly career are portrayed in type and symbol and image, as well as in simple and plain language.

The argument from the perfect moral system of the New Testament has been attacked by comparing the moral precepts of Christianity with those of Mohammedanism and Buddhism. The result has been to show that the only perfect moral system known to mankind is that of the Christian Scriptures.

The argument from the achievements of Christianity has become specially cogent in recent times, because the achievements themselves are now presented to every observer on a scale of magnificence never before known. The practical utility of the churches in countries where they are most firmly established, and their abounding sacrifices to civilize and Christianize the pagan nations, compel candid observers to admit that Christians possess a zeal, a charity, a spirit of self-abnegation, which is not of this world, and must have come down from above.

The literature relating to this subject is voluminous. The book best known to American students is Fisher's *Grounds of Theistic and Christian Belief*. A very valuable book, clear, cogent and brief, is Robinson's *Christian Evidences*. See BIBLE, Vol. III, p. 556.

FRANKLIN JOHNSON.

EVIL EYE. See MAGIC, Vol. XV, p. 206.

EVOLUTE AND INVOLUTE. See MECHANICS, Vol. XV, pp. 686, 687.

EVOLUTION, in algebra. See ALGEBRA, Vol. I, pp. 465, 466.

EVREMOND. See ST. EVREMOND, Vol. XXI, p. 177.

EWART, JAMES COSSAR, a British zoölogist; born at Penicuik, in Midlothian, Nov. 26, 1851; educated at the University of Edinburgh, where he graduated M.D., and where he was appointed demonstrator in anatomy in 1874. The following year he was elected conservator of the museums of University College, London, where he completely reorganized the museums, and carried out investigations upon the bacillus of splenic fever and of other organisms. In 1878 he was appointed by the crown to the chair of natural history in the University of Aberdeen, and in 1882 received the appointment to the same chair in the University of Edinburgh, one of the few prizes open to naturalists in Britain. At Aberdeen he organized the first classes for the practical study of zoölogy in that university, and also started a small marine laboratory. The latter was the first laboratory of the kind in Great Britain, and it was therein that Professor Ewart and the late Dr. Romanes made their study of the echinoderms, which the Royal Society constituted the Croonian lecture of 1881. At Edinburgh Professor Ewart developed the natural history department of the university, and also created an investigation department in connection with the Fishery Board, in which great progress has been made in tracing the life-history of the herring and other edible fishes. Three marine stations and a staff of qualified assistants are at the director's disposal in this work. Professor Ewart has instituted two lectureships in the University of Edinburgh, one on embryology and the other on the philosophy of natural history. He did much to obtain for the students a greatly needed union, similar to those existing at the English universities. Later he undertook an experimental investigation into the subjects of hybridity and telegony, at the Bungalow Penicuik. He obtained a Burchell zebra from the Zoölogical Gardens, Antwerp, and a jet-black Island of Rum pony from Lord Arthur Cecil. A foal from this union was born Aug. 12, 1896, which exhibited the characteristic zebra stripes (of a fawn color), on a nearly black background. The result of the experiment, when completed, will aid in settling the vexed points as to the "infection of the ovum" and also the fertility of hybrids.

EWELL, BENJAMIN STODDERT, soldier and educator, was born in Washington, D. C., on June 10, 1810, and was graduated from West Point in 1832. He was afterward an instructor there in mathematics and sciences. From 1839 to 1847 he was professor of natural philosophy and chemistry in Hampden-Sidney College, Virginia, then professor in Washington College, and in 1854 he became president of William and Mary College, in which place he had a long and distinguished career. He was a Confederate army officer in the Civil War, and afterward returned to the College of William and Mary, and helped to rehabilitate it after the war. He was made president emeritus in 1888, and died in June, 1894. W.F.J.

EWELL, RICHARD STODDERT, soldier, was born at Georgetown, D. C., on February 8, 1817, and was graduated from West Point in 1840. He served on the western frontier, and in most of the battles of the Mexican War. Later he was an Indian fighter in the Gila and Apache country. In May, 1861, he resigned his commission and entered the Confederate army, where he had an active career. He was at the two battles of Manassas, White Oak Swamp, Cedar Mountain, and Kettle Run. He succeeded to the command of Stonewall Jackson's troops at Jackson's death, and led them with distinguished valor at Winchester and Gettysburg and in the Wilderness. After the battle of Spottsylvania, in which he was wounded, he was retired from field duty on account of physical disabilities, and commanded at Richmond, Virginia. He was captured at Sailor's Creek on April 6, 1865, and died on January 25, 1872. W.F.J.

GENERAL EWELL.

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EWER, FERDINAND CARTWRIGHT, clergyman, was born at Nantucket, Mass., on May 22, 1826, and was graduated from Harvard in 1848. At first a Unitarian, he became a ritualistic Episcopalian, of the school of Newman, Pusey and Keble, and was about to enter the priesthood when he was stricken with doubts of the truth of Christianity, and so become a civil engineer and journalist in California. In time his faith in Christianity was restored, and he entered the priesthood in 1858. He settled in New York, and was assistant rector of St. Ann's Church, and rector of Christ Church. From the latter place he withdrew because his vestrymen did not approve his ritualistic practices, and in 1871 he became rector of the new parish of St. Ignatius's, where he remained until his death. He made St. Ignatius's an extreme ritualistic church, and wrote several books in advocacy of ritualism. He died on October 10, 1883. W.F.J.

EWING, a village of Franklin County, central southern Illinois, on the Chicago, Paducah and Memphis railroad, six miles N. of Benton. It is the seat of Ewing College, and contains a large woolen factory. Population 1900, 419.

EWING, FINIS, clergyman, was born in Virginia on June 10, 1773, and became a Presbyterian minister in 1803. The General Assembly denied the validity of his ordination, which had been performed by the Cumberland Presbytery, whereupon he and a few of his friends organized the Cumberland Presbyterian Church, which has since grown to be a considerable denomination. He removed to Missouri in 1820, and organized Cumberland Presbyterian churches there, at New Lebanon and at Lexington. He was the author of *Lectures on Divinity*, an exposition of the creed of the Cumberland Church. He died at Lexington, Mo., on July 4, 1841. W.F.J.

EWING, JAMES ALFRED, a Scotch engineer; born at Dundee, March 27, 1855, and educated at the high school of Dundee and at the University of Edinburgh. He took part in a number of telegraph cable expeditions, and in 1878 was appointed professor of mechanical engineering in the University of Tokyo, where he remained until 1883, when he became professor of engineering at University College, Dundee. In 1890 he was elected professor of mechanism at Cambridge. While in Japan he gave special attention to the subject of earthquakes, and devised seismographs by which a complete analysis of the motion of the ground was obtained. He gave much attention to the subject of magnetism, and was the author of an important work, *Magnetic Induction in Iron and Other Metals* (1892).

EWING, JULIANA HORATIA, an English writer of children's stories, daughter of Alfred Gattis, vicar of Ecclesfield, near Sheffield; born at Ecclesfield in 1842, and better known to the youthful world as "Aunt Judy." At her home in the vicarage she early began to compose nursery plays for her brothers and sisters. Her mother, moved by these nursery stories, conceived the idea of *Aunt Judy's Magazine* as a repository for them, and it was through this periodical that most of Mrs. Ewing's tales first reached the public. In 1864 she married Major Alexander Ewing, a man of literary culture. Mrs. Ewing wrote two volumes in verse concerning child and country life, but it is by her stories that she will be remembered. These treat of both high and low life, and, while at times sparkling with humor, at others they are marked by the deepest pathos. Among the best known of her tales are *Jackanapes; Daddy Darwin's Dovecote; A Flat Iron for a Farthing; We and the World: A Book for Boys;* and *Madam Liberality.* She died May 13, 1885.

EWING, THOMAS, an American lawyer and statesman; born in Virginia, December 28, 1789. He removed to Ohio with his parents and a party of emigrants in 1797. He was graduated from the Ohio University in 1811. Then studied law and was admitted to the Ohio bar in 1816. In 1831 he was elected to the United States Senate where he became known as "Solitude Ewing," from a speech he made, wherein speaking of the disastrous effect of the removal of the deposits by General Jackson, he said, "Our canals have become a solitude and the lake a desert waste of waters." In March, 1841, he was appointed Secretary of the Treasury, but resigned in the same year owing to a misunderstanding with President Tyler. In 1849 he was appointed Secretary of the Interior under President Taylor, retaining this office to the close of the Taylor administration. When Tom Corwin entered Fillmore's Cabinet, Ewing filled his place in the Senate, where he strongly opposed the Fugitive Slave bill. After his retirement from the Senate he resumed his law practice. He would have been a great natural lawyer had he never seen a law book, a great logician had he never seen a work on logic. He died in Lancaster, Ohio, October 26, 1871. W.M.C.

EWING, THOMAS, lawyer and soldier, son of Thomas Ewing (q. v.), was born at Lancaster, Ohio, on August 7, 1829, and was educated at Brown University and the Cincinnati Law School. He was President Taylor's private secretary, chief justice of the United States Court for the territory of Kansas, a member of the Kansas constitutional convention, an officer of the Union army in the Civil War, rising to be major-general of volunteers, a representative in Congress from Ohio from 1877 to 1881, a leader of the Greenback movement, and a lawyer in New York. He died on January 21, 1896. W.F.J.

EXCELSIOR SPRINGS, a city of Clay County, Missouri, in the northwest part of the state. It is ten miles north of the Missouri River and is a health resort. It is reached by the Chicago, Milwaukee and St. Paul railroad. Its permanent population in 1900 was 1,881. W.F.J.

EXCHEQUER, CHANCELLOR OF THE. See CHANCELLOR, Vol. V, p. 338.

EXCHEQUER TALLIES. See TALLAGE, Vol. XXIII, p. 34.

EXCHEQUER BILLS, bills of credit, issued

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by the Commissioner of the British Treasury, to raise money for temporary purposes, to meet the needs of the Exchequer. They form a large part of the floating debt of the country. They are issued in denominations of £100, or multiples thereof, run for five years, and bear a low rate of interest. See also FINANCE, Vol. IX, p. 159.

EXCLUSION BILL, a proposed measure for excluding the Duke of York (afterward James II) from succession to the throne, on account of his avowed Roman Catholicism. A bill to this effect passed the Commons in 1679, but was thrown out by the Upper House (see ENGLAND, Vol. VIII, p. 312). As the new Parliament, summoned in 1681, seemed determined to revert to this measure, it was dissolved, and Charles II ruled thenceforth without control.

EXECUTION, the accomplishment or completion of an act or instrument. In law, it means the enforcing of the judgment of a court. It also has a technical meaning in law, and in this sense refers to a judicial writ directed to the sheriff, or other proper officer of the court, commanding him to enforce the judgment of the court. Thus an execution is issued for the arrest of the defendant, directing the sheriff to hold him in custody, to the intent that the plaintiff's debt shall be satisfied. Such executions are issued only when the debt was incurred through fraud, or the defendant refuses to deliver over his property. The common form of execution is that commanding the sheriff to levy upon sufficient of the defendant's property to satisfy the plaintiff's debt and costs. Execution, in criminal law, is the act of putting to death one convicted and under legal sentence of death. See also CAPITAL PUNISHMENT, in these Supplements.

EXECUTIVE DEPARTMENT is that branch of a government to which is committed the general administrative or executive functions, as distinguished from the legislative and judicial. In many governments the lines of demarcation are not clearly drawn. Thus in Great Britain the heads of the executive departments are also leading members of the legislature. That is true, indeed, in France, Germany, and most European countries. In the United States the distinction is clear and marked. The Constitution (q. v.) divides the government into three co-ordinate parts, to wit, the Executive, consisting of the President; the Legislative, consisting of the Congress, and the Judicial, consisting of the Courts. The President is the Chief Executive, and the powers and duties of his office are defined in the Constitution. Associated with him, as his advisers and aids are the members of the Cabinet, namely, the Secretary of State, the Secretary of the Treasury, the Secretary of War, the Attorney-General, the Postmaster-General, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Commerce and Labor. The various bureaus and commissions under these heads, including the army and navy, postal service, customs service, diplomatic and consular services, the scientific surveys, etc., compose the executive department of the government, which executes the laws enacted by Congress and performs the practical acts of government. W.F.J.

EXECUTORY, in English law, a term applied to contracts, etc., which are not executed; that is, not completed with the forms required to make them legally operative. In American law the term *executory* is used as in England.

EXEGETICAL THEOLOGY OR EXEGESIS. See HERMENEUTICS, Vol. XI, pp. 663–669; THEOLOGY, Vol. XXIII, p. 295.

EXEMPLARY DAMAGES, the damages, or more strictly speaking the compensation, which the law allows in certain cases in addition to compensation for actual damages. This class of damages is called, indiscriminately, exemplary, punitive or vindictive damages, and is allowed in actions of trespass and in all actions on the case for torts or willful injury. Exemplary damages are allowed as a punishment for willful injuries to the person or property, and also as compensation for injuries to the feelings, reputation, and other inconveniences which may not amount to actual damages. Such damages are allowed in actions for breach of promise of marriage, for slander, assault and battery, personal injury resulting from gross carelessness or a malicious motive, and other similar actions. This class of damages is based rather upon the enormity of the offense than the actual damage sustained. This class of damages is sometimes referred to as "smart-money." See DAMAGES, Vol. VI, p. 693.

EXEMPTION LAWS OF THE UNITED STATES, THE. With only four exceptions, the legislative bodies of the separate states and territories have enacted laws exempting the homestead of a resident debtor from seizure or sale for debt. In so doing, and in extending such protection to reasonable limits as regards area and value, each state or territory has acted upon the universal American principle of protecting the home, and assuring to wives and young children shelter and necessary sustenance. The system is also beneficial in extending to non-traders and small debtors the protection of a species of quasi-bankruptcy law.

In the majority of exemption statutes, carefully considered laws have so restricted the benefits of the exemptions as to prevent the protection of the statutes being enjoyed by fraudulent debtors. In a few cases the desire of a more recently settled state to secure settlers is apparent in the liberal character of its exemption laws. But this feeling soon gives way to the pursuit of a better credit.

Wisely conceived and framed as these homestead exemption laws are in the main, certain general principles pervade them all, and give similarity each to the other. As the Indian retired before the frontiersman, and the settler, with his wife and children, followed the smoke of the trapper's gun, the Federal government parceled out the lands to settlers, as described under HOMESTEAD, Vol. XII, p. 127. Then as the separate state was evolved from a territory, it was but a natural sequence that the state government should protect the gift of the Federal power, and in order to foster industry and care for

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THE EXEMPTION LAWS OF THE SEPARATE STATES.

Names of States and Territories.	Real Estate.			Personal Estate.	Wages.
	Area Exempt in the Country.	Area Exempt in Cities.	Maximum Value Exempt.	Maximum Value Exempt. (a)	Wages of Head of Family Exempted.
Alabama	160 acres.	1 lot.	$2,000.	$1,000.	$25.
Alaska (See Oregon)					
Arizona	No limit.	No limit.	$4,000.	$200–$500.	1 month.
Arkansas	80–160 acres.	1 acre.	$2,500.	$500.	
California	No limit.	No limit.	$1,500–$5,000.	$200.	30 days.
Colorado	No limit.	No limit.	$2,000.	$200–$300.	$60.
Connecticut	No limit.	No limit.	$1,000.		$50.
Delaware	No homestead exemption laws.			$75–$200.	Current wages.
District of Columbia	No homestead exemption laws.			$300–$400.	$100
Florida	160 acres.	1½ acres.	No limit.	$1,000.	All wages.
Georgia	No limit.	No limit.	$1,600 in aggregate.		1 month.
Idaho	No limit.	No limit.	$1,000–$5,000.	$200.	30 days.
Illinois	No limit.	No limit.	$1,000.	$100–$400.	$50.
Indiana	No limit.	No limit.	$600.	$600.	1 month.
Indian Territory	No laws.			No laws.	
Iowa	40 acres.	½ acre.	$500.	$200.	90 days.
Kansas	160 acres.	1 acre.	No limit.	$500.	90 days.
Kentucky	No limit.	No limit.	$1,000.	$500.	$50.
Louisiana	No limit.	No limit.	$2,000.	$2,000.	Laborer's wages.
Maine	No limit.	No limit.	$500.	$150.	$20.
Maryland	No limit.	No limit.	$100.	$100.	$100.
Massachusetts	No limit.	No limit.	$800.	$300.	No limit.
Michigan	40 acres.	1 lot.	$1,500.	$250.	$25.
Minnesota	80 acres.	1 lot.		$500.	$25.
Mississippi	160 acres.	Dwelling.	$2,000–$3,000.	(a)	$20.
Missouri	160 acres.	18 sq. rods–5 acres.	$1,500–$3,000.	$300.	30 days.
Montana	160 acres.	¼ acre.	$2,500.	$600–$1,000.	30 days.
Nebraska	160 acres.	½–20 acres.	$2,000 (b)	$500.	60 days.
Nevada	No limit.	No limit.	$5,000.	$500.	$50.
New Hampshire	Residence.	Residence.	$500.		$20.
New Jersey	Residence.	Residence.	$1,000.	$50–$500.	Wages and salaries.
New Mexico	Residence.	Residence.	$1,000.	$200.	3 months.
New York	1 lot.	1 lot.	$1,000.	$250.	60 days.
North Carolina	Residence.	1 lot.	$1,000.	$500.	
North Dakota	160 acres.	2 acres.	$5,000.	$1,500.	
Ohio	Residence.		$1,000.	$500.	3 months.
Oklahoma Territory	160 acres.	1 acre.	No limit.	$600.	90 days.
Oregon	160 acres.	20 acres or 1 lot.	$1,500.	$400.	
Pennsylvania	No limit.	No limit.	$300.	$300.	
Rhode Island	No homestead exemption laws.				$10.
South Carolina	No limit.	No limit.	$1,000.	$500.	
South Dakota	160 acres.	1 acre.	$5,000.	$950.	
Tennessee	No limit.	No limit.	$1,000.	(a)	$30.
Texas	200 acres.	Lot or Lots.	$5,000.	(a)	Current wages.
Utah	No limit.	No limit.	$1,000 (c)	$500.	½ of 60 days.
Vermont	House.	House.	$500.	$250.	Current wages.
Virginia	No limit.	No limit.	$2,000.	$2,000.	$50 per month.
Washington	No limit.	No limit.	$2,000.	$500.	60 days.
West Virginia	No limit.	No limit.	$1,000.	$200.	
Wisconsin	40 acres.	¼ acre.	None.	$200–$1,500.	$180.
Wyoming	160 acres.	House and lot.	$1,500.	$500.	$100.

(a) In nearly every state a long list of specially exempted articles of personal property is included in the statute of the state, and to which reference should be had.

(b) In Nebraska and several other states, additional homestead exemption of real estate may be claimed by disabled Union veterans, when the land claimed as exempt was purchased with pension-money exclusively.

(c) In Utah an additional homestead exemption of $500 may be claimed for a wife, and $250 more for each member of the family.

California, Colorado, Kansas, Oklahoma Territory and Washington specifically exempt pension-moneys from attachment, but in so doing only enunciate a general principle of law.

its future citizens, protect the homestead as far as justice would permit. Accordingly, the homestead exemption laws are found almost invariably restricted in their benefits to bona fide residents, heads of families and dependent children. Here, too, and in a simple way, the natural justice of American legislation extirpated that relic of feudal barbarism and militarism—the custom of primogeniture. The homestead was for the widow and the children equally, not for an eldest son. The widow and children were to succeed to the estate. A thriftless father was rendered unable to sell or assign the homestead unless with the consent of his wife, or, in some cases, of his children or dependent family. A fraudulent debtor, desirous of defeating his creditors, was confined in his homestead exemption to the area of a quarter-section, and in many cases to a specified value, the excess being rendered

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liable to seizure and sale. Public policy restricted as well as protected in this essentially remedial respect. The liens for unpaid purchase-money, laborers' wages, taxes and similar claims were preserved, and in nearly every state notice to creditors was required in the form of an exemption claim, to be filed as of record on the rolls of the nearest court.

Ranging, as the limit of value does, from five thousand dollars in Texas to one hundred dollars in Maryland, and varying in minor details, as each statute naturally must, the printing of the full text of all legal enactments on the subject of exemptions would tax the limits of an encyclopædia, and transgress the province of a legal text-book. A further reason against such a course presents itself in the existence of a cognate series of laws, with similar object, exempting certain specified personal property from distress, seizure or sale. Restricted, also, as these last-named legislative enactments are, in the main, to heads of families, their multitudinous specific exemptions, designed to meet each debtor's needs and conditions in life, are peculiarly the province of a legal treatise to discuss and detail. The principles alone of such legislation are proper here.

The preceding table gives a comprehensive and succinct statement of the exemptions of real and personal estate in each state or territory, but it should be remembered that a reference to the necessary statute will be required to ascertain the numerous qualifications required and the many specific articles exempted. The specific exemptions of all the states may be found collected and concisely, yet accurately, stated in the current annual volume of *Hubbell's Legal Directory*, and similar works.

EXETER, a town and the county seat of Rockingham County, in the southeast corner of the state of New Hampshire. It was founded by John Wheelwright (q. v.) in 1638, and is one of the historic towns of New England. It is now best known as the site of the Phillips Exeter Academy, and also of a large seminary for girls. It has a cotton mill and machine shop. It is on the Exeter River, 12 miles from Portsmouth and 50 miles north of Boston, and is reached by the Boston and Maine railroad. Its population in 1900 was 4,922. W.F.J.

EXETER HALL, a large proprietary building on the north side of the Strand, London. It was completed in 1831, and can seat upward of 5,000 persons. It is let chiefly for religious assemblies, and is in great demand during the "May meetings" of the several religious societies. It has also been used for musical fêtes. In 1880 it was purchased, for $125,000, for the Young Men's Christian Association.

EXHAUSTIONS, METHOD OF, a mode of proving mathematical propositions regarding quantities by continually taking away parts of them. See INFINITESIMAL CALCULUS, Vol. XIII, p. 6.

EXMOOR, a wild and rugged tract of elevated moorland, broken by deep, romantic glens, or combes, sloping toward the sea, in the western part of the county of Somerset, and north and northeast portions of the county of Devon, England. Its highest point is Dunkerry Beacon, Somersetshire (1,668 feet) It is traversed by the headwaters of the Exe and Barle, and numerous smaller streams, all abounding in trout. Exmoor was a royal forest from early days, and embraced a wide area, which has now been brought under cultivation. There are some iron-mines, as well as worked-out silver-mines. From one of the latter, at Coombmartin, one Bullmer presented a massive silver cup to Queen Elizabeth. Exmoor is one of the few remaining haunts of the wild red deer, and the hunting-ground of the Exmoor staghounds, one of the oldest English packs. Transferred as its wild beauty has been to the canvas of many an artist, its fame securely rests in Blackmore's fine prose epic of the western moorlands, *Lorna Doone*. The resort of the tourist of to-day glows in the enthusiastic word-picture of him who first chronicled the deeds of "girt Jan Ridd," and the vile doings of "those flowers of the flock of villany, the Doones of Badgery." A sturdy breed of stocky ponies runs wild on the moor. The coast scenery, especially at Lynton and Lynmouth, is grand, rugged and much frequented by summer tourists. A narrow-gauge railroad was completed, in 1896, from Barnstaple to Lynton, traversing the skirts of the moor.

EXODUS. See EGYPT, Vol. VII, pp. 638, 641, 642.

EXODUS, BOOK OF. See PENTATEUCH, Vol. XVIII, pp. 515 et seq.

EXOGAMY. See TOTEMISM, Vol. XXIII, p. 502.

EXOGENS, a term formerly applied to dicotyledons, to express the fact that the stems increase in thickness by adding new layers of material to the outside, thus making growth-rings. In this application the term has been abandoned, and that of "exogenous" is applied now to those parts or organs which arise from the superficial as well as the deeper-seated tissues of the structure upon which they are borne. Stem branches and leaves are good examples of exogenous organs. See BOTANY, Vol. IV, pp. 89–92.

EXOPHTHALMIC GOITRE. See GOITRE, Vol. X, p. 658.

EXOSMOSE OR ENDOSMOSE. See OSMOSE, in these Supplements.

EXOSTOSIS. See PATHOLOGY, Vol. XVIII, p. 377.

EXOTIC PLANTS OR EXOTICS, cultivated plants originally derived from foreign countries. The term is generally applied to those whose native country differs so much in soil or climate from that into which they have been conveyed, that their cultivation is attended with difficulty, requiring artificial heat, or other means unlike those requisite in the case of indigenous plants. Some exotics seldom flower in their new home, and of those that do some never ripen their fruit and seeds.

EXPANSION, THEORY OF. See HEAT, Vol. XI, pp. 518–520.

EXPATRIATION, the act of a person in voluntarily relinquishing his citizenship in his own coun-

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try and becoming a citizen, by naturalization or otherwise, of another country. The right to abandon one's country and claim citizenship in another has been seriously disputed, but, so far as the United States is concerned, the question was settled by an act of Congress in 1868, declaring this right to be inherent in all people, and denying the right claimed by foreign nations to consider naturalized Americans as citizens of the state from which they came. Since the passage of this act, treaties have been made with most European states recognizing the right of expatriation, but in some cases subject to qualifications. See ALLEGIANCE, Vol. I, pp. 511–512.

EXPECTATION. See PROBABILITY, Vol. XIX, p. 795.

EXPLOSIVES. See GUNPOWDERS, Vol. XXVII, p. 199.

EXPOSITIONS. See EXHIBITIONS, Vol. VIII, pp. 702–704. See also WORLD'S FAIRS, in these Supplements.

EXPONENT AND EXPONENTIAL, a symbol denoting the number of times a particular quantity is to be taken as a factor to produce the power indicated. It is written as a small letter or figure at the right hand of, and above, the symbol of the quantity affected by it. Thus $a \times a \times a = a^3$ which denotes the third power of a, and the product of $5 \times 5 \times 5 = 5^3$ which denotes the third power of 5. The figure is the *exponent*, or index, of the power. Other illustrations of exponents are $a^0 = 1$, whatever a may be; $a^{-3} = 1 \div a$, $a^{\frac{1}{2}} = \sqrt{a}$, $a^{\frac{1}{3}} = \sqrt[3]{a}$, $a^{\frac{4}{3}} = \sqrt[3]{a^4} = (a^{\frac{1}{3}})4$. In general a^n (where a is any number or expression) stands for the nth power of a and there the value of this contracted notation is obvious. Introduced by Descartes, the theory of indices affects algebraical operations of every conceivable kind. An exponential equation is one in which the x or y occurs as the exponent of one or more terms as $a^x = b$, $5^x = 800$. Its solution often requires the use of logarithms. When a^x equals any given number, x is the logarithm of the number represented by a^x. W. R. B.

EX POST FACTO LAW, any criminal or penal statute rendering an act punishable in a manner in which it was not punishable when it was committed. Any law which would make an act criminal which was not criminal when done, or which would increase the severity of the punishment of a previous act, or which would alter the rules of evidence or procedure so as to put one accused of a crime committed previous to the law in a worse position before the courts, is prohibited by the constitution of the United States.

EXPRESS, a system for the fast conveyance of goods, merchandise and parcels. The express business in the United States had its beginning in the custom of intrusting to stage-coach drivers, railroad conductors, etc., parcels for delivery; but it was not until William F. Harnden of Boston contracted with the Boston and Worcester railroad for the transmission of packages that anything like a system was introduced into the carrying business. The project recommending itself to business men, competing companies sprang up rapidly, and express lines were established in all directions. Besides delivering goods, express companies undertake to collect, on account of merchants, the price of goods sold and forwarded by express; this process is known as the system of C.O.D., or "collect on delivery." The companies also have a system of money-orders payable at any of their offices throughout the country, and received, like checks, by large banks, when handed in by depositors. The most profitable branch of the business is the collection of notes, and care and transportation of deeds, bullion and valuables of all kinds. The United States government contracts with one of these companies for the conveyance and delivery of all public moneys and securities. Before the law an express company is a "common carrier," with the same liabilities as any other common carrier, notwithstanding any declaration on its bills of lading that it is not to be so considered. The leading express companies in the United States are the Adams Express Company, American Express Company, United States Express Company and Wells, Fargo and Company. In continental Europe the carrying service is performed by the post-office; in the United Kingdom, mainly by the railways themselves, although the parcels post is also well established. Experiments made in the United States on the part of railroads, in the work of collection and delivery, have not proved successful.

EXTENSITY OF SENSATION. See PSYCHOLOGY, Vol. XX, p. 58.

EXTENT, in English law, a writ issuing out of the court of exchequer to compel payment of debts to the crown. See WRIT, Vol. XXIV, p. 731.

EXTERRITORIALITY signifies the immunity to which foreigners are entitled who, being in another state, are not amenable to its laws. Ambassadors, ministers from a foreign state, consuls and other officers of foreign states, whose duties require them to be located in the state to which they are sent as representatives, are included in this class.

EXTORTION is the act of an officer, or one acting under color of official authority, in unlawfully taking money or something of value from another for the purpose of procuring such officer to perform a duty. The act of requiring unlawful and exorbitant fees for services is extortion. The word is sometimes used in a broader sense, meaning any oppression or act under color of right, whereby one requires another to pay money or surrender property to procure the performance of a duty or prevent the perpetration of an injury. Under some circumstances the offense is punishable as a misdemeanor.

EXTRADITION. The right to demand of a foreign state the return of a fugitive from justice, who has taken refuge in such state, has not fully been determined in international law. It is probable that the necessity of determining whether this right exists as an inherent right of a state will not arise soon, for the reason that most enlightened nations now have extradition treaties with the principal states of the world, whereby it is agreed, under certain limitations, that fugitives from justice in another state shall be returned to the state from which they have fled. It has been decided in the United States and in England, that, in the absence of treaties,

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h is not the duty of one state to turn over a fugitive cr minal to the state from which he has fled. Before the extradition treaty with Spain, the President of the United States honored the requisition of that government asking the return of Arguelles, because of the atrocity of the crime charged against him. The Senate interposed a resolution inquiring under what law or what treaty this action was taken. The President responded that for the sake of justice he had honored the requisition upon the ground of the comity of nations, but made no claim that the United States could be required to do so. Congress has established laws providing for the execution of agreements made by treaty for the return of fugitives from justice, which would, perhaps, by implication, exclude the right to make such return when no treaty is in existence. Both the United States and Great Britain, however, frequently have obtained the return of fugitive criminals from states with which no treaty existed. France and most of the other states adhere to the doctrine, that, under the comity of nations, fugitives from justice, who have taken refuge in a foreign state, should be delivered over to the state from which they have fled, regardless of whether an extradition treaty was in force.

In 1842 an extradition treaty was entered into between the United States and Great Britain, but only seven crimes were named which were sufficient to warrant extradition of fugitives. This treaty was changed in 1889, and increased the number of extraditable offenses to 27. The condition was added in the treaty concluded in 1889, also, that no person who should be surrendered under that treaty should be tried for any offense committed prior to the time of his surrender except the extradition offense. Most modern treaties on this subject require that *prima facie* proof of the guilt of the person accused shall be presented before his surrender can be demanded, and the mere assertion of guilt by the foreign government is not sufficient. Political offenses almost universally are excluded in modern treaties as extraditable offenses, for the reason that the political conditions of the different states vary so vastly that an offense of this class which may be punishable with great severity in one state may be considered trivial by most of the other nations of the world. Because of the great oppression which is sometimes brought about through the medium of laws against political offenses, most of the enlightened nations of the world refuse to surrender those accused of crimes of this class. The great difficulty, however, which arises on account of this exception, is to make a proper distinction between political offenses and those which are not of a political nature. Frequently, crimes, essentially political, are accompanied by acts of violence, which are the result of malice, rather than opposition to political conditions. No accepted definition of the term *political crime*, as used in extradition treaties, has been formulated, and the most the courts of the United States have done is to decide whether particular cases come within the meaning of that term. Since the assassination of President Garfield, provisions have been inserted in the treaties between the United States and several foreign powers, to the effect that an attempt against the head of a government or a member of his family, when such attempt comprises the act of murder, assassination or poisoning, shall not be considered a political offense. It is the custom of the United States and Great Britain to surrender their own citizens who have escaped after having committed a crime in foreign territory. This rule is not generally followed by other nations. It is usually the practice to either undertake the punishment themselves or permit the offender to escape punishment entirely. Among the states with which the United States now has extradition treaties, are the following: Austria, Hungary, Belgium, Dominican Republic, Ecuador, France, the German Empire, Great Britain, Hawaiian Islands, Haiti, Italy, Japan, Luxemburg, Mexico, Netherlands, Nicaragua, Orange Free State, Ottoman Empire, San Salvador, Spain, Sweden and Norway, and Switzerland. Extradition, or, more strictly speaking, rendition of fugitives from justice from one state of the United States to the state in which the crime was committed, is provided for by the constitution of the United States, and is not in any manner governed by the rules of international extradition. The constitution provides that any person charged with treason, felony or other crime in one state of the United States, and who has fled from justice, and is found in another state, shall, upon demand of the executive officer of the state from which he has fled, be delivered up to be removed to the state in which the offense was committed. Under this provision, no exception is made as to any class of crimes, as is the custom in international treaties, and the general manner in which the rendition shall be made is fixed by the United States statutes. By act of Congress the executive authority of the state from which the fugitive has fled is the proper source to make demand for his return, and a copy of an indictment or an affidavit made before a magistrate of any state or territory, charging the person demanded with having committed treason, felony or other crime, duly certified by the governor or chief magistrate whence the person so charged has fled, must be presented to the executive authority of the state upon which the requisition is made. The general details as to the manner in which requisitions shall be made, and what officers shall make the arrests, and what officers shall act as agent for the executive authority of the state demanding the return, for the purpose of receiving the prisoner, are fixed by the state statutes. The state making demand for return of the criminal must pay all costs connected with the arrest and delivery of the person extradited. See EXTRADITION, Vol. VIII, p. 711.

EXUMAS, a part of the group of the Bahama Islands, comprising Great Exuma (lat. 23° 30′ N., long. 75° 50′ W.), Little Exuma and the Exuma Keys. They contain about 2,000 inhabitants, who are employed partly in agriculture, but chiefly in salt-making. In 1851 the Exumas exported 115,356 bushels of salt. Little Exuma is the second most important port of entry in the Bahamas.

EYALET, former name for a Turkish vilayet; q.v., in these Supplements.

EYAM, a village in north Derbyshire, north-central

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England, five miles N. of Bakewell, with a population of 1,038, chiefly engaged in lead-mining. Here, in September, 1665, the plague then raging in London broke out in its most virulent form. William Monpesson, the rector of the parish, aided by Thomas Stanley, devoted himself to the care of the dying with the most heroic courage. The plague lingered 13 months, and 260 out of a population of 350 perished.

EYEBRIGHT, the common name of *Euphrasia*, a genus of plants of the family *Scrophulariceæ*, having a tubular calyx, the upper lip of the corolla divided, the lower of three nearly equal lobes, the cells of the anthers spurred at the base, a two-celled capsule and striated seeds. Some of the species are root-parasites. They are natives of Europe and Asia. The common eyebright (*E. officinalis*) is a little plant about six inches high, with ovate serrated leaves, and white or reddish flowers streaked with purple. It is abundant in pastures and on mountains, and has been used as a medicine in diseases of the eyes and catarrhal affections. It is a weak astringent.

EYE, Development of. See Sense-Organs, in these Supplements.

EYE, Diseases of. See Ophthalmology, Vol. XVII, pp. 802–809.

EYEPIECES. See Telescope, Vol. XXIII, pp. 156–157.

EYLAU, Battle of. This battle was fought between the allied Russians and Prussians and Napoleon on February 7 and 8, 1807, at Eylau, in Prussia, a small town about 28 miles distant from Königsberg, and was one of the bloodiest battles on record, the fight on the 8th lasting twelve hours. The French were 85,000 strong with 350 guns and the Russians and Prussians 75,000 strong, with 460 pieces of artillery. About 50,000 men perished, but it was a drawn battle, neither side having obtained its object, but both sides claimed the victory. W.R.B.

EYMERICUS, Nicolaus, a Spanish inquisitor; born about 1302 at Gerona in Catalonia. He entered the Dominican order in 1334, and was appointed in 1356, by Pope Innocent VI, inquisitor-general and judge of heretics, which offices he filled for 43 years. He died at his birth-place, Jan. 14, 1399. Of his writings the best known is *Directorium Inquisitorum* (1503). G.A.S.

EYRE, a salt lake of South Australia, lying north of Spencer Gulf, at an altitude of 79 feet, and having an area of 3,706 square miles. Except in the rainy season, this lake is generally a mere salt marsh. It is underlaid with an inferior quality of coal. It was discovered in 1840 by Edward John Eyre.

EYRE, Edward John, an English explorer and colonial governor; born in August, 1815, in Yorkshire; went to Australia in 1833, and in 1840–41 explored the south coast of Australia and discovered Lake Torrens. He was afterward appointed lieutenant-governor of New Zealand and of the island of St. Vincent. In 1862 he became governor of Jamaica, and in 1865 suppressed, with severity, a negro insurrection. Martial law was proclaimed, and a wealthy mulatto named Gordon, who was a member of the House of Assembly, was hanged. Eyre was recalled and prosecuted by a committee, of which John Stuart Mill was a member. Such men as Carlyle, Charles Kingsley and Sir Roderick Murchison defended Eyre, and he was acquitted by a jury. After the trial he went into retirement. The English government eventually reimbursed him for the expenses, amounting to fifty thousand dollars, which he incurred in defending himself. Died Nov. 30, 1901. See Jamaica, XIII, 561.

EYRIA or EYRE'S PENINSULA, on the south coast of South Australia, triangular in shape, its base being formed by the Gawler Range, while its sides are washed on the southeast by Spencer Gulf and on the southwest by the Great Australian Bight. It is a rich pastoral country.

EYTELWEIN, Johan Albert, a German engineer; born Dec. 31, 1764, in Frankfort-on-the-Main. He superintended the regulating of rivers in eastern Prussia, and the harbor buildings of Memel, Pilau and Swinemünde. He wrote *Manual of the Mechanics of Solid Bodies and of Hydraulics* (1842); and *Manual of Statics of Solid Bodies* (1832). He died at Berlin, Aug. 18, 1848. G.A.S.

EZEKIEL, Moses Jacob, an American sculptor; born in Richmond, Virginia, in 1844; served in the Confederate army during the war, and in 1869 entered the Royal Academy of Arts at Berlin, remaining till 1871, when he entered the studio of Albert Wolf. In 1873 he gained the Michaelbeer prize, entitling him to two years' study in Italy, where he went the following year. He took up a permanent residence in Rome, making only occasional visits to America. His most famous work, a group entitled *Religious Liberty*, is in Fairmount Park, Philadelphia. Some of his other works are *Israel; Eve; The Sailor Boy; Grace Darling*. His productions have been exhibited at Rome, Berlin, Cincinnati and the National Academy, New York, and elsewhere.

EZION-GEBER or EZION-GABER, the Biblical Syrian port which stood at the head of the Gulf of Akabah, the easternmost inlet at the head of the Red Sea, near where the modern village of El-Akabah is situated, about 150 miles S. of Jerusalem. It was an encampment of the children of Israel after removing from Ebronah and before continuing their journey to Kadesh. Later it was the port where Kings Solomon and Jehoshaphat built their fleets for voyages to the Land of Ophir, whence they obtained their supplies of gold, gems, and precious woods. C.L.S.

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FAAM—FACTORY LEGISLATION

FAAM OR FAHAM, an orchid, native of Madagascar, prized for the fragrance of its leaves, which is owing to the presence of coumarin. In Mauritius an infusion of faam leaves is in great repute as a cure for pulmonary consumption.

FABA (Lat., a bean), a genus of leguminous plants comprising the common annual bean *F. vulgaris*. As an esculent, beans are extremely nutritious. Several varieties are grown. W.R.B.

FABLIAUX OR FABLEAUX, an appellation given in old French literature to a class of short, metrical narratives, intended for recitation,—the tales of the Trouvères. They were the prototypes of the modern novel. See ROMANCE, Vol. XX, p. 649.

FABRE, CHARLES EDWARD, clergyman and educator; was born in Canada, and entered the priesthood of the Roman Catholic Church. He was a distinguished pulpit orator, and was made bishop of Montreal in 1876 and archbishop in 1886. He is remembered for his services as an instructor of the deaf and dumb, and as the founder of an asylum and school for them in Montreal, where he successfully introduced his own system of instruction. He died in Montreal on December 30, 1896. W.F.J.

FABRE, HECTOR, journalist; was born in Montreal, Canada, on August 9, 1834, and was educated at the St. Sulpice College. He was admitted to the bar, but devoted himself to journalism, as editor of *L'Ordre* of Montreal, and *Le Canadien* and *L'Evénement* of Quebec. In 1875 he entered the Canadian Senate, and in 1882 became Canadian commissioner in Paris, where he has founded and conducts the paper *Paris-Canada*. He has written several books. W.F.J.

FABRICE, GEORG FRIEDRICH ALBERT VON, a Saxon general and statesman; born May 23, 1818, at Quesnoy-sur-Deule, France. In 1834 he entered the Saxon service, took part in the campaign of Schleswig-Holstein in 1849, and served with great distinction as Chief of Staff to the Crown Prince Albert of Saxony in the campaign of 1866. Appointed in the same year Secretary of War, he reorganized the Saxon army after the Prussian model. During the war of 1870–71, he was intrusted with the administration of the northern provinces of France, and negotiated the preliminaries of peace. He became in 1876 President of the Ministry, and in 1882 Minister of Foreign Affairs. In 1884 he was created a count by the king. He died March 25, 1891, in Dresden. G.A.S.

FABRIONI, GIOVANNI, an Italian scholar; born at Florence in 1752. His many works on political economy, agriculture and physics are remarkable both for their sound principles and for the scope of subjects on which they treat. He was director of bridges and highways for the French transalpine department during the first empire, and held many positions connected with literature and science. He died at Florence in 1823. G.A.S.

FABULÆ ATELLANÆ. See ATELLA, Vol. II, p. 724.

FABVIER, CHARLES NICOLAS, BARON, was born in France, on December 10, 1782, and was sent to Constantinople in 1807 to defend the place. After Waterloo he was persecuted for his Napoleonic traditions, and accordingly went to England in 1817, and six years later to Greece to aid the war for independence. He was made commander of the Greek infantry, but fell into disgrace after the disaster at Chios and the fall of the Acropolis, and in 1829 returned to France. In 1848 he was ambassador to Turkey. He died on September 15, 1855. W.F.J.

FACATATIVA, Colombia, a town of Cundinamarca, on the Facatativa River, one of the head-streams of the Magdalena, and the terminus of a railway line 18 miles northwest of Bogotá, the capital. The town, situated at an altitude of 8,400 feet in the Cordillera Oriental, is a distributing outlet by way of the Magdalena River for the interior commerce centering at Bogotá. Population, 8,000. C.L.S.

FACCIO, FRANCO, musician; was born at Verona, Italy, on March 8, 1840. He produced an overture in 1860, and a successful opera in 1863. He fought in Garibaldi's army in 1866, and made a tour in Scandinavia in 1867–68. For some years he was conductor of music at the Carcano Theater, and then became conductor of opera at La Scala, Milan, a place in which he soon won distinction as the foremost operatic conductor in Italy. He was the conductor of the first European performance of Verdi's *Aida* in 1872, and also of the first production of the same composer's *Otello* in 1887. Among his compositions are to be recalled *Le Sorelle d'Italia*, an opera written in partnership with Arrigo Boito about 1862, and another opera, *Hamlet*, for which Boito wrote the libretto in 1865. A *Festival Cantata* was also produced in 1884. W.F.J.

FACIAL PARALYSIS OR BELL'S PALSY. See PARALYSIS, Vol. XVIII, p. 261.

FACING AND BORING MACHINES FOR LOCOMOTIVES. See MACHINE TOOLS, in these Supplements.

FACTOR OF SAFETY. See STRENGTH OF MATERIALS, Vol. XXII, p. 625.

FACTORY LEGISLATION IN THE UNITED STATES. In almost every state in the United State laws are in force regulating the manner of conducting factories and workshops. Most of these laws require that the sanitary condition of all factories and workshops be subject to inspection by a

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board of factory inspectors or other officers appointed for that purpose, and establish more or less rigid rules under which such enterprises shall be conducted. The object of this class of legislation is to protect the health of the workmen, and also to prevent the extension, among the public, of infectious diseases and vermin, through the medium of the manufactured articles. Legislation has been attempted in most of the states, with somewhat varied success, to regulate the number of hours which shall constitute a day's labor in factories and workshops, and to make it unlawful to require employees to work for a great number of hours per day. This class of legislation has been enacted most frequently with respect to the labor of women and minors, and in some states minors are not permitted to receive employment except upon complying with certain educational requirements. The substance of the present condition of the statutory factory regulations in the various states is as follows:

California. No male or female under the age of 18 years shall be employed in a factory or workshop for more than 10 hours per day, or 60 hours per week. Children under 10 shall not be so employed. Any violation is a misdemeanor, punishable by fine.

Colorado. Statutes prohibit employment of children under 14 years of age in factories and workshops.

Connecticut. Males under the age of 16, and all females, shall not be employed in factories more than 10 hours per day, or 60 hours per week. No child under 14 years of age shall be so employed. Any violation is a misdemeanor, punishable by fine.

Georgia. The statute prohibits the employment of any one under 21 years of age in a factory or workshop, or any one, without respect to age, in a cotton or woolen factory, for more than 11 hours per day, or 66 hours per week.

Illinois. No minor under the age of 14 years shall be employed in a factory or workshop. The law restricting the right of employment of females in factories to 8 hours per day has recently been declared unconstitutional.

Indiana. Minors between the ages of 14 and 18 years are restricted to 10 hours' employment per day in factories or workshops, and those under 14 years of age to 8 hours. A violation is a misdemeanor, punishable by fine.

Louisiana. Males under 18 years of age, and all females, are prohibited from working in factories or workshops for more than 10 hours per day, or 60 hours per week, out of which time they shall have 1 hour daily for dinner. Boys under 12 or girls under 14 years of age are excluded from such employment. It is a misdemeanor, punishable by fine, to violate this statute.

Maine. Males under 16 years of age, and all females, are exempted from more than 10 hours' labor per day, or 60 hours per week, in factories or workshops, but females above the age of 18 years may contract to work a greater number of hours. This class of employment is prohibited to minors under 12 years of age. Violation amounts to a misdemeanor, punishable by fine.

Maryland. The statute forbids the employment of any one under the age of 16 years in a factory or workshop for more than 10 hours per day, or 60 hours per week, and makes any violation a misdemeanor, punishable by fine.

Massachusetts. All males under 18 years of age, and all females, are prohibited from working in factories or workshops for more than 10 hours per day, or 58 hours per week, from which time they shall be allowed one half-hour for dinner, or one half-hour after any six hours' work. No one under 21 years of age may work between the hours of 10 o'clock p.m. and 6 o'clock a.m. No children under 13 years of age shall be employed at work of this class, nor under 14 years of age, unless they can read and write and have attended school for 30 weeks during the previous year. Violation of the law is a misdemeanor, punishable by fine.

Michigan. Females under 21 and males under 18 years of age are prohibited from working in a factory or workshop for more than 10 hours per day, or 60 hours per week, and shall have 1 hour daily of this time for dinner. The factory inspector may issue a permit to allow a shorter time for dinner. Those above those ages may contract to work a greater number of hours per day. No minor under the age of 14 years may be so employed. A violation is made a misdemeanor, and punishable by fine.

Minnesota. The statute prohibits work in factories or workshops by males under 18 years of age, and all females for more than 10 hours per day, or 60 hours per week, and by females under the age of 18 years for more than 8 hours per day. But all persons above 14 years of age may contract to work a greater number of hours per day.

Nebraska. Minors under 12 years of age shall not be employed in factories or workshops for more than 6 months in a year.

New Hampshire. The statute provides that males under the age of 18 years, and all females, shall not work in factories or workshops for more than 10 hours per day, or 60 hours per week, and that no minors under 10 years of age shall be so employed. A violation is a misdemeanor, punishable by fine.

New Jersey. All under the age of 21 years are excluded from work in factories or workshops for more than 10 hours per day, or 60 hours per week, and no boy under 12 or girl under 14 years of age may be so employed. Violations are misdemeanors, punishable by fine.

New York. Males under 18 and females under 21 years of age are not permitted to work in factories or workshops for more than 10 hours per day, or 60 hours per week, and shall have 1 hour of such time for dinner. Factory inspector may issue permit to allow shorter time for dinner. Minors under the age of 14 years shall not be so employed. No male under 18 years of age, and no woman, shall work between the hours of 9 p.m. and 6 a.m. Violations are punishable by fine.

North Dakota. Males under 18, and women, are prohibited from working in factories or workshops for more than 10 hours per day, or 60 hours per week, but any one above 14 years of age may contract to work a greater number of hours per day. Boys under 12 and girls under 14 years of age are prohibited from such employment by the state constitution. Violations are misdemeanors, and punishable by fine.

Ohio. No person under 18 years of age may work in a workshop or factory for more than 10 hours per day, and no minor under 12 years of age shall be so employed.

Oklahoma. Males under 18 years of age, and females, shall not work in a factory or workshop for more than 10 hours per day, but any one over 18 years of age may contract to work a greater number of hours per day. A violation is a misdemeanor, and punishable by fine.

Pennsylvania. No one under 21 years of age may be employed in a factory or workshop for more than 12 hours per day, from which time 1 hour shall be allowed for dinner. The factory inspector may issue a permit to allow a shorter time for dinner. No one under 13 years of age shall be so employed. A violation is a misdemeanor, punishable by fine.

Rhode Island. Males under 16 years of age, and females, are limited to 10 hours' employment per day in factories or workshops, and no minors under the age of 12 years shall be so employed. Violations are misdemeanors, punishable by fine.

South Carolina. No one may work in a cotton or woolen factory for more than 11 hours per day.

South Dakota. Ten hours per day, or 60 hours per week, is the limit of employment in factories or workshops permitted to males under 18 years of age, or women, but any one over 14 years of age may contract to work a greater number of hours.

Tennessee. Minors under 12 years of age are not permitted to work in factories or workshops.

Vermont. Children under 15 years old shall not work in factories or workshops for more than 10 hours per day. Those under 10 years of age shall not be so employed.

Virginia. Males under 14 years of age, and women are excluded from employment in factories or workshops

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for more than 10 hours per day, or 60 hours per week, and a violation is punishable by fine.

West Virginia. No minors under 12 years old may work in factories or workshops.

Wisconsin. Males under 18, and women, shall not be required to work in a factory or workshop for more than 8 hours per day, but any one over 18 may contract to work overtime. No minor under 14 years of age may be so employed. Violations are punishable by fine.

The states of Arkansas, Florida, Idaho, Iowa, Kentucky, Kansas, Mississippi, Missouri, Nevada, North Carolina, Oregon, Texas, Washington and Wyoming, with Arizona and New Mexico, have no legislation of this character. In many states, children under certain specified ages, ranging from 13 to 16 years, are prohibited from working in factories unless they can read and write, and also, in many states, unless they have attended school for a certain period of the previous year. Frequently, also, children of tender years are not permitted to work in places which would tend to injure their morals, or where the work is dangerous. Legislation has been enacted in many states requiring that factory employees shall be paid weekly, and also that the payment shall be in money. These provisions have been declared unconstitutional in several states. The supreme courts of the states of Pennsylvania, Ohio, West Virginia, Missouri and Illinois have declared laws requiring payment in money to be unconstitutional and void. The supreme court of Indiana alone, thus far, has sustained a law of this character. It is likely that these laws, as well as many other laws designed to benefit factory employees, will yet be declared void in many other states, as being a limitation of the right of contract, and therefore contrary to the constitution of the state and of the United States. In Massachusetts similar laws have been held valid, on account of the peculiar provision of the constitution of that state; and in Rhode Island laws affecting corporations alone were declared valid It has thus far been difficult to devise laws that will stand all the tests to which they may be subjected, to regulate the mode of conducting factories so that full protection may be given employees. As this class of laws is statutory and constantly being changed, it will be necessary to refer to the state statutes for detailed information concerning them, to insure accuracy. See FACTORY ACTS, Vol. VIII, pp. 739–740; and LABOR LAWS, these Supplements.

FAED, JOHN, a Scottish painter; born at Burley Mill, near Gatehouse-of-Fleet, Kirkcudbrightshire, 1820. His love of art was early manifested, and even hardly in his teens he made tours through the villages of Galloway, painting miniatures. In 1841 he went to Edinburgh, and in 1851 became a member of the Royal Scottish Academy. In 1861 went to London, where his talents won recognition. In 1880 he returned to Gatehouse-of-Fleet, and his later pictures were chiefly landscapes. Among his paintings are *The Cottar's Saturday Night* (1854); *Mary and His Friends* (1858); *Catherine Seyton* (1864); *John Anderson, My Jo* (1870); and *The Leisure Hour* (1878).

FAED, THOMAS, a Scottish painter, brother of John Faed, was born at Burley Mill, June 8, 1826, and in 1842 began his regular art studies in Edinburgh. At the Trustees Academy he took several prizes. In 1849 he was made an associate of the Royal Scottish Academy; in 1861, an A.R.A., in 1864 an R.A., and was elected an honorary member of the Vienna Royal Academy in 1875. Some of his well-known works, most of which deal with domestic and pathetic subjects, are *Highland Mary* (1856); *From Dawn to Sunset* (1861); *The Last of the Clan* (1865); *God's Acre* (1872); *Little Cold Tooties* (1877). Died in London, Aug. 22, 1900.

FAELTEN, CARL, musician, was born in Germany, on December 21, 1846, and was educated at Weimar. He became a teacher of music at Frankfort-on-the-Main, from 1868 to 1882, then came to America and taught in the Peabody Institute, Baltimore, from 1882 to 1885. From 1885 to 1897 he taught in the New England Conservatory of Music, Boston, and since 1897 has been director of the Faelten Pianoforte School. He has written many instruction books. W.F.J.

FAGGING, a usage in the great public schools of England, in virtue of which the senior boys are authorized to exact a variety of services from the junior boys. A lower-form boy has certain duties to perform to all the upper-form boys, as in stopping the balls for them when practicing cricket, and others which he owes to a special master, such as stoking his fire, and carrying his messages of a more or less private kind. Thomas Hughes's well-known *Tom Brown's Schooldays* presents a vivid, and at the same time accurate, account of this usage.

FAGOTTO AND FAGOTTINO. See OBOE, Vol. XVII, p. 727.

FAHLUN. See FALUN, Vol. IX, p. 17.

FAIDHERBE, LOUIS LÉON CÉSAR, a French general; born June 3, 1818, in Lille; studied at Paris and at Metz, and served as officer of the engineer corps in Algiers, Guadeloupe and in the Senegal, of which colony he was appointed Governor in 1854. In this capacity he, from 1855–58, subdued the mighty tribes on the banks of the Senegal River, thus greatly enlarging French colonial possessions in Africa. After a short sojourn to France, he again was appointed Governor of Senegambia, in 1865 commander at Bona, and in 1870 at Constantine. In November, 1870, appointed commander-in-chief of the Northern Army by Gambetta, he was forced to retreat in the battle of Hallue, Dec. 23. Although successful in the engagement of Bapaume, Jan. 2, he was utterly routed by Goeben at St. Ouentin, Jan. 19. An ardent partisan of Gambetta, he was elected to the National Assembly in 1871, but retired from public life shortly afterwards. In the same year he was sent on a scientific expedition to Upper Egypt, and published eminent works on geography, ethnography, and philology. In his *Campagne de l'Armée du Nord 1870–71*, he endeavored to vindicate his campaign. He died in Paris, Sept. 28, 1889. G.A.S.

FAIENCE, FAENZA OR FAYENCE, a general term for all sorts of glazed earthenware and porcelain. The origin of the name is disputed. Some derive it from Fayence, a small town of Provence; others from Faenza, a city of Italy; while certain

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writers consider the isle of Majorca the place where it was originally manufactured, as the Italians still call faience *majolica* or *mayolina*. See POTTERY, Vol. XIX, pp. 646–648.

FAIENCE WARE, AMERICAN. See CERAMIC ART, in these Supplements.

FAILLON, MICHAEL ÉTIENNE, historian, was born in France, at Tarascon, in 1799, and joined the Sulpician Order. In 1854 he visited Canada to investigate the condition of the order there. He wrote a number of historical works, including a history of the French in Canada. He died on October 25, 1870. W.F.J.

FAILLY, PIERRE LOUIS CHARLES ACHILLE DE, a French general; born Jan. 21, 1810, at Rozoy-sur-Serre, Aisne. He commanded a brigade in the Crimean War. At the head of a division he distinguished himself in the battle of Solferino (1859), and later in the reorganization of the army by introducing the Chassepot rifle. In the expedition to Rome for the protection of the Pope, he defeated Garibaldi's troops at Mentana, Nov. 4, 1867. In 1870 he covered the retreat from Wörth of MacMahon's First Army Corps; was taken a prisoner at Sedan. Was refused another command. Died, Nov. 15, 1892, at Compiègne. G.A.S.

FAINEANTS ("do-naughts"), kings of France, the last of the Merovingian dynasty. See FRANCE, Vol. IX, pp. 467–468; and GERMANY, Vol. X, p. 432.

FAINTING OR SYNCOPE. See HEART, Vol. XI, p. 495.

FAIRBAIRN, SIR ANDREW, a British railway magnate; born March 7, 1828, in Glasgow, Scotland. He was the son of SIR PETER (1800–61), a large manufacturer of engineering-tools, whom the Queen knighted on the occasion of her visit to Leeds in 1858, during his mayoralty; and also nephew of SIR WILLIAM, the famous engineer. The younger man was educated at Leeds, Glasgow, and Cambridge University, graduating at Peterhouse College in 1850. He was called to the bar, but in 1856 became a partner with his father; was twice mayor of Leeds (1866–68), when he was knighted; became director of the Great Northern Railway in 1878, and commissioner, the same year, to the Paris Exposition; sat in the House of Commons for a West Riding division for 12 years from 1880. He died May 31, 1901.

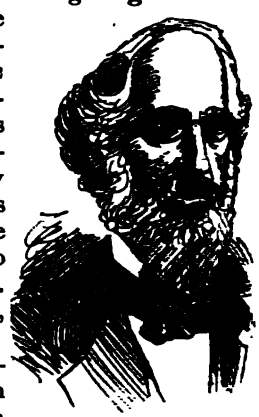
FAIRBAIRN, ANDREW MARTIN, theologian and educator; was born near Edinburgh on November 4, 1838, and was educated at the University of that city and in Germany. He then became a Congregational preacher at Aberdeen, and also a writer of religious books. In 1878 he was chosen principal of the Congregational college at Airedale, near Bradford, England, where he served with distinction until 1888, when he was called to the principalship of Mansfield (Congregational) College at Oxford. He received the degree of D.D. in 1878 from the University of Edinburgh and in 1881–83 was Muir Lecturer there on comparative religions. His first important writings were some brilliant essays in *The Contemporary Review*, and his published volumes include *Studies in the Philosophy of Religion and History* (1876); *Studies in the Life of Christ* (1880), and *Religion in History and in the Life of To-Day* (1884). W.F.J.

FAIRBAIRN, PATRICK, theologian; was born at Hallyburton, Berwickshire, Scotland, on January 28, 1805, was educated at the University of Edinburgh, and became a preacher of the Scottish (Presbyterian) Church in 1826. In 1843 he withdrew from the Established Church and became a leader of the Free Church, and 10 years later became professor of divinity in that church's theological college at Aberdeen. In 1856 he was made principal of the Free Church College at Glasgow; he was moderator of the general assembly in 1865; was appointed to visit the Presbyterian churches of the United States in 1867, and was one of the revisers of the Old Testament. He was the author of *The Typology of Scripture*, and other works. He died on August 6, 1874. W.F.J.

FAIRBAIRN, ROBERT BRINKERHOOF, Episcopal clergyman; born in New York, May, 27, 1814; educated at Trinity College, Hartford, and at the General Theological Seminary; held rectorships in Hudson River towns; professor in St. Stephen's College, Annandale, N. Y., in 1862; warden thereof in 1863; aided in securing a large endowment and new buildings for the college; published *The Child of Faith*; and *Morality in Its Relation to the Gospel*. Died in Brooklyn, N. Y., Jan. 27, 1894.

FAIRBANKS, CHARLES WARREN, lawyer and statesman, born on farm near Unionville Center, Union Co., O., May 11, 1852; graduated at Ohio Wesleyan University, 1872, admitted to Ohio bar, 1874 and established practice and made his future home at Indianapolis where he moved in 1876. Was elected U. S. Senator in 1897 and re-elected in 1903; and nominated for Vice-President by Republican National Convention at Chicago, June 23, 1904; on ticket with Theodore Roosevelt and was elected the following November.

FAIRBANKS, ERASTUS, manufacturer and statesman, was born at Brimfield, Massachusetts, on October 28, 1792, and settled at St. Johnsbury, Vermont, in 1812. He formed a partnership with his brother Thaddeus (q. v.), in 1825, and engaged in the manufacture of the weighing machines invented by the latter. He was elected to the legislature in 1836, and in 1852 and 1860 was elected governor of Vermont. In his second term, as "war governor," he was notably successful in raising troops for the Civil War. He was a philanthropist, who did many good works. He died on November 20, 1864. W.F.J.



THADDEUS FAIRBANKS.

FAIRBANKS, THADDEUS, inventor, was born at Brimfield, Mass., on January 17, 1796, and removed to St. Johnsbury, Vt., in 1815. In 1831 he invented the weighing machine, or platform

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scales, known by his name all over the world, and with his brother Erastus engaged in the manufacture of them, with great success. He was decorated by the emperor of Austria with the Order of Francis Joseph. He died on April 12, 1886. W.F.J.

FAIRBURY, a city of Livingston County, Illinois, in the northeastern part of the state, near the headwaters of the Vermilion River, 80 miles southwest of Chicago. It is in a rich mineral country, and has quarries of coal, sandstone, quartz, limestone and mica, and beds of valuable clay. It is also an important agricultural center. It stands at the junction of the Wabash and the Toledo, Peoria and Western railroads, and had a population of 2,187 in 1900. W.F.J.

FAIRBURY, a city and the county seat of Jefferson County, Nebraska, in the southeastern part of the state. It is on the Little Blue River, and is the seat of flour mills, iron foundries, and extensive nurseries and seed farms. The river gives it good water power. It is reached by the Chicago, Rock Island and Pacific, the Burlington and Missouri River and the St. Joseph and Grand Island railroads, and is 100 miles southwest of Omaha. Its population in 1900 was 3,140. W.F.J.

FAIRCHILD, CHARLES STEBBINS, lawyer and banker, was born at Cazenovia, N. Y., on April 30, 1842, was graduated from Harvard College in 1863 and was admitted to the New York bar in 1865. He practiced his profession with much success, and then entered political life as a Democrat. He was deputy attorney-general of New York in 1874 and attorney-general in 1876–77; assistant Secretary of the U. S. Treasury in 1885–87, and Secretary of the Treasury in 1887–89 in succession to Daniel Manning. Since 1889 he has been engaged in banking in New York City. W.F.J.

CHARLES S. FAIRCHILD.

FAIRCHILD, HERMAN LEROY, educator, was born at Montrose, Penn., on April 29, 1850, and was graduated from Cornell University in 1874. After teaching school two years, and spending eleven years in scientific work in New York, he became in 1888 professor of geology in the University of Rochester. He was secretary of the New York Academy of Sciences in 1885–88, and since 1889 has been president of the Rochester Academy of Science, and since 1890 secretary of the Geological Society of America. He has written a *History of the New York Academy of Sciences* and a great number of monographs on scientific topics. W.F.J.

FAIRCHILD, JAMES HARRIS, educator and author, was born at Stockbridge, Mass., on November 25, 1817, and was graduated from Oberlin College in 1838. Four years later he became professor of Greek and Latin at Oberlin, and in 1866 president of that college, in which office he remained until 1889, and did a great work for the moral, intellectual, and material development of the institution. He edited the *Memoirs of Charles G. Finney* and wrote several books, including *Moral Philosophy*, and *Elements of Theology*. He died on March 19, 1902. W.F.J.

FAIRCHILD, LUCIUS, soldier and statesman, was born at Franklin Mills, Ohio, on December 27, 1831, and became a volunteer soldier in the Civil War as an officer of Iowa infantry. He served with gallantry under McClellan and Pope, and was conspicuous for his gallantry at Antietam. At Gettysburg he lost his right arm and was compelled to retire from active service. He was soon afterward promoted to be brigadier-general of volunteers. After his retirement from the army he settled in Wisconsin, where he was secretary of state in 1864–65, and governor of the State in 1866–67. He was United States consul at Liverpool, and consul general at Paris, for a number of years. In 1880 he was appointed by the President minister to Spain, and remained in that office until 1882. He was commander-in-chief of the Military Order of the Loyal Legion, and attracted much attention by his outspoken opposition to the proposed return of captured Confederate battle flags. He was for many years a prominent leader of the Republican party in Wisconsin, and died on May 23, 1896. W.F.J.

FAIRFAX, a village of Franklin County, northwestern Vermont, on a branch of the Lamoille River. It has the New Hampton Theological and Literary Institution (Baptist), and manufactories of woolens, lumber and leather. Population 1900, 1,338.

FAIRFAX, JOHN CONTEE, an American physician; born at Vaucluse, Va., Sept. 13, 1830. He received a medical education, and practiced at Woodburne and Northampton, in Maryland. He was entitled to the title of Baron Fairfax of Cameron, in the peerage of Scotland, and was the only American citizen who possessed a title of nobility. The heir to the peerage in 1896 was A. K. Fairfax, his son, born in Northampton, Md., in 1870. The Fairfax estates in Virginia were the scene of George Washington's first labors as a surveyor. Died Sept. 28, 1900.

FAIRFIELD, the southwestern county of the state of Connecticut, and also one of its historic towns. The latter is on the shore of Long Island Sound, five miles southeast of Bridgeport, and has a good harbor, with some commerce, and a number of manufacturing establishments. It is surrounded on the land sides by a fine agricultural country, and is a favorite place of summer residence. It is reached by the New York, New Haven and Hartford railroad. Its population in 1900 was 4,489. W.F.J.

FAIRFIELD, Illinois, a city and the county seat of Wayne County, in the southeastern part of the state. It is a center of the agricultural region of the Wabash Valley. It is reached by the Louisville, Evansville and St. Louis and the Baltimore and Ohio railroads. Its population in 1900 was 2,338. W.F.J

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FAIRFIELD, Iowa, a city and the county seat of Jefferson County, in the southeastern part of the state. It lies in the rich farming region between the Des Moines and Skunk rivers, 53 miles northwest of Keokuk, is at the intersection of the Chicago, Burlington and Quincy and the Chicago, Rock Island and Pacific railroads, and had in 1900 a population of 4,689. W.F.J.

FAIRFIELD, Maine, a village of Somerset County, in the southwest-central part of the state, on the Kennebec River near Waterville and 21 miles north by east from Augusta. It has important industries and much commerce by the river and by the Maine Central railroad. Its population in 1900 was 2,238. W.F.J.

FAIRFIELD, a city of Clay County, southeastern Nebraska, 80 miles W.S.W. of Lincoln, on the St. Joseph and Grand Island railroad. Fairfield College is located here. It is in a farming and grazing district, and has a creamery, three grain-elevators and a syrup manufactory. Population 1900, 1,203.

FAIRFIELD, a town and the capital of Freestone County, eastern central Texas. It has two colleges. Its industries are tanning and flour and cotton-making. Population about 500.

FAIRFORD, a village of Gloucestershire, southeastern central England, 9 miles E. of Cirencester, and 26 miles W.S.W. of Oxford. Its fine church, built in the fifteenth century, is famous for its 28 stained-glass windows. The village is famed as the birthplace of JOHN KEBLE; q.v., Vol. XIV, p. 26. Population, about 1,500.

FAIRHAVEN, Massachusetts, a town of Bristol County, in the southeastern part of the state. It lies on the eastern shore of New Bedford Harbor, opposite the city of New Bedford, has extensive manufactories of hardware and leather goods. It is reached by the New York, New Haven and Hartford railroad, and in 1900 had a population of 3,567. W.F.J.

FAIRHAVEN, Vermont, a village of Rutland County, in the western part of the state, on the Poultney River near Lake Bomoseen. It has extensive marble and slate quarries, and is reached by the Rutland railroad. Its population in 1900 was 2,470. W.F.J.

FAIRHAVEN, a city of Whatcom County, northwestern Washington, on Bellingham Bay, just south of New Whatcom and adjacent to it, on the Great Northern railroad. It is in a fertile agricultural district, and the coal and lumber produced constitute the principal industries of the city. Population 1900, 4,228.

FAIR HEAD OR BENMORE HEAD, Ireland, the northeasternmost point of the country, in County Antrim, Province of Ulster, five miles east-northeast of Ballycastle. It is a lofty promontory of columnar greenstone, 530 feet high, overlooking the North Channel. C.L.S.

FAIR ISLE, a solitary island in the Atlantic, 25 miles S. of the Shetland Islands. It rises in one part (Sheep Craig) 480 feet above the sea. Its inhabitants, numbering a little over 200, are engaged in fishing and making woolen articles. See ORKNEY AND SHETLAND, Vol. XVII, p. 870.

FAIRLIE, ROBERT F., an English engineer, born in 1831. He introduced into Britain the American system of bogie-trucks, known in the United States as the swiveling-truck, which was applied in America to locomotives in 1832. Fairlie contracted to double the traffic capacity of a narrow tramway leading from a neighboring quarry to Portmadoc, in the county of Carnarvon, Wales. He accomplished his purpose by building the *Little Wonder* locomotive, with double swiveling-trucks, which not only moved trains of two hundred cars, but made the curving road adaptable to passenger trains. His system was so successful that it was introduced into South America, Mexico, Canada and Russia. He received a gold medal from the czar in appreciation of the service of the new engines on the St. Petersburg and Moscow railway. He was also rewarded in Britain by being made a knight. In 1884 he went to Venezuela, where he died the following year from an attack of malarial fever. He was the author of *Railways or No Railways?* (1875).

FAIRMONT, a village and the capital of Marion County, northeastern West Virginia, situated at the head of navigation, on the Monongahela River, 77 miles S.E. of Wheeling, on the Baltimore and Ohio and Monongahela River railroads. It contains a state normal school, has flour-mills, machine-shops, cigar and furniture factories, and there are coal-mines in the vicinity. Population 1900, 5,655.

FAIRMONT, a village and the capital of Martin County, central southern Minnesota, 111 miles S.W. of St. Paul, on the Chicago, Milwaukee and St. Paul railroad. The vicinity is a farming and stock-raising district, abounding in small lakes. The principal industries of the village are cheese and butter making. Population 1900, 3,040.

FAIR OAKS, a railroad station near Chickahominy, Virginia, on the Richmond and York River railroad, the scene of a battle fought May 31 and June 1, 1862. The engagement of Fair Oaks, or as it was termed by the Confederates, Seven Pines, was the first considerable encounter between the army of the Potomac under General George B. McClellan and the army of northern Virginia under General Joseph E. Johnston, who was succeeded by R. E. Lee during the progress of this battle. The first day's fighting was mainly at or near Seven Pines; the second day's, about Fair Oaks. Seven Pines is the junction of the Williamsburg and Nine-mile roads, seven miles east of Richmond and one mile southeast of Fair Oaks. McClellan's main army lay north of the Chickahominy. On May 23d Keyes's and Heintzelman's corps (about two fifths of McClellan's army) had crossed the Chickahominy River, and by May 30th Keyes's corps was intrenched at Seven Pines, his outposts extending to within five miles of Richmond. Heintzelman lay a few miles east. It was then that Johnston decided to attempt to crush this part of the army of the Potomac before reinforcements could be sent across the swollen waters of the Chickahominy. The attack was made May 31st, by Gen. D. H. Hill upon the divisions of Casey and Couch at Seven Pines. The superior numbers of the Confederates forced the Union troops, after an obstinate defense, to abandon their

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intrenchments, but, reinforced by part of Heintzelman's corps, they renewed the fight. Meanwhile Hill also was reinforced by R. B. Anderson's brigade, and after severe fighting, which lasted till darkness interfered, the Union army was driven from its position. About seven o'clock General Joseph E. Johnston was severely wounded and taken to Richmond. Early June 1st the battle was renewed, Gen. G. W. Smith now commanding the Confederates. The Union army regained all the ground lost the first day, and after much severe fighting, during which Gen. O. O. Howard lost his right arm, compelled the Confederates to give way in disorder. No advantage was taken of the victory by the Union commander, and the final effect was equivalent to a victory for the Confederates. Confidence was restored at Richmond, and General Lee decided to defend Richmond on the lines then occupied by his army. The number actually engaged at Fair Oaks was about twenty thousand on either side. The losses on the Union side were, in killed, wounded and missing, 5,031; on the Confederate side, 6,134.

FAIRPLAY, a town and the capital of Park County, central Colorado, at the head of South Park, on the Union Pacific railroad, 117 miles S.W. from Denver. It is at an altitude of 9,964 feet above sea-level, and is the point whence the Mount Lincoln mining district derives its supplies. It is one of the oldest mining towns in the state. Its chief occupation is stock-raising and quartz-mining. Population, 1890, 301; 1900, 319.

FAIRPORT, a village of Monroe County, New York, in the western part of the state. It is in the Genesee Valley, ten miles southeast of Rochester, and has some industries. It is reached by the New York Central and Hudson River and the West Shore railroads, and had in 1900 a population of 2,489. W.F.J.

FAIRY RINGS. See MUSHROOM, Vol. XVII, p. 83.

FAITHFULL, EMILY, philanthropist; was born at Headley Rectory, in Surrey, England, in 1835, was educated at Kensington, and in early life was presented at Court, where she ever afterward remained a favorite. She became interested in the welfare of working women, and in 1860 established a printing house in London, in which women were employed on favorable terms as typesetters.

EMILY FAITHFULL.

This enterprise, which finely combined practical business with generous philanthropy, greatly pleased Queen Victoria, who thereupon assured the success of the undertaking by appointing Miss Faithfull her printer and publisher in ordinary. The establishment was thereafter known as the Victoria Press, and in token of the royal patronage a sumptuous work, entitled *Victoria Regina*, was issued and dedicated to the Queen. In 1863 Miss Faithfull founded the *Victoria Magazine*, devoted to the industrial interests of women. She became also a lecturer upon social and literary topics, made three extended visits to the United States, and in 1888 received a Civil List pension in recognition of her philanthropic services. Upon the visit of the Queen of Roumania to England in 1890 Miss Faithfull was requested by Queen Victoria to describe to her the industrial condition of women in England and to discuss with her various progressive plans for Roumania. Miss Faithfull did much literary work, in books and periodicals. She was for years a member of the staff of the *Lady's Pictorial*, and she was the author of *Change upon Change*, a successful novel; *Three Visits to America; Some of the Drawbacks Connected with the Present Employment of Women*, and a volume of miscellany in prose and verse entitled *A Welcome* and dedicated to Princess Alexandra of Denmark upon her marriage to the Prince of Wales. She was universally esteemed for her character, graces and good deeds, and her industrial enterprise. She died on May 31, 1895. W.F.J.

FAIVRE, ANTOINE JEAN ETIENNE, a French painter, was born at Besançon, France, May 24, 1830. His first work was a portrait of Nessim-Bey (1855). This was followed by more portraits, and in 1849 he traveled in Italy, and from 1860 to 1862 in Russia. In 1864 he exhibited at the Salon a ceiling, entitled *Blind-man's Buff*, and in 1865 he painted *Flowers;* in 1867, *Idyl;* in 1869, *First Hours of the Day;* in 1870, *Family Reunion in the Park of Limois;* in 1873, *The Missive;* in 1877, *The Secret;* in 1884, *In the Conservatory;* in 1885, *Autumn and Summer.*

FAIZPUR, a town of the Bombay presidency, about 200 miles E. of Surat. It has a reputation for its dark blue and red dyes and cotton prints. Population, 9,640.

FALCIDIAN LAW. See ANNUITIES, Vol. II, p. 70.

FALCONER, ION KEITH, a Scotch Orientalist, missionary and athlete; born in Edinburgh, July 5, 1856. He was the younger brother of Lord Kintore. From Harrow he went to Cambridge, and there began evangelistic work. In London he aided in founding an assembly hall, contributing ten thousand dollars. A keen cyclist, he defeated, in 1878, the fastest rider in the world, and rode from Land's End to John O'Groat's. He wrote the article SHORTHAND in this ENCYCLOPÆDIA. He had accepted the Lord Almoner's professorship of Arabic at Cambridge, and was settled at Shaikh Othman, near Aden, Arabia, as a missionary, when his promising career was cut short by fever, May 10, 1887.

FALCONER, JOHN M., artist, was born in Edinburgh, Scotland, on May 22, 1820, and received an academic education. He came to America in his sixteenth year, and adopted the career of an artist. His studies were pursued in New York, at the National Academy of Design, at the Art Association in Brooklyn, and at the Louvre in Paris. He has long enjoyed much success as a painter in oils, water colors, and enamels on por-

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celain, and also as an etcher on copper. His best work has been done in the depicting of historic buildings, in Europe and America. His pictures include *Where the Declaration of Independence Was Signed*, *Shakespeare's Birthplace*, and *Kenilworth Castle*. He has written a *History of Water Color Painting*. His studio is in Brooklyn, New York. W.F.J.

FALCONET, a name used in the fifteenth and sixteenth centuries for a small field-gun. The ball weighed from one to two pounds, and the gun from five to fifteen hundredweight.

FALCONIDÆ. See FALCON, Vol. IX, pp. 3–5.

FALDSTOOL, a small desk in churches in England, at which the litany should be sung or said. The name is also given to a folding-stool used by Roman Catholic bishops and other prelates on certain occasions.

FALEME, French West Africa, a western affluent of the Senegal River rising in the Futa Jallon Mountains and after a northeastern course of about 200 miles joining the Senegal above Bakel. It is navigable to the rapids and falls, 120 miles from its mouth, and is an important commercial stream. C.L.S.

FALERNIAN WINE, one of the favorite wines of the Romans. It is described by Horace as surpassing all other wines then in repute; but in the time of Pliny, Falernian wine had begun to decline in quality.

FALGUIÈRE, JEAN ALEXANDRE JOSEPH, a French painter and sculptor; born at Toulouse, Sept. 7, 1831. He was a pupil of Jouffroy, studied at the École des Beaux Arts, and while there gained the prix de Rome in 1859. In 1857 he sent to the Salon a plaster statue, *The Infant Theseus*, reproduced in marble in 1865. Among his other sculptures are *A Christian Martyr* (1867); *Ophelia* (1869); *Pierre Corneille* (1872); *Egyptian Dance* (1873); *The Swiss Entertaining the French Army* (1874). Among his paintings are *Near the Chateau* (1873); *The Wrestlers* (1874); *Slaughter of the Bull* (1881); *Cain and Abel* (1876); *The Beheading of John the Baptist* (1877); *Madeleine* (1887); and *Juno* (1889). In 1882 he was elected a member of the French Academy, and an officer of the Legion of Honor. He died at Paris April 19, 1900.

FALK, PAUL LUDWIG ADALBERT, statesman; was born in Prussian Silesia, on August 10, 1827, and was educated at the University of Breslau. He was called to the bar in 1847, and three years later entered the public service as prosecuting attorney. He became connected with the ministry of justice at Berlin in 1861, judge of the court of appeals at Glogau in 1862, and permanent privy councilor to the ministry of justice in 1868. Meantime he was a deputy in the Prussian Parliament in 1858–61, and a member of the North German Parliament in 1867–71. Upon the organization of the German Empire he became a member of the Reichstag. He was made by Prince Bismarck minister of public worship on January 2, 1872, for the purpose of devising and executing laws intended to weaken the political influence of the Roman Catholic Church in Germany. The result was the code of repressive acts known as the Falk Laws, or May Laws, which were in force for many years but have now been repealed. He resigned his ministry on July 14, 1879, and in January, 1892, was made chief justice of Westphalia. He died on July 7, 1900. W.F.J.

FALKLAND ISLANDS OR LES ILES MALOUINES, a British colony in the South Atlantic. For history and earlier statistics, see FALKLAND ISLANDS, Vol. IX, pp. 14–16. South Georgia, an island 800 miles E.S.E., has been annexed to the colony. Its area is 1,570 square miles, but it is snow-covered, sterile and uninhabited. The present area of the Falklands is 7,500 square miles, with a total population of 2,043. The chief town is Stanley, with a population of 700. The government is administered by the governor, assisted by an executive and legislative council. There were, in 1892, two government schools, with 142 pupils; one Catholic school, with 51 pupils, and one school at Darwin, with 23 pupils. There are no naval or military forces. The total revenue for 1900 was $77,425; expenditures, $76,740; imports, $330,690, and exports, $561,560. Sheep-farming is the chief industry, 2,325,154 acres being devoted to sheep-pasturage. In 1892 there were in the colony 3,824 horses, 6,321 cattle and 667,344 sheep.

FALKLAND, VISCOUNT. See CARY, SIR LUCIUS, Vol. V, p. 149.

FALKÖPING, Sweden, a town on the fertile Falbygden plain, in the southern province of Skaraborg, 50 miles by rail northeast of Göteborg. Here Queen Margaret of Denmark defeated King Albert of Sweden, February 24, 1839, and effected the union of Denmark, Sweden and Norway as one kingdom. Population, 1900, 5,890. C.L.S.

FALLING BODIES. See GRAVITATION, Vol. XI, pp. 59–68.

FALLOPIAN TUBES. See MAMMALIA, Vol. XV, p. 370.

FALLOW DEER. See DEER, Vol. VII, p. 23.

FALLOWING–GROUND. See AGRICULTURE, Vol. I, pp. 300–303.

FALLOWS, SAMUEL, clergyman and educator, was born in Lancashire, England, on December 13, 1835, and came to America in 1848. He was graduated from the University of Wisconsin in 1859, and for the next two years was vice-president of Galesville University. During the Civil War he was an officer of U. S. Volunteers, rising to be brigadier-general. From 1859 to 1875 he was a minister of the Methodist Episcopal Church, from 1871 to 1874 State superintendent of public instruction in Wisconsin, from 1866 to 1874 a regent of the University of Wisconsin, and in 1874–75 president of the Illinois Wesleyan University at Bloomington. In 1875 he joined

BISHOP FALLOWS.

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the Reformed Episcopal Church and became rector of a parish in Chicago, and in 1876 was elected a bishop of that church. He has been five times elected presiding bishop since 1897, and has filled many public places in connection with educational and philanthropic work. He has also written many educational, historical, and religious books, including *A Handbook of Briticisms, Americanisms, and Provincial Words;* a *Handbook of Synonyms;* and a *Complete Dictionary of Synonyms and Antonyms.* W.F.J.

FALL RIVER, a great manufacturing and commercial city of Bristol County, Massachusetts. (For history and general account see Vol. IX, p. 16.) For many years it has been the chief cotton-goods manufacturing city of America, practically controlling the cotton goods trade of the continent. It contained in 1900 42 companies engaged in cotton manufacture, with 65 mills, more than $45,000,000 capital, and yearly products of about $30,000,000. The establishments include spinning mills, looms, bleaching, dyeing and printing works, producing every known kind of cotton cloth. The chief staple however is print cloths, of which Fall River manufactures two-thirds of the entire American output. Although largely given up to manufactories, the city is otherwise a handsome and attractive one, and a favorite place of residence. Its streets are spacious and well made, and its public buildings, including custom-house, city hall and high school, are chiefly built of granite and are of commanding appearance. There is a large free public library, maintained by the city. Despite many strikes and other disturbances of trade and the growing rivalry of southern manufacturing towns, Fall River is increasing in population and wealth more rapidly than most American cities. Its population was 74,398 in 1890 and 104,863 in 1900. W.F.J.

FALLS CITY, a city and the county seat of Richardson County, in the southeastern corner of Nebraska. It lies on the Nemaha River a tributary of the Missouri, and is eighty-five miles south of Omaha and eighty miles southeast of Lincoln. It is at the intersection of the Missouri Pacific and the Burlington and Missouri River railroads, and has extensive manufacturing and commercial interests. Its population in 1900 was 3,022. W.F.J.

FALMOUTH, a town and the capital of Pendleton County, northern Kentucky, on the Licking River, at its junction with the South Licking, 35 miles S. of Cincinnati, Ohio, on the Louisville and Nashville railroad. It has an academy, a woolen mill, a saw-mill, a distillery, a creamery and a canning factory. The principal occupation of the vicinity is tobacco-raising and farming. Population 1900, 1,134.

FALMOUTH, a town of Barnstable County, Massachusetts. It has, at Wood's Holl, a fine harbor, and is a summer resort. It is reached by the New York, New Haven and Hartford railroad, and in 1900 had a population of 3,500. W.F.J.

FALSE BAY, an inlet of the Atlantic, in Cape Colony, Africa, its west side being formed by the Cape of Good Hope. It is about 22 miles in length and breadth. Here is a station of the Cape naval squadron, known as Simon's Bay.

FALSE IMPRISONMENT, the unlawful restraint of the liberty of another. The offense will amount to false imprisonment whether the unlawful detention be by confinement in a place made for imprisonment generally, or merely one made use of for the occasion; or even forcible detention without the use of doors or locks, and in any place whatsoever. An action may be sustained for damages for false imprisonment, and in some cases an indictment may be had. The method for obtaining a release from false imprisonment is by writ of *habeas corpus.*

FALSE PRETENSES, fraudulent statements and misrepresentations made with the unlawful design and intent to thereby obtain from another money, goods, wares or merchandise without adequate compensation, or without any compensation, therefor. To constitute this offense, it is necessary that the representations shall be made concerning some present or past fact or condition. Representations as to what conditions may occur in the future are mere expressions of opinion. This offense is made punishable by the statutes in most states. For the civil remedy for this offense, see DECEIT, in these Supplements.

FALSETTO. See VOICE, Vol. XXIV, p. 296.

FAMAGOSTA. See CYPRUS, Vol. VI, p. 660.

FAMILISTS. See DAVIDISTS, Vol. VI, p. 742.

FAMILY, a group of organisms composed of genera having general structural features in common. As with species, so here no absolute limits can be defined, and in many orders the genera have so many features in common that any attempted division into families must be largely arbitrary. Some orders contain only one family. Some families contain thousands of species, while others are composed of a single genus and species. In zoölogical literature the families are usually designated by the termination *-idæ.* The botanist Gray employed the word *family* as a popular synonym for order This use was never widely adopted.

FAMILY HISTORIES, AMERICAN. See GENEALOGIES, AMERICAN, in these Supplements.

FANARIOTS, the general name given to the Greeks inhabiting the Fanar, or Fanal, in Constantinople. They first appear in history after the taking of Constantinople by the Turks.

FANDANGO, an old Andalusian dance, a variety of the seguidilla, accompanied by the guitar and castanets. In its original form, the fandango was in six-eight time, of slow tempo, mostly in the minor, with a trio in the major; sometimes, however, the whole was in a major key. Later it took the three-four time and the characteristic Spanish rhythm. There is a curious piece of history said to be connected with this dance. Soon after its first introduction in the seventeenth century, it was condemned by the ecclesiastical authorities in Spain as a "godless dance." Just as the Consistory were about to prohibit it, one of the judges remarked

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that it was not fair to condemn any one unheard. Two celebrated dancers were accordingly introduced to perform the fandango before the Consistory. This they did, with such effect that, according to the old chronicler, "every one joined in, and the hall of the consistorium was turned into a dancing-saloon." No more was heard of the condemnation of the fandango. Similar dances to the fandango are the Tirana, the Polo and the Jota Arragonesa.

FANEUIL HALL, a celebrated building in Boston, Mass., originally erected in 1740–42 by Peter Faneuil (born in New Rochelle, N. Y., in 1700; died in Boston, Mass., March 3, 1743). It comprised a market-house on the ground floor and a town-hall and other rooms above. In 1761 it was destroyed by fire; in 1763 it was rebuilt by the town; and during the Revolutionary period it was a meeting-place of the patriots, to whose fervid oratory and important resolutions is due the name of "the cradle of American liberty" by which it is now known. The lower floor is still used as a market, and the upper floor as a historical museum and a place for public meetings.

E.E.T.

FANFANI, Pietro, philologist and author; was born in Italy in 1815, and in 1847 founded the *Philological Record*. He was the author of several vocabularies of standard rank, of *Writ at Random; The Laughing Democritus*, and other humorous and satirical works, and of *Cecco d'Ascoli; Paolina; The Coachman and His Family*, and other novels. He died in 1879.

W.F.J.

FAN-MOTOR, a device for use with alternating electric currents. The motor is simple in design and light in weight, and will drive a 12-inch fan at one thousand revolutions per minute with a current of about one ampere. The whole apparatus, motor and pedestal, weighs only about 15 pounds, thus rendering it very portable. The motor comprises an arc-shaped laminated field-magnet and a continuously wound drum-armature having a finely laminated core and a commutator, the field-magnet and armature windings being connected in series relation. The motor is used on a fifty-volt transformer circuit, and exhibits almost no sparking. The simplicity of the device is one of its chief recommendations, presenting many analogous points of construction to a direct-current motor, except its fine lamination, which adapts it for alternating-currents. There is very little heating of the iron when the motor is in operation. It is adapted to a number of commercial and domestic uses in which but little power is required, such as the operating of fans and sewing-machines.

FANNING, a coral island in the Pacific, lying in lat. 3° 51′ N., long. 159° 22′ W. It has about 150 inhabitants, and was formally annexed by Britain in 1888, as lying in the path of a possible submarine cable between Canada and Australia. Fanning Island is also called American Island. The name of Fanning Islands is sometimes given to the whole group comprising Fanning, Christmas, New York or Washington, Jarvis and Palmyra islands.

FANNING, David, an American loyalist and freebooter; born in Wake County, N. C., about 1756. He was a carpenter, but took to a roving life. In 1781 he was robbed by a party of Whigs, and in revenge surrounded himself with a small band of desperadoes and scoured the country, laying waste the settlements and committing frightful atrocities, but lending such good aid to the British troops that he was rewarded with the commission of a lieutenant-colonel in the militia. He captured many prominent Whigs, and either delivered them at British headquarters or hung them. Among his exploits were the capture of the judges, lawyers, and officers of the court sitting at Pittsborough, besides several citizens; the capture of Col. Alston and about 30 men; a raid upon Campbellton, and another on Hillsborough, in which he took prisoners Gov. Burke, his suite, and a number of citizens. He became an outlaw when the Whigs gained the ascendency, and fled to Florida and afterward to St. John's, N. B., where he was elected to the Assembly. Subsequently he was convicted of rape and sentenced to death, but finally obtained a pardon. He died in Digby, N. S., in 1825.

E.E.T.

FANNING, Edmund, soldier and administrator, was born on Long Island, N. Y., in 1737, and was graduated from Yale College in 1757. He settled in North Carolina, became a colonel of militia and member of the colonial legislature. In 1765 he was clerk of the superior court, and afterward held other civil offices, in which, by exacting extortionate fees, he became rich. In 1771 the "Regulators" took him from his house and beat him, and he fled for his life to New York, where he was Governor Tryon's private secretary, and also surveyor-general. He was an extreme Tory, and made himself obnoxious to the Revolutionary party. As a consequence, in 1775 his house was raided by American revolutionists, and he fled to a British warship. The next year he was commissioned as colonel in the British army and raised and commanded "the King's American regiment of foot." He saw much active service in the war, and was twice wounded. His property was confiscated in 1779, and in 1783 he fled with other Tories to Nova Scotia, where he became lieutenant-governor. From 1794 to 1813 he was governor of Prince Edward's Island. He died in London on February 28, 1818.

W.F.J.

FANNING, John Thomas, engineer, was born at Norwich, Conn., on December 31, 1837, and studied architecture and engineering. He was a volunteer soldier in the Civil War, rising to be a lieutenant-colonel of Connecticut troops. After the war he engaged in practice as a civil engineer, paying especial attention to the designing and construction of water-works and water-power establishments. For some years his activities were chiefly confined to New England, but later he removed to the west and was engaged in developing the water power of the Mississippi River at Minneapolis, of the Missouri River at Great Falls and at Helena, and of the Spokane River in the State of Washington. He has also been consult-

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ng engineer of several railroads in the northwest. He is the author of *A Treatise on Hydraulic and Water-Supply Engineering*. W.F.J.

FANNING-MACHINE, a machine employed to winnow grain (see *Winnowing-Machines*, under AGRICULTURE, Vol. I, p. 290). The earliest invention of the fanning-machine is attributed to a Scotch farmer, Andrew Rodger, in 1737. It met with strong opposition and prejudice.

FANS. See GABOON, Vol. X, p. 4.

FANTAIL PIGEON. See DOVE, Vol. VII, 328.

FANTASIA. See MUSIC, Vol XVII, p. 103.

FANTEES. See ASHANTEE, Vol. II, p. 595.

FAN-TRACERY VAULTING. See *Groined Vaulting*, under ARCHITECTURE, Vol. II, p. 409.

FARAD. See TELEGRAPH, Vol. XXIII, p. 124.

FARALLONES, California, a rocky plateau of the Pacific Ocean, comprising six elevated islets, and their submerged extensions, 30 miles west by south of the Golden Gate entrance to San Francisco Bay. The name is derived from the Spanish *farallones*, signifying islets. On the southernmost and largest is the Farallon lighthouse, exhibiting a flashing light of the first order, visible 26 miles from its altitude of 350 feet above sea-level. C.L.S.

FARCE. See DRAMA, Vol. VII, pp. 342, 376–378.

FARCY. See GLANDERS, Vol. X, p. 566; VETERINARY SCIENCE, Vol. XXIV, p. 219.

FARDEL-BOUND, a disease of domesticated ruminants, the cause of which is the impaction of the fardel, or third stomach, the folds of which become dry, and refuse to exercise their normal function of returning the cud to the mouth to be remasticated. This impaction and paralysis are due to improper food of a dry, indigestible kind, such as over-ripe clover, rye-grass, hay, vetches, etc., which the stomach cannot sufficiently moisten. The "loss of cud" is a symptom, merely, of this disease, so that all attempts to attain the return of the cud are useless and only attempted by quacks. Other symptoms exhibited are stupidity, fever, dry nose, and sometimes grunting from discomfort. The treatment is the giving of mild purgatives, such as Epsom salts, and mashes of bran or gruel drenches, to which a stomachic may be added, such as ginger; molasses is also excellent. Sometimes clysters of soap and water are very useful. The object is to get rid of the impaction, and to tone up the stomach for renewed effort.

FAREWELL, CAPE, the southern-most point of Greenland on an islet in the North Atlantic Ocean, about 30 miles south of the port and trading station of Frederiksdal. C.L.S.

FARGO, an important city and the county seat of Cass County, North Dakota, on the eastern border of the state. It is on the Red River of the North, opposite Moorehead, Minnesota, and is reached by the Chicago, Milwaukee and St. Paul, the Great Northern and the Northern Pacific railroads. It is a great market for wheat and for agricultural machinery. Nearly half the place was burned in June, 1893, but its growth was not checked, its population increasing from 5,664 in 1890 to 9,589 in 1900. W.F.J.

FARGUS, FREDERICK JOHN, an English novelist who wrote under the pseudonym of "Hugh Conway"; born at Bristol, Dec. 26, 1847, the son of an auctioneer. In 1861 he entered the training-ship *Conway*, stationed in the Mersey, intending to adopt the sea as a profession. Hence his pseudonym. The father wished the son to become an auctioneer. The lad did so, but found relaxation in writing verses and tales for the newspapers. He published a volume of verses in 1879; in 1883 he removed to London; and in 1884 *Called Back* appeared as volume I of Arrowsmith's Bristol Library. This book had wide popularity and sale, a dramatized version, by Comyns Carr, further adding to his fame. *Bound Together*, a collection of tales, appeared in 1884. Then followed *Dark Days*, an even greater success than *Called Back; At What Cost, and Other Stories* (1885); *Slings and Arrows* (1885); *A Cardinal Sin* (1886); *Carriston's Gift, and Other Stories* (1886); *Living or Dead* (1886); *Somebody's Story: An Exact Reproduction of Hugh Conway's Original Manuscript* (1886); *Life's Idylls* (1879; new ed., 1887); *Lays and Lyrics* (1887). Died at Monte Carlo, May 15, 1885.

FARIBAULT, a city, the capital of Rice Co., Minn., 47 miles S. of St. Paul, at the confluence of the Strait and Cannon rivers, and on the Chicago, Milwaukee and St. Paul and Minneapolis and St. Louis railroads; has several factories, chiefly those which manufacture from wool, grains, and wood; a state asylum for the deaf, dumb, and blind; Seabury Divinity College, Shattuck School for (boys), and St. Mary's School (for girls), all three Protestant Episcopal. Pop. 1890, 6,520; 1900, 7,868.

FARINA (Lat., meal or flour). In general the product of grinding and sifting wheat, corn and other seeds; hence the term farinaceous food, but in particular finely-powdered white maize or Indian corn. Of the different kinds of farina, that obtained from cereals holds first place. The farina of different kinds of pulse, or seeds of leguminous plants, has different chemical and commercial properties, but is extremely nutritious. As the chief constituent of farina is starch, it is also the flour of starchy roots, as potatoes and arrow-root; and is found in some stems as sago. Cassava meal is commonly called farina. W.R.B.

FARINA, SALVATORE, novelist, "the Italian Goldsmith"; born at Sorso, Sardinia, Jan. 10, 1846. His works, which were at once successful, include *Two Amours* (1869); *A Secret* (1870); *Forbidden Fruit; Romance of a Widower; The Hundred Eyes of Love; Dounina's Treasure; Courage and Onward; Through the Beautiful Eyes of Glory; Little Don Quixote* (1890); *Living for Love* (1890); *For Life and Death* (1891); *Last Battle of Priest Agostino;* and *Capelli Bianchi.*

FARJEON, BENJAMIN LEOPOLD, an English novelist; born in London, England, of Jewish parentage, May 12, 1833. He spent some years as a journalist in New Zealand and Australia, and in 1869 returned to London, where he commenced his career as a writer of novels, dealing mostly with low life, from which he has been characterized as a follower of Dickens. His first story, *Grif*, dealing with Australian life, appeared in 1870; and among his

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other better-known books are *Blades o' Grass* (1874); *Bread and Cheese and Kisses* (1874); *The Duchess of Rosemary Lane* (1876); *Solomon Isaacs* (1877); *Great Porter Square: A Mystery* (1884); *Molka Christmas Angels* (1886); *Three Times Tried* (1886); *Toilers of Babylon* (1888); *Ties* (1891); and *For the Defense* (1892); *The Last Tenant* (1893); *Something Occurred* (1893); *A Fair Jewess* (1894); and *The Betrayal of John Fordham* (1896). In 1877 Mr. Farjeon married a daughter of Joseph Jefferson, Died Aug. 23, 1903.

FARLEY, James Lewis, financier and author; was born in Dublin, Ireland, on September 9, 1823. He became interested in finance, and after the Crimean War was made agent of the then formed Ottoman Bank, at Beyrout, Syria, where he successfully organized a branch of the bank. Four years later he became accountant-general of the State Bank of Turkey at Constantinople, since merged into the Imperial Ottoman Bank. In 1870 he returned to England as Turkish consul at Bristol. He was for a time a correspondent of the *London Daily News*, and was the author of *Two Years in Syria; The Druses and Maronites; The Resources of Turkey; Banking in Turkey*, and *Turkey*. He was a privy councilor to the Bulgarian government. He died on November 12, 1885. W.F.J.

FARLOW, William Gilson, botanist, was born in Boston on December 17, 1844, and was graduated from Harvard College in 1866 and from the Harvard Medical School in 1870. After several years of scientific study in Europe he became adjunct professor of botany at Harvard from 1874 to 1879, and in 1879 professor of cryptogamic botany, which place he continues to fill. He has long devoted especial attention to fungi, and to the fungoid diseases of plants and trees, and is recognized as one of the foremost authorities upon such subjects. He has written *Marine Algæ of New England*, *The Black Knot*, *The Potato Rot*, *Diseases of Orange and Olive Trees*, an *Introduction to Cryptogamic Botany*, an *Index of Fungi*, and *The Gymnosprangia of the United States*. He is a member of the American Association for the Advancement of Science. W.F.J.

FARMER CITY, a city of Dewitt County, Illinois, in the central part of the state. It lies on Salt Creek, 125 miles southwest of Chicago, and is reached by the Illinois Central and the Cleveland, Cincinnati, Chicago and St. Louis railroads. Its population in 1900 was 1,664. W.F.J.

FARMERS-GENERAL (Fr., *fermiers généraux*), the name given to a privileged association in France which flourished previous to the revolution of 1789. The members were granted the privilege of collecting the taxes on certain branches of the revenues of the nation. This system of tax-gathering became general in France from the year 1546, when Francis I let out the *gabelle*, or salt-tax, in this way. The privileges of the position were sold to the highest bidder, but they were largely in the hands of the king's favorites The powers, rights and duties of the class were defined by special decrees; but however severe may have been the fiscal laws against fraud and contraband, it is notorious that shortly before the Revolution abuses of the most flagrant description had demoralized the system and the men. During the Revolution most of these obnoxious tax-gatherers perished on the scaffold, the innocent among them being occasionally confounded with the guilty. About thirty farmers-general were executed in 1794. Farmers of the revenue was also an institution of ancient Rome. Tolls on roads and duties of various kinds were at one time farmed, also, in Great Britain.

FARMERS' INSTITUTES, organizations in different states, which, by holding meetings within the state, provide the agriculturist and stock-raiser with the opportunity of keeping abreast of the times. These institutes are organized in connection with the board of agriculture of the state, or independently, though often with some indirect communication existing between them and the former institutions. The best results are attained under the superintendence of an official appointed by the state board of agriculture, especially when the latter has control of the agricultural college. In such case the state board acts as an executive patron aiding directly in the raising of the needful funds to carry on the institutes to the best advantage. Lecture courses are provided, which usually last the greater portion of a week. The latest discovery or invention, or the addition to the list of improved breeds, is discussed, and its mission determined. Similarly, improved methods of cultivation, stock-raising, dairying, beef-raising, mutton or wool production, etc., are but a few of the important matters that are passed in review at the meetings. Discussions follow, and the farmer becomes impressed with the value of a liberal education, and soon realizes that he can obtain substantial aid from the laboratory of the scientist, while the agricultural professor comes in contact with the man of practical experience and obtains many a suggestion from the cultivator.

The institute movement is not new, the New York State Agricultural Society having inaugurated similar meetings and lectures in 1842. In 1859 the Massachusetts State Board of Agriculture endeavored, with but moderate success, to establish systematic courses. In Michigan, in 1861, the state authorized the board of agriculture, which, in that state, has control of the Agricultural College, to institute winter courses of lectures for others than students of the Agricultural College, under necessary rules and regulations. It was not, however, until ten years later that such a scheme was practically materialized. This was, however, the first attempt to make these lectures an integral function of the state agricultural institutions. These state organizations have stimulated the origination of many local and county clubs, as well as institutes in connection therewith. The state of New York appropriates $15,000 per annum for the expenses connected with their institutes, and other states follow with smaller sums. The institute movement is most lively in the Northern and Northwestern states.

FARMERS' ORGANIZATIONS. The earliest of the great farmers' organizations was that of the Patrons of Industry, a secret order, with ritual and

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"degrees of work," suggested by those of the Masonic and Odd Fellows fraternities. The scheme was devised and formulated and publicly announced Aug. 5, 1867, by William Saunders, then superintendent of the United States government gardens and conservatories in Washington, District of Columbia. Mr. Saunders, having occasion to visit western New York, Ohio and other Western states, took with him the ritual and plan of "work" under the first degree, which had been formulated in Washington, and interested five others in the new order. Later in the autumn, the work of the second, third and fourth degrees was formulated, and the name *Patrons of Husbandry* given to the order. At Washington, in December, 1867, nine persons, who had taken the four degrees, met and organized the National Grange. The constitution provided for the admission of women to membership, and also for the election of four ladies as officers, to be designated Ceres, Pomona, Flora and Lady Assistant Steward. The chief objects of the organization were stated to be "the promotion of unity and co-operation among the tillers of the soil, and the diffusion of a higher measure of intelligence and culture." Seven years later there were reported about twenty-two thousand granges, with a membership reaching up into hundreds of thousands. During the year 1888 over two hundred granges were added. A year later the membership, including men and women, was reported at over half a million, and in 1890 the subordinate granges at about twenty-six thousand. The laws governing the order in essential matters originate in the National Grange, from which, also, emanate the charters of all local, county or state granges.

The first farmers' alliance was organized in Texas in 1873, for the purpose of coöperation against cattle-thieves, but as it increased in numbers its scope was extended, and in 1880 it was chartered by the state of Texas as a benevolent institution. In 1887 it had reached a membership of over one hundred thousand, and then united with the Farmers' Union of Louisiana, which reported a membership of ten thousand. These two bodies thus consolidated were incorporated under the laws of the District of Columbia as the National Farmers' Alliance and Coöperative Union. About the date of the Texas organization (1873), another farmers' alliance was organized in the state of New York, and spread westward as a non-secret order, and became a strong body north of the Ohio River and west of Pennsylvania. The *National Agricultural Wheel*, a league or guild similar in scope and aims to those of the Grange, was founded in Prairie County, Arkansas, in 1880, and soon reported numerous branches and a large membership in the Southwest.

The National Farmers' Alliance and Industrial Union is the outcome of the union consummated in St. Louis, Missouri, Oct. 1, 1889, between the National Farmers' Alliance and Coöperative Union and the National Agricultural Wheel, the new name being given to the united societies at the annual meeting held in that place on that date. The new society thus created was then credited with a total membership estimated at from 1,600,000 to 2,500,000.

At the meeting at Ocala, Florida, held in December, 1890, a series of resolutions was adopted, which became known as the "Ocala Platform," and was substantially as follows: The abolition of national banks; the establishment of subtreasuries, where the government should loan money to farmers at a low rate of interest; the increase of the circulating medium to not less than fifty dollars *per capita;* the prevention of dealing in futures on agricultural and mechanical productions; the free and unlimited coinage of silver; the prohibition of the alien ownership of land, and the restoration to the government of all such lands, as well as those owned by corporations in excess of their reasonable needs; the extension of free trade; the establishment of a graduated income tax; the limitation of national and state taxes to the absolute needs of an economically administered government; and the government ownership of all means of communication and transportation.

One of the remarkable features of the meeting at Ocala was the development of a feeling in favor of an independent political party movement—a movement which would be likely to engage the attention and sympathy of all the various farmers' organizations, and at the same time be sufficiently unrestricted in its membership to open its doors to such "honest persons" as are shut out from membership in most, if not all, of the other farmers' societies. There was already at hand an organization which seemed adapted to meet the want indicated. Nearly a year previous, the *Citizens' Alliance* was started in Kansas, and had already a large membership in that state, and in Nebraska and Iowa. A national organization was perfected at Ocala. The declaration of principles stated that "the organization is formed for the purpose of coöperating with the Farmers' Alliance, the Knights of Labor and other orders in the support of the St. Louis platform [which embraced largely the same items adopted at Ocala] 'and to this end the organization is political in its nature.'"

The National Farmers' Political League is a non-secret, independent, non-partisan organization. Its work is directed toward securing a just representation and treatment of the agricultural interests in Congress and in the legislatures, and due recognition of farmers in all public affairs, without conflicting with the best interests of the entire people. It consists of a national league, and of state leagues, with county and town leagues. The national league has general supervision of the affairs of the Farmers' League and the work of organization, and attends specially to the farmers' interests in Congress. The state leagues, as soon as organized, push the work of organization in their respective states, and attend to the farmers' special interests in the legislature. The county league attends to the farmers' interests in county matters, and to affairs in Senatorial and Representative districts. The town leagues furnish the delegates who constitute the county leagues, and attend to the farmers' interests in local districts and in each election precinct.

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Other important organizations are the Farmers' Mutual Benefit Association, which claims to have a half-million members, mostly in the Western states; the National Farmers' League, mainly an eastern association; the Patrons of Husbandry, with headquarters in Michigan and membership in that and adjacent states; the National Colored Farmers' Alliance and Coöperative Union, composed of negroes, and naturally strongest in the Southern states; the National Farmers' Alliance, which was organized in Chicago in 1880, and is composed of state alliances in fifteen states, with societies in others. The principles of the National Farmers' Alliance are very much the same as those included in the "Ocala Platform." They, however, refer more forcibly to the preservation of the pooling clause in the Interstate Commerce Law; to the extension of the franchise to women, and giving them pay equal to that of men for equal work; and to the enactment by Congress of laws forbidding the sale of options on produce in exchanges of the country.

The chairman of the National Farmers' Alliance and Industrial Union at Ocala issued a call in 1891 for a meeting of "delegates from all the organizations of producers," and included the People's Party, the Independent Party, the Knights of Labor, etc. This confederation of parties met, in its first annual convention, as the People's Party, at Omaha, July 2, 1892. On the Fourth of July it adopted a platform, in which it declared for a union of labor forces, free coinage of silver, increase of the circulating medium, a graduated income tax, government ownership of the telegraph and telephone, reclamation of lands from aliens, the eight-hour law, limitation of the office of President to one term, and opposition to all subsidies to private corporations. Its candidates were General James B. Weaver of Iowa for President, and General James Field of Virginia for Vice-President. A fusion with other parties was made in some of the states. The People's Party received 1,055,424 popular and 22 electoral votes. See PEOPLE'S PARTY, in these Supplements.

FARMINGTON, Connecticut, a town of Hartford County, in the central part of the state. It is a manufacturing place and the seat of a well-known girls' school, and is reached by the New York, New Haven and Hartford railroad. Its population in 1900 was 3,331. W.F.J.

FARMINGTON, Iowa, a town of Van Buren County, in the southeastern part of the state. It lies on the Des Moines River, and on the Chicago, Rock Island and Pacific and the Kansas City and Western railroads. It has various manufactories, and is an agricultural market center. It population in 1900 was 1,332. W.F.J.

FARMINGTON, a village and the capital of Franklin County, western Maine, on the Sandy River, and on the Sandy River and Maine Central railroads. It has a state normal school, besides other excellent schools. It contains machine-shops, saw, shingle and clapboard mills, a drum factory and a spool-factory. It is supplied with electric lights and city water. Population 1900, 1,251.

FARMINGTON, a village of Dakota County, southeastern Minnesota, on the Vermilion River, and on the Chicago, Milwaukee and St. Paul (two branches) railroad, 20 miles S. of St. Paul. The village contains a flouring-mill, and shoe and carriage manufactories. It has a large wheat-elevator, and is located in a wheat-growing region. Population 1900, 733.

FARMINGTON, Missouri, a city and the county seat of St. François County, in the southeastern part of the state. It lies near Iron Mountain and Pilot Knob, and is reached by the St. Louis, Iron Mountain and Southern railroad. It is sixty miles south of St. Louis, in an agricultural and lead-mining region. Its population in 1900 was 1,778. W.F.J.

FARMINGTON, New Hampshire, a town of Strafford County, in the southeast part of the state. It lies on the Cocheco River, twenty-seven miles north by west from Portsmouth, has a fine water power and has manufactories of leather, lumber and other goods. It is reached by the Boston and Maine railroad, and had in 1900 a population of 2,265. W.F.J.

FARMINGTON, a city and the capital of Davis County, central northern Utah, on the Great Salt Lake, and on the Rio Grande Western and Union Pacific railroads, 18 miles N. of Salt Lake City. The town is a fruit-raising center, and is provided with irrigating ditches and with water from the mountain reservoirs. Some of the streams are used for water-power in mills, the water being then led down through the farms. Population 1900, 968.

FARMS IN THE UNITED STATES. See AGRICULTURE, in these Supplements.

FARMVILLE, a town and the county seat of Prince Edward County, Virginia, in the south-central part of the state. It lies on the Appomattox River, 55 miles west by south from Richmond, and was on April 7, 1865, the scene of one of the closing engagements of the Civil War. Hampden-Sydney College is situated near by. It is reached by the Norfolk and Western railroad, and had a population of 2,471 in 1900. W.F.J.

FARNAM, HENRY WALCOTT, political economist, was born at New Haven, Conn., in 1853, and was graduated from Yale College in 1874 and from the University of Strasburg, Germany, in 1878. From 1878 to 1880 he was a tutor in political economy at Yale University, and since 1880 has been professor of political economy since 1881 also in the Sheffield Scientific School), and an editor of *The Yale Review*. W.F.J.

FARNBOROUGH, LORD, better known as Sir Thomas Erskine May, an English jurist; born in 1815; educated at Bedford School, and became assistant librarian to the House of Commons in 1831. He was called to the bar in 1838, and was later appointed examiner of petitions for private bills and taxing-master of the House. In 1871 he was appointed clerk of the House. He was made a Companion of the Bath in 1860, and Knight Commander in 1866. He resigned his office of clerk, April 15, 1886, received a vote of thanks from the House for his public services, and was soon afterward gazetted

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a peer of the realm, with the title of Baron Farnborough, but did not live to take his seat, dying May 17th of the same year. He published several standard works on the law and practice of Parliament, the more important being *A Treatise on the Law, Privileges and Proceedings of Parliament* (1844), which was translated into German and Hungarian; *Constitutional History of England Since the Accession of George III, 1760–1860* (3d ed. 1871); and *Democracy in Europe: A History* (1877).

FARNE ISLANDS. See NORTHUMBERLAND, Vol. XVII, p. 578.

FARNESE BULL. See ARCHÆOLOGY, Vol. II, p. 319.

FARNHAM, ELIZA WOODSON (BURHANS), an American philanthropist; born in Rensselaerville, N. Y., Nov. 17, 1815. In 1835 she went to Illinois, and in 1836 married Thomas J. Farnham (q. v.). In 1841 she returned to New York, and employed herself in visiting prisons and in lecturing to women till 1844, when she became matron at Sing Sing prison, with a view to demonstrating the value of kindness in prison reform. She filled this post successfully for four years, and in 1848 became connected with the Institute for the Blind in Boston. She next spent eight years in California, and in 1859 organized a society to aid women to emigrate to the West. She died in New York, Dec. 15, 1864. E.E.T.

FARNHAM, ROSWELL, statesman, was born in Boston on July 23, 1827, was taken by his parents to Brattleboro, Vt., in his boyhood, and was graduated from the University of Vermont in 1849. He became a lawyer and filled local offices in Vermont, was a soldier and lieutenant-colonel in the Civil War, served in the Vermont legislature in 1868–69, was a member of the State board of education in 1873–75, and was governor of the State in 1880–82. He died on January 5, 1903. W.F.J.

FARNHAM, THOMAS J., an American traveller and author; born in Vermont in 1804. At first a lawyer, he led a band of pioneers across the continent to Oregon in 1839. He went to California the same year, and was instrumental in securing the release of a number of American and English prisoners detained by the Mexican government. He published *Travels in Oregon Territory* (1842); *Travels in California and Scenes in the Pacific;* etc. He died in California in September, 1848 E.E.T.

FARO, a game of cards in which the players bet on the order in which the cards will appear when taken singly from the box in which they are placed by the dealer, who is also the banker. A long table is required, at the middle of which, at one side, sits the dealer. In front of him is the box in which he places the cards, face up, after shuffling. The faro-box has a slit at one end, through which the dealer can slide the cards one at a time; there is, also, a spring, which keeps the cards level with the slit. At the right of the dealer the checks used for betting are piled, and at this end, also, is the "case-keeper," an arrangement by means of which each "turn" of two cards may be recorded for the benefit of the players. Any player may be case-keeper, the name applying to the person as well as the device. The players sit around the table, on three sides, and any may keep tally of the turn of the cards for himself. On the table itself is the "lay-out," or representations of the cards thereon, arranged in duplicate, one set on each end of the table, to accommodate all the players. The cards represented number thirteen, from the ace up to the king, in regular order. The players make their bets upon the cards which they think may appear, and bets may be placed on any number of cards by the same player. The top card is then removed from the box by the dealer; this card is called the "soda" card, and does not count in the game. The dealer places it to his right. He then removes the next card, which "loses," and places it above the soda card. The dealer claims all bets made by the players on this card, unless it is "coppered." The third card, which "wins," and upon which the dealer has to pay sums equal to those wagered by the players, is removed and placed to the left of the losing or soda cards. The game then proceeds in the same way, the fourth card losing and placed on the soda pile, and the fifth winning and placed on the winning pile. But sometimes the losing and the winning cards are of the same denomination, in which case they are called "split," and in all such cases the better loses half his stake. Again, any card may be "coppered," by placing a copper, button or other recognized article on the card, and this changes the bet, so that if the card would ordinarily have lost, it now wins, and *vice versa*. The "showing" of two cards is a "turn"; and after each turn, new bets are made for another, and this continues to the last three cards in the pack. The only betting allowed after this is termed "calling the turn," or guessing which card will show first, or guessing the order in which the last two cards will show. The last card is called the "hock" card; hence "from soda to hock" has become a synonym for "from first to last." There are different ways of betting on the last turn. The game is played as above in America, and substantially in the same manner in Europe. The origin of the name is supposed to be due to a former representation of a figure of Pharaoh on one of the cards.

FARR, WILLIAM, an English medical statistician; born at Kenley, Shropshire, Nov. 30, 1807; died in London, April 14, 1883. He studied medicine at the universities of Paris and London; graduated from University College in 1833, and devoted himself to the study of vital statistics. Through his efforts, great improvement was made in the collection of data for that department; the registration of all the deaths in England, and their causes, was begun, and Dr. Farr was given a position in the registrar's office. He was assistant census commissioner of Great Britain from 1851 to 1881; in 1855 was elected a fellow of the Royal Society; and in 1859 received from the University of Oxford the degree of D.C.L. He was a frequent contributor to the *British Annals of Medicine;* and his paper on *The Construction of Life Tables* (1859), his introduction to the *English Life Tables* (1864), and *Statistical Nosology*, are of great value.

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FARRAR, FREDERIC WILLIAM, an English preacher and author, dean of Canterbury since 1895, chaplain to the Speaker of the House of Commons (1890–95), and chaplain in ordinary to the Queen; was born in Bombay, India, Aug. 7, 1831. He was educated at King's College, London; became a classical exhibitioner of the University of London, and was successively a scholar and fellow of Trinity College, Cambridge, gaining, among other university honors, the chancellor's prize for English verse. He became a deacon of the English Church in 1854, and three years later was admitted into priest's orders. For sixteen years he was a master at Harrow, and in 1871–76 held with distinction the head-mastership of Marlborough College. At Cambridge, Dr. Farrar was a select preacher before the university, and in 1870 delivered the Hulsean lectures, published as *The Witness of History to Christ* (1870). In 1876 he became rector of St. Margaret's, London, and canon of Westminster; and in 1883 archdeacon of Westminster and rural dean. As an author, Dr. Farrar first came into note by his stories of school life, *Eric; or, Little by Little* (1858); *Julian Home* (1859); and *St. Winifred's; or, The World of School* (1862); and by a series of philological works, the chief of which are *Chapters on Language* and *Families of Speech*, (rev. ed. in 1 vol., 1878). His educational works embrace *Greek Grammar Rules* (6th ed., 1865); *Greek Syntax* (3d ed., 1867); *Public School Education* (a lecture with notes, 1867); and an edited volume of *Essays on a Liberal Education* (1868). His theological works are marked by great Biblical erudition and a florid, rhetorical style. The best known are: *Life of Christ* (1874); *Life of St. Paul* (1879); *The Early Days of Christianity* (1882); *Seekers After God* (1883); *Solomon: His Life and Times* (1887). In 1878 appeared *Eternal Hope*, in which its author opened the door of hope to friends of the impenitent dead. The most important of his volumes of sermons are: *The Fall of Man* (1865); *The Silence and Voices of God* (1873); *The Messages of the Books* (1885); *Every-Day Christian Life* (1887); *In the Days of Thy Youth*, and *The Voice from Sinai* (1892); *Sermons* (1893); and *The Second Book of Kings* (1894). He also delivered the Bampton lectures for 1885, on *The History of Interpretation;* and wrote *Sketches of Church History* (1889); *Lives of the Fathers* (2 vols., 1889); *Places that Our Lord Loved* (1891); *Social and Present Day Questions* (1891); *The Life of Christ as Represented in Art* (1894); *The Young Man Master of Himself* (1897); *The Bible, Its Meaning and Supremacy* (1897); *The Herods* (1897); and *The Life of Lives* (1899). *Darkness and Dawn* (1892) is a story of Nero's time; and *Gathering Clouds* (1895) of Chrysostom's. Dr. Farrar's popularity as a writer has hardly kept pace with his literary productiveness, except in the case of his eloquent *Life of Christ*, of which edition after edition appears, together with numberless translations. Died in London, March 23, 1903.

DEAN FARRAR.

FARRAR, HENRY, an American artist; born in London, England, March 23, 1844. His father was Thomas Farrar an English miniature painter. He removed to New York in 1863, first gained distinction for his water colors, and afterwards took high rank as a landscape painter. He is also widely known as an etcher. He is a member of the New York Etching Club and of the American Water Color Society. He won a medal at the Paris Exposition in 1878. W.M.C.

FARRER, LORD, an English economist, free-trader, and administrator, was born in London, June 24, 1819, and died at Dorking, Oct. 12, 1899. The son of an eminent lawyer he was educated at Eton and Oxford, was called to the bar in 1844, and in 1850 was appointed assistant-secretary of the Marine Department of the Board of Trade. Later on he became permanent secretary of the Board and greatly influenced many of its important decisions. In 1883 he was made a baronet and ten years later was raised to the peerage for distinguished public services. He was stoutly opposed to protection, an advocate of the gold standard, and an adviser of the Crown in regard to commercial treaties. He was for a time president of the Cobden Club, and vice-chairman on the London County Council. He wrote *Studies in Currency*, and *Free Trade v. Fair Trade.*

FARRIERY. See SHOES, HORSE, Vol. XXI, p. 870.

FARSAN ARCHIPELAGO. See RED SEA, Vol. XX, p. 329.

FARTHINGS. See MONEY, Vol. XVI, p. 760; NUMISMATICS, Vol. XVII, p. 674.

FARWELL, CHARLES BENJAMIN, was born in Steuben County, N. Y., on July 1, 1823, and at the age of fifteen went to Illinois and became a surveyor and farmer. In 1844 he settled at Chicago, became a bank teller, and county clerk, and in 1861 became a member of the mercantile firm of J. V. Farwell & Co. When that concern was incorporated in 1891 he was elected its president. He began a useful career in Congress in 1871, paying especial attention to fiscal legislation. He was elected to the United States Senate in 1887, and served until March, 1891. W.F.J.

CHARLES B. FARWELL.

FARWELL, JOHN VILLIERS, was born in Steuben County, N. Y., on July 29, 1825, removed to Illinois in 1838, and in 1861 established one of the greatest dry-goods houses in the West. He was a member of the U. S. Christian Commission during the Civil War, was an Indian commissioner in President Grant's first term, was a great benefactor of the Young Men's Christian Associa-

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tion and generously supported the work of the late D. L. Moody. He died in 1903. W.F.J.

FASHODA, a town on an island in the White Nile, 60 miles below the mouth of the Sobat tributary. It was founded by the Egyptian government in 1867 and made the capital of the neighboring province, the Shilluk territory. Since 1885, when the Mahdi overthrew Egyptian rule in the Sudan, Fashoda and the other Egyptian posts on the waterways of the Upper Nile had to be abandoned. Taking advantage of this, and actuated by jealousy of England in her attempt to recover the Sudan for Egypt and civilization, France encouraged a scientific expedition, under Major Marchand (which had entered the Sudan from French Kongo), to occupy the Bahr-el-Ghazal region and plant the tricolor at Fashoda. This Major Marchand did in July, 1898, and when the Khalifa had been defeated at Omdurman, on September 2d of that year, General (afterwards Lord) Kitchener heard of the French occupation of the territory which had been Egypt's, and he proceeded thither in a British gunboat and demanded the withdrawal of the French from the region. The demand was not complied with, Marchand averring that he could not withdraw without instructions from his government, and that he was there on the strength of a treaty with the chiefs of the neighboring Shilluk tribe, who had placed themselves under the protection of France. Though Marchand was unable to defend the post or even protect himself from Dervish attack, General Kitchener left him and his small following unmolested, and contented himself with serving a protest upon Marchand for illegal occupation, since the region was Egyptian territory recovered with the aid of British arms. Kitchener raised over Fashoda the Egyptian and British flags, and leaving a garrison to occupy the place and the neighboring post of Sobat, he descended the Nile to Khartum and made report to the British authorities at Cairo and London. Marchand similarly reported to Paris, and the question for a time vexed the diplomatic mind of the two countries and threatened war. Finally the matter was settled by France ordering Marchand and his expedition to evacuate Fashoda, the announcement being made by Lord Salisbury at a Guildhall dinner in London in honor of Gen. Kitchener, Nov. 5, 1898.

FATIGUE OF METALS. See STRENGTH OF MATERIALS, Vol. XXII, p. 632.

FAUCIT, HELEN. See MARTIN, LADY THEODORE, in these Supplements.

FAUGÈRE, ARMAND PROSPER, a French writer; born at Bergerac, Dordogne, Feb. 10, 1810; died in 1888. He was for some time employed in the department of public instruction, and subsequently became director of the archives in the Bureau of Foreign Affairs. He published *Éloge de Blaise Pascal* (1842); *Pensées, Fragments et Lettres de Blaise Pascal*, restored to their original form (1844); *Mémoires de Madame Roland* (1864); and *Fragments de Littérature Morale et Politique* (1865).

FAULKNER, CHARLES JAMES, SR., an American statesman; born in Martinsburg, Va., in 1806. He was a member of the Virginia House of Representatives, 1831; State senator, 1841–44; member of the National House of Representatives, 1851–59 and 1875–77; minister to France, 1859; returned to the United States in 1861, and was arrested, but was later exchanged. He died in Martinsburg, Nov. 1, 1884. E.E.T.

FAULKNER, CHARLES JAMES, JR., an American statesman; born in Martinsburg, W. Va., Sept. 21, 1847. In 1862 he entered the Virginia Military Academy at Lexington, and served in the Confederate army. In September, 1868, he was admitted to the bar; and in 1879 was elected circuit judge in West Virginia. In 1887 and 1893 he was elected United States senator from that State, as a Democrat. In July, 1898, he was appointed a member of the Canadian-American Joint Commission. E.E.T.

FAULKNER'S ISLAND, a small island in Long Island Sound, near Guilford, Connecticut, but belonging to New York state. It is chiefly valuable as the site of a lighthouse. W.F.J.

FAULT. See GEOLOGY, Vol. X, pp. 233, 267, 330.

FAUQUIER WHITE SULPHUR SPRINGS, in Fauquier Co., Va., 56 miles S.W. of Washington, D. C.; is delightfully situated, and the waters are of much value in certain chronic diseases. The buildings were mostly destroyed during the war.

FAURE, FRANÇOIS FELIX, President of the French Republic, was born in Paris on January 30, 1841, and became a manufacturer and president of the Chamber of Commerce at Havre. During the war of 1870–71 he commanded a battalion of the Guard Mobile, and went to Paris to aid in suppressing the Commune. He began his Parliamentary career in 1881, when he was elected a deputy from Havre, as a Gambettist Republican, and in the fall of that year he became an under-secretary of state in the ministry of commerce and the colonies in the cabinet headed by Gambetta. He retired on the fall of that cabinet in 1882, but was recalled to the same place under the Ferry Ministry in 1883, and served until that ministry fell in 1885. A third time he was installed in the same place under the Tirard Ministry, in 1888. He was minister of marine in the Dupuy Cabinet of 1894, and was elected vice-president of the chamber of deputies. Upon the inglorious resignation of Casimir-Perier from the Presidency of the Republic, in January, 1895, Felix Faure was elected to succeed him, receiving 430 votes to 361 cast for Henri Brisson. His administration was pure and dignified, but labor troubles of an aggravated kind prevailed and the Dreyfus case was a cause of much political recrimination and unrest. Various anti-Jewish and anti-Republican conspiracies were also rife. With these the President dealt judiciously, though not always with the strength

F. F. FAURE.

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and decision which many thought the emergencies demanded. The labors and trials of his office told seriously upon his health, and an attempt to murder him in 1896 was an additional shock to him. He died on February 16, 1899. W.F.J.

FAUSTIN I, FAUSTIN ELIE SOULOUQUE (1785–1867), emperor of Hayti. See HAYTI, Vol. XI, p. 487.

FAVIGNANA, Italy, the largest of the Ægades islands, 6 miles from the west coast of Sicily. San Giacomo, the chief town, is on the north coast; the town and fortress of San Leonardo stand on a fine bay on the east. Building stone, animal products, and prepared tunny and anchovies are exported. C.L.S.

FAVONIUS, the personification of the west wind; also known as Zephyrus. According to Greek mythology he was the son of Astræus and Eos, and presided over the growth of fruits and flowers. He was represented as a youth crowned with a wreath of flowers. R.W.C.

FAVOSITIDÆ, the family of honeycomb corals. The skeleton consists of hollow prismatic columns, pierced by numerous holes and divided by septa into a vertical series of cells. These columns are closely set in more or less hemispherical masses. These corals are characteristic of Carboniferous and Devonian formations.

FAVRE, GABRIEL CLAUDE JULES, a French politician; born in Lyons, March 21, 1809; became, in 1848, Secretary-General of the Ministry of the Interior, and was also Under-Secretary in the Ministry of Foreign Affairs. From 1863–68 he became the real leader of those antagonistic to the second empire. On April 23, 1868, he was elected to the French Academy. At the session of July 15, 1870, which declared war against Prussia, he voted against all war measures. After the battle of Sedan he moved for the deposition of the Napoleonic dynasty and for the appointment of national defenses, and became Minister of Foreign Affairs. In this capacity he took a prominent part in the peace preliminaries with Germany, Jan. 28, 1871. Feb. 8, elected to the National Assembly, he was appointed Minister of Foreign Affairs by Thiers. He signed the treaty of peace with Germany at Frankfort-on-the-Main, March 10. He retired July 22, was re-elected a Senator for the Department of the Rhone, 1876, and died in Versailles, Jan. 19, 1880. G.A.S.

FAVUS OR SCALD HEAD. See MEDICINE, Vol. XV, p. 826; and PARASITISM, Vol. XVIII, p. 274.

FAWCETT, EDGAR, an American novelist and poet; born in New York city, May 26, 1847. He was graduated from Columbia College in 1867 and began contributing verse and short stories to the magazines. His first novel was published in 1873 and he soon became well known as a writer of society fiction. He spent most of his life in Europe. His poetical works include *Short Poems for Short People* (1872); *Fantasy and Passion* (1877); *Song and Story* (1884); *Romance and Revery* (1886); *The New King Arthur; Songs of Doubts and Dreams* (1889). Among his more important novels are *Purple and Fine Linen* (1873); *A Hopeless Case* (1880), *A Gentleman of Leisure* (1881); *An Ambitious Woman* (1883); *Rutherford* (1884); *Tinkling Cymbals* (1884); *The Adventures of a Widow* (1884); *Social Silhouettes* (1885); *The Confessions of Claude* (1886); *The House at High Bridge* (1887); *A Man's Will* (1888); *Olivia Delaplaine* (1888); *Fabian Dimitry* (1890); *An Heir to Millions* (1892); *Women Must Weep* (1892); *A Mild Barbarian* (1894); *Outrageous Fortune* (1894). He died in London, England, May 2, 1904. W.M.C.

FAWCETT, HENRY, an English politician and economist; born Aug. 26, 1833, in Salisbury; studied at Cambridge. While hunting he lost the sight of both eyes, but continued his studies. In 1863 he published *Manual of Political Economy*, when he was appointed professor of political economy at Cambridge. In 1865 he was elected to Parliament where he sided with the Radicals and where he became prominent by his learning, his judgment and his eloquence. In 1876 he took a prominent part in the opposition to Beaconsfield's policy in the Orient, and became in 1880 postmaster-general under Gladstone. He introduced the parcels-express. He died on Nov. 6, 1884. Among his writings are *Pauperism, Its Causes and Remedies* (1871); *Essays and Lectures on Social and Political Subjects* (1872); *Speeches on Some Current Political Questions* (1873); *Indian Finance* (1880); *State Socialism and the Nationalization of the Land* (1883). G.A.S.

FAWCETT, MILLICENT GARRETT, an English authoress; born at Aldeburg, Suffolk, June 11, 1847. She is the widow of the late Henry Fawcett, Postmaster-General, described in the preceding article, and takes a front rank among the leaders in the woman's suffrage movement in England. She assisted her husband in the compiling of his works, and established her reputation as a writer on diverse subjects by numerous publications. Among them are to be mentioned *Political Economy for Beginners* (1870), 6th edition in 1887, translated into German (Berlin, 1888); *Life of Queen Victoria* (2d edition, 1892); *Essays and Lectures*, jointly with Henry Fawcett (1872); *Some Eminent Women of Our Times* (1889); *Tales in Political Economy* (1870); *Life of Sir William Molesworth* (1901). G.A.S.

FAWCETT, PHILIPPA GARRETT, is a daughter of the late Henry Fawcett, British statesman, and his wife Millicent Garrett Fawcett, author and philanthropist. She was born in England in 1868, entered the University of Cambridge, and distinguished herself by her scholarship there, being in the mathematical tripos of 1890 declared to stand "above the senior wrangler." This achievement of hers had a marked effect upon the course of higher education for women in England. W.F.J.

FAY, THEODORE SEDGWICK, author and diplomat; was born in New York on February 10, 1807, and was admitted to the bar in 1838. He soon began writing for *The New York Mirror*,

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ent several years in European travel, and de-
ted himself to literary work. He was U. S.
cretary of legation at Berlin from 1837 to 1853,
d in 1853 became minister to Switzerland,
here he spent several years. He wrote *Dreams*
d Reveries of a Quiet Man, *The Minute Book*,
orman Leslie, *Countess Ida*, *Hoboken: A Ro-*
ance of New York, *Ulric, or The Voices*, *The*
hree Germanys, *Great Outlines of Geography*,
iews of Christianity, *Forty Dollars and the*
oots, *History of Switzerland*, and other works
poetry and prose which are highly esteemed as
luable contributions to literature and scientific
formation. He was also a voluminous contribu-
r to periodical literature. He spent the last
ars of his life in Berlin, and died there on
ovember 17, 1898. W.F.J.

FAYAL. See AZORES, Vol. III, p. 147.

FAYE, HERVÉ AUGUSTE ÉTIENNE ALBANS, tronomer; was born in France on October 1, 14, became a student in the Paris Observatory, d on November 22, 1843, discovered a new met. He received the Lalande prize from the cademy of Sciences in 1846 for a paper on stellar rallax, and was elected to that academy in place Baron Damoiseau in 1847. He received the oss of the Legion of Honor in 1843, and in 1864 as made an officer of the legion. He was a rofessor in the École Polytechnique in 1848–54, ctor of the University Academy of Nancy in 54–73, and professor in the École Polytech-que again in 1873. W.F.J.

FAYERWEATHER, DANIEL B., an American hilanthropist; born at Stepney, Connecticut, in 21. At an early age he learned the trade of a oemaker, and at 34 became a member of a firm leather dealers in New York city. That move as the beginning of his success, and at the time of is death he represented the largest hide and ather business in New York, if not of the world. e died in New York, Nov. 15, 1890, and left an state estimated at six million dollars, the bulk of hich was bequeathed to various institutions of arning.

FAYETTE, a village of Fayette County, north-astern Iowa, on the Volga River, and on the Chi-ago, Milwaukee and St. Paul railroad, 58 miles .W. of Dubuque. It is an agricultural and stock-aising center, and has wagon and carriage factories nd creameries. It is the seat of Upper Iowa Uni-ersity, a co-educational Methodist Episcopal insti-ution founded in 1857. It has 22 instructors, 450 upils, a library of 5,500 volumes and $43,000 in roductive funds. Population, 1900, 1,315.

FAYETTE, a city and the county seat of loward County, Missouri, in the central part of he state. It lies on the Bonne Femme River a mall tributary of the Missouri River, twelve iles from the latter, and about midway between t. Louis and Kansas City. It is the seat of loward-Payne and Central colleges, contains everal mills and factories, and is the center of an gricultural and mining district. It is reached y the Missouri, Kansas and Texas railroad, and ad in 1900 a population of 2,717. W.F.J.

FAYETTEVILLE, Arkansas, is a city and the county seat of Washington County, in the northwestern part of the state, among the Ozark Mountains. It is the seat of the Arkansas Industrial University, and of some factories, and is a pleasure and health resort. It is reached by the St. Louis and San Francisco railroad. Its population in 1900 was 4,061. W.F.J.

FAYETTEVILLE, New York, is a village of Onondaga County, in the central part of the state, ten miles east of Syracuse and the same distance south of Oneida Lake. It has a large variety of industries, including canning, flour mills, paper mills, and lime, cement and plaster mills. It is on the West Shore railroad and near the Erie Canal and New York Central and Hudson River railroad. Its population in 1900 was 1,304. W.F.J.

FAYETTEVILLE, North Carolina, a town and the county seat of Cumberland County, in the south-central part of the state. For many years it was the capital of the state, and its chief inland city. Its industries include a rolling mill, vehicle factories and cotton mills. It is the site of the State Colored Normal School. It lies at the intersection of the Atlantic Coast Line and the Cape Fear and Yadkin Valley railroads. Its population was 4,222 in 1890 and 4,670 in 1900. See also under FAYETTEVILLE, Vol. IX, p. 52. W.F.J.

FAYETTEVILLE, Tennessee, a town and the county seat of Lincoln County, near the center of the "southern tier" of the state. It lies on Elk River, a tributary of the Tennessee, in an agricultural region chiefly devoted to corn and cotton. It has some manufactories of woolen cloths and of vehicles. It is seventy miles south of Nashville, and is reached by the Nashville, Chattanooga and St. Louis railroad. Its population in 1900 was 2,708. W.F.J.

FAYRER, SIR JOSEPH, an English surgeon-general; born in Plymouth, Dec. 2, 1824. He studied at London and Edinburgh; accompanied the English army on its expedition to Burma, and saw service during the Indian mutiny, when he distinguished himself at the defense of Lucknow. From 1874–95 he was president of the medical college of the Indian Office, physician to the late Duke of Edinburgh, and became, 1901, physician extraordinary to the king. He published *Clinical and Pathological Observations in India; With the Princes in India; Life of Sir R. Martin; Recollections of My Life; Tropical Diseases; Thanatophidia of India*, etc. G.A.S.

FAYUM, a province of Upper Egypt, with an area of 500 sq. miles and a population of 371,000; in ancient times irrigated by the Lake of Moeris. Its chief city is Medinêt-el-Fayum, with 33,000 inhabitants, an American mission house, a large bazaar and an ancient mosque. G.A.S.

FAZY, JAMES, a Swiss statesman; born at Geneva, May 12, 1796; studied law and political economy at Paris, and sided with the opposition to the Bourbons. On account of persecution of the Democratic press under Louis Philippe, he, in 1833,

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returned to Geneva, where he became one of the foremost leaders of the radical party. As such he wielded a great influence on the affairs of Geneva, and of the Swiss Diet and Federal Council. In 1862, however, he was defeated at the election for the Federal Council. After having been imprisoned for his participation in the uprising of 1864, he fled from Geneva, but returned to his native place, where he died, Nov. 5, 1878. G.A.S.

FEAR, CAPE, a point of Smith's Island, Brunswick County, North Carolina, forming the southern extremity of that state. W.F.J.

FEAST. See FESTIVAL, Vol. IX, p. 99.

FEATHERFOIL, WATER FEATHER OR WATER VIOLET, aquatic herbs rooting in the mud, or floating with large pinnatifid submersed crowded leaves and small white or purplish flowers. *Hottonia inflata* is the American featherfoil, having stem entirely submerged as also the spongy sessile leaves. The hollow flower stalks bear the flowers in clusters at end of stem above the water, native to the eastern United States. W.R.B.

FEATHER-GRASS (*Stipa pennata*), a well-known species of grass, characterized by beautifully feathered awns, sometimes a foot in length, which if gathered before the seeds are ripe the awns remain attached to the stalks and will retain their beauty throughout the winter, forming a pleasing decoration to rooms. W.R.B.

FEATHER RIVER, a river of northern California, a feeder of the Sacramento. It rises in two forks, in Plumas County, in the Sierra Nevada, and has a southerly course of about 250 miles. Large quantities of gold have been found on its bars.

FEATHER-STAR. See ECHINODERMATA, Vol. VII, p. 550.

FEATHERSTONHAUGH, GEORGE WILLIAM, was the author of a geological report made in 1834, on the country between the Missouri and Red rivers, of *Observations Upon the Treaty of Washington* (meaning the Ashburton treaty), in 1842, which latter attracted attention abroad and was reviewed at length in *The London Quarterly Review;* and of *An Excursion Through the Slave States*, of which *The London New Monthly Magazine* said: "The notices of the natural history and the mines are novel and interesting, and his pictures of the heroes of the bowie knife remarkably characteristic and entertaining." He was the author of various other books of travel and adventure, including an account of a canoe journey in the northwest. He was one of the British commissioners for marking the United States-Canadian boundary, spent the closing years of his life in the British consular service, and died in 1866. W.F.J.

FEBRICULA OR EPHEMERAL FEVER, a fever of short duration and mild character, having no distinct type or specific symptoms by which it can be distinguished or described. Simple treatment, as cooling drinks and sometimes enemas, is generally sufficient to reduce the fever.

FEBRONIANISM. See HONTHEIM, JOHANN NIKOLAS VON, Vol. XII, p. 147; and POPEDOM, Vol. XIX, p. 522.

FECHNER, GUSTAVE THEODORE, an eminent German physicist and scientist; was born in Germany on April 19, 1805, was educated at Leipsic, and for several years was professor in the university there. His sight failing, he retired from his chair and devoted his attention to anthropology and other topics. He was one of the founders of the modern sciences of psychology and psychophysics, and wrote a number of elaborate treatises on ethics, physics, psychology and mathematics. He died on November 19, 1887. W.F.J.

FECHTER, CHARLES, actor, was born in London on October 23, 1823, and spent his boyhood in France where he was educated as a sculptor. In 1840 he went upon the stage and soon won much success, in both tragedy and comedy. He made his debut upon the English stage in London in 1860, in *Ruy Blas*, and was most favorably received, and afterward startled the critics and public with his original performances of Hamlet and Othello, departing widely from all traditions of those parts and "playing Hamlet in a red wig." In 1869 he came to America, played much in New York and Boston, repeating the successes of his French and English careers, and spent the remainder of his life here. He died on August 5, 1879. W.F.J.

FECUNDATION. See REPRODUCTION, Vol. XX, pp. 437–441.

FEDERALIST, a collection of papers first published in the *Independent Journal* of New York City, by Hamilton, Madison and Jay, from October, 1787, until March, 1788. They were 85 in number, and appeared under a joint signature, "A Citizen of New York," at first, afterward "Publius." These papers did much to secure the ratification of the constitution.

FEDERALIST PARTY. When the constitution of the United States had been framed by the convention and sent by the Continental Congress to the states (1787) for ratification or rejection, those who favored its acceptance were called Federalists, and those who opposed it Antifederalists.

After the constitution became "the supreme law of the land," the term *Antifederalist* gradually ceased to have any significance, but the term *Federalist* continued to be used, and was applied to the party in control of the Federal government.

Led by Washington, Adams, Hamilton, Jay, Fisher Ames, Pickering and Morris, it established the machinery of the new government, organized the supreme, circuit and district courts; created the Departments of State, Treasury and War; funded the old Continental Congress debt; assumed and funded the debts of the states caused by the Revolution; made preparation for the payment of the money borrowed from France, Holland and Spain and in 1791 chartered the first bank of the United States.

Each one of these measures was, of course, attended with opposition, and out of this opposition grew the Republican party, with Jefferson, Madison, Monroe, John Randolph, B. F. Bache, Elbridge Gerry and Albert Gallatin as leaders and organizers.

The Southern and agricultural states, under the lead of Madison, objected to funding the Continental debt at its face value, and resisted the assump-

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tion of the state debts on any terms. So strong was the opposition, that, in order to carry these measures, the Federalists were forced to purchase the support of Southern members by consenting to locate the site of the national capital on the banks of the Potomac River. The national debt thus created amounted, in round numbers, to seventy-five million dollars, and was the first great financial measure of the Federalists.

The second was the founding of the Bank of the United States, with a capital of ten million dollars, and power to establish branches in as many cities and towns as the directors thought fit. That Congress had a right to charter a bank was denied by many, because no such power was expressly given by the constitution of the United States. Madison and Jefferson declared there were but two classes of powers: those expressly granted, and those absolutely necessary to carry out the expressly granted powers. Hamilton and Washington and the Federalists added a third class of resultant powers, by which they meant such as could be deduced or implied from the general character of the constitution.

The third part of their financial policy was the system of taxation. They began, in 1789, with duties on imports; but the unforeseen expenses of government, and an Indian war which broke out in Ohio, forced them to increase these as much as they dared, and then gather an internal revenue by taxes on snuff, refined sugar, carriages and domestic distilled whisky.

Each one of these measures had been carried by a strictly sectional vote, and developed so much opposition in the South and in the agricultural sections of the North, that Jefferson and Madison seized the occasion and organized the Republican party.

Though this party sprang from difference of opinion as to the wisdom of certain domestic measures, it was hardly organized when a new cause of opposition was found in the foreign policy of the Federalists. Early in 1793 France declared war on Great Britain, and sent the first minister from the French Republic to the United States, which at that time had no treaty with Great Britain, and was bound by a treaty of alliance with France. Construing this to be a defensive treaty, Washington issued his proclamation of neutrality, and drove hosts of voters into the Republican ranks.

In Congress the Republicans, who now commanded a small majority in the House of Representatives, attempted (1794) to carry through measures hostile to England, which so alarmed Washington, that, with the approval of the Senate, John Jay was sent to London to negotiate a treaty of amity and commerce. This famous treaty was sent to the Senate in June, 1795; was ratified by a vote of 20 to 10; was publicly burned by the Republicans all over the land, and brought upon Washington the most violent abuse.

As he would not accept a third term, the Presidential election of 1796 was contested for the first time. No formal nomination was made, but it was known that Jefferson and Burr were the choice of the Republicans, and John Adams and Thomas Pinckney of the Federalists. The Twelfth Amendment did not exist and Adams having received 71 votes and Jefferson 68, they became, respectively, President and Vice-President.

Scarcely had they been inaugurated when the French Directory, angry at the ratification of Jay's treaty, refused to receive C. C. Pinckney as minister from the United States, and expelled him from France. When, in the interest of peace, a special mission of three envoys (John Marshall, Elbridge Gerry and C. C. Pinckney) was sent, they, too, were dismissed.

So devoted was the Republican party to the cause of France, that, in spite of this treatment, the Federalists were unable to carry a bill to arm American vessels. Indeed, it was not till the Senate ordered the dispatches of the envoys to be published that the popular indignation was aroused. From these dispatches it appeared that, on reaching Paris, the Americans had been approached by agents of the Directory and told that before they could be received they must pay each of the five Directors $50,000, and promise to make a loan to France. When this was known, the outburst of popular wrath swept away all opposition and left the Federalists in full control. Using their new power, they (1798) suspended the French treaties; created the Navy Department; gathered a navy; ordered a provisional army to be raised; passed the Alien and Sedition laws, and from 1798 to 1800 carried on a naval warfare against France, in which privateers, armed merchantmen and naval vessels took part.

The elections of 1798 gave the Federalists a majority in the Seventh Congress (1799–1801); but their career was run. The tremendous stretch of power involved in the passage of the Alien and Sedition laws the vigorous prosecution, under the Sedition law, of the editors of Republican newspapers, and the rapid decline of the excitement over the conduct of France, turned the tide, and in 1800 the Republicans defeated John Adams and C. C. Pinckney, the Federalist candidates, and elected Thomas Jefferson and Aaron Burr President and Vice-President.

Thus driven from the control of national affairs, the Federalist party rapidly declined. In 1804 it carried but two states (Connecticut and Delaware) and two electors in Maryland.

Hatred of the embargo (1807–09) enabled them to carry five states in 1808, which the bitter opposition to the War of 1812–15 increased to seven in 1812; but the number of Federalist states fell to three in 1816, after which the party ceased to nominate Presidential candidates, and disappeared utterly from national political history.

J. B. McMaster.

FEDERALIST THEOLOGY. See Theology, Vol. XXIII, p. 288; Coccеius, Vol. VI, p. 84.

FEDERALSBURG, a village of Caroline County, eastern Maryland, on Nanticoke River, and on the Philadelphia, Wilmington and Baltimore railroad, in the center of the great peach peninsula. Fruit-raising and the making of fruit-baskets are the chief occupations. Population 1900, 539.

FEDERATION OF LABOR, American. See Labor Organizations, in these Supplements.

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FEEHAN, PATRICK A., an American Catholic prelate; born at Killenaul, County Tipperary, Ireland, Aug. 29, 1829. Entering Castle Knock College at the age of 16 years, he studied there for two years and then entered Maynooth College, where he studied philosophy and theology for five years, and where, upon his graduation, he was offered a professorship. Emigrating to America in 1852 he entered the Ecclesiastical Seminary at Carondelet, where he was ordained priest November 1st of that year. He labored as priest and teacher for 12 years under Archbishop Kendrick of the see of St. Louis, becoming professor of moral theology and sacred scripture in the Seminary of Carondelet. He became bishop of the see of Nashville in 1865, and found that diocese almost completely demoralized and deeply in debt as a result of the war. Despite the great yellow-fever epidemic that swept over the diocese at the very beginning of his incumbency, he rehabilitated and wonderfully developed the see of Nashville, showing such remarkable ability as far surpassed even the expectations of those on whose recommendation he had been assigned to that diocese, and it was in recognition of this that he was appointed the first archbishop of the arch-diocese of Chicago, in 1880. Died July 12, 1902.

ARCHBISHOP FEEHAN.

FEELING, MENTAL. See PSYCHOLOGY, Vol. XX, pp. 71–79.

FEIA, Brazil, a large shallow lake in the province of Rio de Janeiro, near the Atlantic, with which it connects by the Furado, an artificial channel. It has an area of about 200 square miles; the town of Campos on its north shore is 130 miles northeast of Rio de Janeiro. C.L.S.

FEIJO, DIEGO ANTONIO, a Brazilian statesman; born in Itu, Province of São Paulo. At first a priest, distinguished by his eloquence as a pulpit orator, he turned to politics and was a deputy to the Cortes convened in Portugal. When the Brazilian declaration of independence was made known at Lisbon, he fled to England, studied the political institutions of that country, and returned to Brazil. He became a member of the legislative assembly and exerted his influence to depose Dom Pedro. After the revolution of 1831 he held almost supreme power, though his office was only that of minister of justice. He ultimately became a champion of constitutional monarchy. In 1832 he became a senator for Rio de Janeiro; and in 1834 was appointed bishop of Marianna and regent of Brazil for four years. He died in 1843. E.E.T.

FELANICHE OR FELANITX, a town of the Spanish Balearic Isles in Majorca, 8 miles northwest of Colon, its port on the Mediterranean. It is a wine-producing and exporting center. Population, 11,800. C.L.S.

FELCH, ALPHEUS, an American public man; born in Limerick, Me., Sept. 28, 1806. He received a classical education, graduating at Bowdoin College in 1827; commenced the practice of law in Ann Arbor, Mich.; was a member of the Michigan House of Representatives, 1836–37; bank commissioner, 1838–39; was elected auditor-general in 1842, but resigned; judge of the supreme court, 1842–45; governor of Michigan, 1845–47; United States senator, 1847–53; member of the California Land Claims Commission under the treaty of Guadalupe Hidalgo, 1853–56; delegate to the national Democratic convention at Chicago in 1864; and, later, professor of law at the University of Michigan. He died at Ann Arbor, Michigan, June 13, 1896. E.E.T.

FELDSPAR OR FELSPAR. See GEOLOGY, Vol. X, p. 203; and MINERALOGY, Vol. XVI, p. 436.

FÉLIBRES (*Expositors*), lovers of ancient Provençal literature, who have done much, since their first organization in 1835, toward restoring the masterpieces of this most poetical language, which was undoubtedly at the head of European *belles-lettres* in the thirteenth and fourteenth centuries. To those ancient poems of the troubadours the modern Félibres have added some admirable productions of their own, due to the pens of Joseph Roumanille, Frédéric Mistral, Aubanel, Camille Reybaud, and others. The Félibrige, or the society composed of the Félibres, has its headquarters at Avignon, with branches in various parts of France, Spain and northern Italy. They foster the study of Provençal literature, publish an almanac, *Armana Prouvençau*, and a periodical, issued by one of the societies, entitled *Revue des Langues Romanes*, established in 1870. See also MISTRAL, in these Supplements.

FELICITAS, SAINT, a Roman matron martyred with her seven sons, A.D. 164, under Marcus Aurelius, because they refused to worship idols. St. Felicitas is commemorated in the Roman martyrology on the 23d of November, and the sons on the 10th of July, on which day their festival occurs. A woman of the same name suffered death with Saint Perpetua, A.D. 211, also for refusing to offer sacrifices to idols.

FELLAH. See EGYPT, Vol. VII, p. 626.

FELLAHIEH OR DORAK, a thriving manufacturing town in the province of Khoristan, southwestern Persia. By a canal uniting the river Dorak with the river Karun, considerable trade is carried on. Population, about 8,000.

FELLATAS OR FOULAHS. See AFRICA, Vol. I, p. 235.

FELLOW-SERVANTS, those who are engaged in the same service for the same employer. The general rule of law, is that one who is employed by another in a specified line of duty assumes the risks and perils which are necessarily incident to that employment, and if injured as a consequence of such risks and perils, the employer is, ordinarily, not answerable for such injury. The perils and risks resulting from the carelessness or negligence of a fellow-servant are among those assumed by an em-

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ployee. The rule as to fellow-servants was first applied n England in 1837, and its first application in the United States was made by the court of appeals of South Carolina in 1841, but before the decision of the English court was known there. Since that time the courts of the various states have almost universally followed the rule. The difficulty has been to determine properly when the rule applies. The reason for the rule seems to be, that when several persons are employed in a common enterprise, or in a common line of work, and the safety of each person so employed depends in a certain degree upon the care and attention which his fellow-workmen give to their duties, all the persons so employed are usually in a position to observe the conduct of the others, and if proper skill is not shown, may report such misconduct to their employer, and if the employer will not take the necessary precautions, by employing skillful and competent workmen, may leave his service. It s considered by the courts that, for these reasons, justice will be done to a greater extent by requiring workmen to assume the risk of injury by reason of he neglect of fellow-workmen than by permitting hem to resort to the common employer for indemnity. See EMPLOYERS' AND EMPLOYEES' LIABILITY, n these Supplements.

FELLOWSHIP, an ancient institution in European colleges and universities, and of recent adoption n educational institutions in America. In the universities of Cambridge and Oxford a fellow is chosen rom among the post-graduate students on account f special ability in some line of investigation. The ellowship carries with it certain privileges in the hoice of rooms in the college buildings, a share in ne government of the institution, and certain duties, uch as assisting in the work of instruction and in ne discipline of the undergraduates. Fellowships re of two classes—resident and traveling. The traveling-fellowship permits its holder to study at some ther British institution, or, more generally, at some 'ontinental university. A fellowship of either class resupposes that all work during the continuance of ne special term for which it is granted is to be done long one line. In England, fellowships are granted or one, two, or three years, or for life. All the expenses of the holder are paid from either the income f a special endowment or from the university general funds. In the United States, fellowships have een endowed by private means, to promote research long certain lines of study. Nominally, it is required of the fellow that he devote a portion of his me to giving instruction, and, in a few instances, s at Princeton College, that he take charge of a ection of the dormitories. There are traveling-fellowships in connection with all the higher schools. Among the institutions for men offering fellowships re Johns Hopkins, Harvard, Princeton, Cornell and ne University of Chicago; among those for women, ryn Mawr, Vassar and Wellesley. No one is eligible to a fellowship who has not been granted a aster's degree. There are, in the United States, rganizations of women, of which the Association of ollegiate Alumnæ is the principal, for aiding young omen in securing higher education. Several of ese organizations have collected funds, from the income of which they have established traveling European fellowships, to enable young women to secure the advantages of the European universities. These organizations are generally independent of any educational institution.

FELON. See WHITLOW, Vol. XXIV, p. 586.

FELSTONE OR FELSITE. See GRANITE, Vol. XI, p. 44.

FELTON, CORNELIUS CONWAY, an American educator; born in West Newbury, Mass., Nov. 6, 1807. He graduated at Harvard in 1827. He taught at the Livingston high school, Geneseo, N. Y., 1827–29, and in the latter year was appointed Latin tutor at Harvard. The following year he was appointed Greek tutor, and in 1832 was made college professor of Greek. In 1834 he received the appointment of Eliot professor of Greek literature, the duties of which position he continued to discharge until his election as president of the college. In 1853–54 he spent thirteen months in Europe, five of which were passed in Greece. He was a member of the Massachusetts Board of Education and a regent of the Smithsonian Institution. In 1858 he made a second visit to Europe, and continued his studies in Greek antiquities, etc. In 1860 he was chosen president of Harvard College. He published many Greek texts and was a frequent contributor to the reviews. He died in Chester, Pa., Feb. 26, 1862. E.E.T.

FELTON, SAMUEL MORSE, engineer and railroad officer, nephew of Cornelius Conway Felton (q. v.), was born in Philadelphia on February 3, 1853, the son of that Samuel Morse Felton who as a railroad manager in 1861 detected and baffled a plot for the interception and perhaps assassination of Abraham Lincoln when on his way to Washington to be inaugurated as President. The elder Felton was a civil engineer, and spent most of his life in railroad work, and his son followed his example. He was educated at the Massachusetts Institute of Technology, and entered railroad work in 1868. He has been connected with a number of prominent railroads, as superintendent, general manager, vice-president, and president, and has been the receiver of several embarrassed companies. He was president of the Eastern Tennessee, Virginia and Georgia road in 1890–92, of the Louisville Southern in 1891–93, of the Alabama Great Southern in 1891–93, of the Cincinnati, New Orleans and Pacific in 1890–99, and has been president of the Chicago and Alton since 1899. W.F.J.

FELUCCA, a vessel used in the Mediterranean, propelled by from 16 to 24 oars, and rigged with two lateen sails. It has frequently a rudder at each end, to be applied as occasion demands. During the wars between France and England, feluccas were armed with a heavy gun or two, and sent out as gunboats against the English ships.

FEMERN OR FEHMARN, Germany, a low-lying island of Schleswig-Holstein, in the Baltic Sea, separated by Femern Sound, one mile wide, from the mainland. The soil is fertile; grain is cultivated and cattle raised, but the chief sources of income are the fisheries and shipping. The

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principal town is Burg. Area, 65 square miles; population, 10,000. C.L.S.

FEMUR. See ANATOMY, Vol. I, p. 727.

FENCES, LAW OF. Under the common law, land-owners were not obliged to erect fences inclosing land for the purpose of preventing roaming cattle from trespassing, but might rely upon an action for damages against the owner of the trespassing animals. This rule is followed in some states of the United States, but in others, by statute, all land must be inclosed before damages can be recovered from the owner of stock which has injured another's premises. In most states the duty is imposed upon railroad companies to maintain fences along their lines, and in the absence of a compliance therewith, they are liable for any destruction of stock which they may cause. In many states the subject of division or partition fences is regulated by statutes. In such states the owners of adjacent tracts of land are bound to erect and maintain one half of a suitable fence along the line separating such tracts. In some states, fence-viewers or other officers are provided for to determine the just share of each party liable to maintain a partition-fence, and suitable methods are provided for enforcing their adjudications.

FENESTELLA OR FENESTRELLA, a genus of fossil polyzoa having the polypes arranged in a network or lacework. This is the type of a family which ranged from the Lower Silurian to the Permian.

FENIANISM. See IRELAND, Vol. XIII, p. 277; and HOME RULE, in these Supplements.

FENN, GEORGE MANVILLE, an English novelist; born in Westminster, Jan. 3, 1831; became a master in a country school; entered into business as a printer; issued a magazine in 1862, and was associated in the proprietorship of a provincial newspaper in 1864. He contributed short stories to *All the Year Round*, *Chambers's Journal*, *Once a Week*, and to a London evening newspaper, *The Star*, then edited by Justin McCarthy, for which he also wrote a series of articles, entitled *Readings by Starlight*, published in collected form in 1867. In 1870 he became editor of *Cassell's Magazine*. Of his works, including novels, boys' stories, adventures, sketches, and plays, the following may be named: *Webs in the Way* (1867); *The Sapphire Cross* (1871); *The Parson of Dumford* (1879); *Off to the Wilds* (1881); *Nat the Naturalist* (1883); *The Rosery Folk* (1884); *The Silver Cañon* (1884); *A Double Knot* (1890); *Cutlas and Cudgel* (1890); *The Grand Chaco* (1892); *In an Alpine Valley* (1893); *Blue Jackets* (1893); *High Play* (1898); *A Woman Worth Winning* (1898); *Nic Revel* (1898); *Draw Swords* (1898); and *The Silver Salvers* (1898). His works have had much popularity in America.

FENNEC OR ZERDA (*Vulpes zerda*), one of the foxes found on the sandy plains of Africa. The animal is small, has large ears and blue eyes. It digs burrows in the sand. The zerdas are often tamed and kept as pets.

FENTON, a village of Genesee County, Michigan, in the southeast-central part of the state, fifty miles northwest of Detroit. It is in a farming and stock raising country, and contains flour mills, a foundry and other industries. It is reached by the Detroit, Grand Haven and Milwaukee railroad. Its population in 1900 was 2,408. W.F.J.

FENTON, REUBEN EATON, an American statesman; born in Carroll, N. Y., July 4, 1819. When 17 years of age his father's failure threw him on his own resources. He engaged in lumbering and rafting, but managed to educate himself by studying in camp. He was supervisor of Carroll, 1843; Representative in Congress from New York, 1853–55 and 1857–64, in which latter year he resigned, having been elected governor of New York State. He was United States senator from New York from March 4, 1869, to March 3, 1875. He died in Jamestown, N. Y., Aug. 25, 1885. E.E.T.

FENWICK, BENEDICT JOSEPH, clergyman, was born in Maryland on September 3, 1782, a descendant of English colonists who accompanied Lord Baltimore to America. He was educated at Georgetown College, entered the Roman Catholic priesthood, and was one of the first to join the Society of Jesus when it was re-established here in 1806. He was settled in New York City in 1809, and founded a Catholic school there, and in 1816 was made vicar-general of the diocese. In 1824 he was made president of Georgetown College, and in 1825 was appointed and consecrated bishop of the diocese of Boston, which then comprised the whole of New England. He founded the College of the Holy Cross at Worcester, Mass., and other institutions. He died on August 11, 1846. W.F.J.

FENWICK, EDWARD D., clergyman, brother of Benedict Joseph Fenwick (q. v.), was born in Maryland in 1768, and was educated in the Netherlands, and became a member of a Dominican community in England. Thence he came to America and became a missionary in Kentucky and Ohio. He built the first Catholic church in Cincinnati, and many others elsewhere in the State, and when the new diocese of Cincinnati was created in 1821 he was made its first bishop. He received many gifts from the Pope, from the King of France, and from other Catholic notables of Europe, and thus was enabled to build the Cincinnati cathedral. He died on September 26, 1832. W.F.J.

FENYES, ELEK, a Hungarian geographer and statistical author; born in Csokaj, in the county of Bihar, in 1807. He traveled over the country, and thoroughly acquainted himself with the state of the Hungarian kingdom, of which there had never before been an authentic survey. The first-fruits of his enterprise appeared in 1840, under the title, *Hungary and Its Annexed Parts, Geographically and Statistically Considered.* He was awarded the great prize of 200 ducats by the Hungarian Academy. Among his other works are *The Statistics of Hungary* (1843); *General Atlas for Hungary* (1845); *Description of Hungary* (1847); *Geographical Dictionary of Hungary* (1851). All of his works are written in the Magyar tongue, and some of them have been translated into German, and repeatedly published.

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They form invaluable stories, both for the historian and linguist. During the national government of Hungary, in 1848 Fenyes was chief of the Statistical Bureau. He died in 1876.

FERÆ NATURÆ, a term used to designate that class of animals which have not been domesticated, and are, therefore, not the subject of personal property. Such animals belong to a person only during such time as he has possession of them. The owner of land has a qualified property of this class of animals during the time, by reason of their immature age, they are not able to leave.

FER-DE-LANCE, one of the most deadly members of the rattlesnake family (*Crotalidæ*), inhabiting Brazil and some of the West Indies. It is variously classified as *Bothrops lanceolatus*, and *Craspedocephalus lanceolatus*. R.W.C.

FERDINAND I, Prince of Bulgaria, Duke of Saxe; born in Vienna, Austria, Feb. 26, 1861, the youngest son of Prince August of Saxe-Coburg-Gotha, and his wife, Clementine, Princess of Bourbon-Orleans. He was chosen prince of Bulgaria by the Grand National Assembly at Tirnova, July 7, 1887, and, although his election was not confirmed or assented to by the Sublime Porte or by the Treaty Powers, he subscribed to the constitution and took up the reins of government, under the title of Ferdinand I, at Tirnova, Aug. 14, 1887. He married, April 8, 1893, at Villa Pianore, Florence, Italy, Marie Louise Pie Thérèse Anne Ferdinande Françoise Antoinette Marguerite Josephine Caroline Blanche Lucie Apollonie de Bourbon, Princess of Parma, daughter of Robert Charles, Duke of Parma, by whom he had two children, the heir apparent to the Bulgarian throne, Prince Boris of Tirnova, born in the palace of Sofia, Jan. 18, 1894, and Cyril, Prince of Preslav, born in Sofia, Nov. 5, 1895. Prince Ferdinand's rule was marked by a policy of *rapprochement* with Russia. While the history of his reign will be found under the more appropriate heading of Bulgaria (q.v., in these Supplements), his embracing the faith of the orthodox Russian Church in lieu of the tenets of the Catholic faith, and his decision, in 1896, to bring up his son, Prince Boris, in the faith of the Russian Church, are here worthy of mention. He played what has been deemed a discreditable part in the assassination of his ex-premier, Stambuloff (q.v., in these Supplements), and was but a tool in the hands of Muscovite diplomats, paving the way for the advance of their ruler toward the shores of the Golden Horn.

FERDINAND I.

FERGUS FALLS, a city and the capital of Otter-tail County, central western Minnesota, on the Little Red River, and on the Great Northern and Northern Pacific railroads. It has good water-power, and flour and paper mills. It has a state high school and a Norwegian Lutheran college. Population 1890, 3,772; 1900, 6,072.

FERGUSON, John Calvin, educator, was born in Canada on March 1, 1866, and was graduated from Boston University in 1886. He became president of Nankin University, China, in 1888–97, president of Nanyang College, Shanghai, China, in 1897–1902, and since 1902 has been secretary to the Chinese ministry of Commerce. He has taken a prominent part in the introduction of American and European civilization into the Chinese Empire, and the cultivation of good relations with that country. W.F.J.

FERGUSON, Samuel David, clergyman, was born at Charleston, S. C., on January 1, 1842, a free negro, and emigrated with his parents to Liberia in 1848. He became a minister of the Protestant Episcopal Church of America, and was made Missionary Bishop of Cape Palmas in 1884, the first negro to be elevated to the episcopacy of that church. W.F.J.

FERGUSON, Sir Samuel, poet and antiquary; was born at Belfast, Ireland, in 1810, was educated at Trinity College, Dublin, and was called to the bar in 1838. He paid more attention to antiquarian research than to law, however, and found in 1867 a congenial place as deputy keeper of records in the Four Courts. He was president of the Royal Irish Academy, and was knighted in 1878. He wrote *Lays of the Western Gael* (1865); *Congal* (1872); *Poems* (1880), and *The Forging of the Anchor* (1883); the last named being a particularly spirited poem which has enjoyed great popularity. His edition of *Leabhar Breac* appeared in 1876, and his *Ogham Inscriptions* in 1887. He was a profuse contributor to the *Transactions* of the Royal Irish Academy, and did much for the study of ancient Irish art and for the revival of interest in Celtic literature. He died in 1886. W.F.J.

FERGUSSON, James, a Scottish architect; born at Ayr in 1808; died Jan. 9, 1886. He was educated at the high school of Edinburgh, and after spending some years as an indigo-planter in Bengal, engaged in extensive explorations of India, sketching and studying the rock temples. In 1859 he was appointed a member of a royal commission on the defenses of Great Britain. His later works include *Illustrations of the Rock-cut Temples of India* (1845); *The Palaces of Nineveh and Persepolis Restored* (1851); *Hand-book of Architecture* (1855); *History of the Modern Styles of Architecture* (1862); *History of Ancient and Modern Architecture* (1868); *Tree and Serpent Worship* (1869); *History of Rude Stone Monuments* (1872); *The Temples of the Jews and Other Buildings in the Haram Area at Jerusalem* (1878). The chief features of his earlier works were embodied in *Cave Temples of India* (1880). His works on architecture are regarded as standard authority. He became, also, an authority on the construction of fortifications. His recommendation of presenting round instead of salient angles to the enemy's artillery has been adopted.

FERIÆ, in Roman antiquities, were holidays, during which all free Romans suspended their business and their political and legal doings, and when slaves were allowed a rest from their labors. These

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celebrations were private or public. The former were celebrated by individual families or persons to commemorate some particular family or personal event. The public feriæ included the several days on which religious festivals of a public character were held. The precise dates were fixed by the magistrates, or other officials, with special reference to some exigency. The manner of holding these feriæ bore some analogy to the celebration of the Sabbath in later times. The name is still preserved in the Roman Catholic Church, and refers to a week-day wherein no specific religious service is appointed.

FERNALD, CHARLES HENRY, zoölogist, was born on Mount Desert Island, Maine, on March 16, 1838, and was educated at the Maine Wesleyan Seminary. He served in the Civil War as acting ensign in the U. S. navy, and afterward engaged in teaching, as principal of Litchfield and Houghton Academies, professor of natural history in the Maine State College, and, since 1886, professor of zoölogy in the Massachusetts Agricultural College. He has written books on *The Tortricidæ of North America*, *Butterflies of Maine*, *The Gypsy Moth*, etc., and is esteemed as one of the foremost American authorities in entomology and a most efficient counsellor against insect pests. W.F.J.

FERNANDEZ DE LOS RIOS, ANGEL, publicist; was born in Spain on July 27, 1821, became active in Spanish literature and politics, and was banished for political reasons. He settled in Paris, and was the author of *All or Nothing* (1876), an anti-Bourbon study of social conditions in Spain, and other works on Spanish affairs. He died in France in 1879. W.F.J.

FERNANDEZ DE PIEDRAHITA, LUCAS, a South American prelate and historian; born in Bogotá, New Granada, in 1624. He was a direct decendant of the Incas of Peru. In 1656 he was made vicar-general of Bogotá. He wrote *The History of the Kingdom of New Granada*, a most invaluable work. He died in Panama in 1688. W.M.C.

FERNANDEZ-LIZARDI, JOSE JOAQUIN, novelist; was born in the City of Mexico in 1771, and became one of the most eminent novelists of that country. His best known works were *Periquillo Sarniento* (1816); *Sad Days and Gala Nights* (1823), and *Life and Exploits of the Famous Knight Don Catrin de la Facheuda* (1832). He died in Mexico in June, 1827. W.F.J.

FERNANDINA, an ancient city of Nassau County, on Amelia Island, at the northeastern corner of the state of Florida, between Prince William Sound, Nassau Sound, the mouth of the St. Mary's River, and the Atlantic Ocean. It has a good harbor and considerable commerce in lumber, cotton, and naval stores, and is connected with New York by steamship lines. It is reached by the Florida Central railroad. Its population was 2,803 in 1890 and 3,245 in 1900. W.F.J.

FERNANDO PO, Western Africa, an island belonging to Spain, opposite the town and German colony of Kamerun, in the Gulf of Guinea. (See FERNANDO PO, Vol. IX, p. 88.) A line of steamers gives regular communication with Spanish ports and promotes the exports of such natural products as palm kernels and oil, cabinet woods, rubber, wools and hides. Santa Isabel, formerly Port Clarence on the north shore, is the principal town. Population, 30,000. C.L.S.

FERN, FANNY. See PARTON, SARAH PAYTON, in these Supplements.

FERN, SWEET, a shrub of the family *Myricaceæ*, a native of North America, chiefly in the East, in sterile, rocky soil, and forming a small bush with fern-like leaves. Its leaves have a powerful aromatic fragrance when rubbed. It is tonic and astringent, and much used in the United States as a domestic remedy for diarrhœa.

FERNOW, BERNHARD EDUARD, a German-American scientist; born in Prussia, January 7, 1851. He was graduated from the University of Königsberg and removed to the United States in 1876. He was chief of the division of forestry in the Department of Agriculture from 1886 to 1898 and then became director and dean of the New York State College of Forestry at Cornell University. He is the author of *The White Pine* (1899); *Report upon Forestry Investigations* (1899), and other works. W.M.C.

FERONIA, an ancient Italian divinity. Some consider her to have been the goddess of liberty because at Terracuia slaves were emancipated in her temple. Others regard her as the goddess of the earth, or the lower world, and as akin to Mania and Tellus. W.R.B.

FEROZABAD OR FIROSABAD, a town of British India, 24 miles E. of Agra. It is surrounded by a wall, outside of which are many mounds and interesting ruins. Population, 16,023.

FERRACUTE SOLDERING-TABLE. See CAN-MANUFACTURE, in these Supplements.

FERRAR, NICHOLAS, an English religious exemplar; born in London in 1592; entered Clare Hall, Cambridge, at the age of 14; graduated and obtained a fellowship in 1610. He studied medicine, but owing to ill health traveled abroad in 1613–18. On his return he entered the office of his father, a London merchant, who was closely identified with the Virginia Company. Ferrar was returned to Parliament in 1624, but retired, the following year, to Little Gidding, in Huntingdonshire, where he founded the religious community which became known, on account of the asceticism there practiced, as the "Arminian Nunnery." In 1626 he was ordained a deacon by Laud. The community consisted, at the start, of himself and mother, his sister, brother and brother-in-law, their wives and families, numbering about forty souls. The members engaged themselves in constant religious services, including nightly watches and devotions. They also employed themselves in the craft of fine bookbinding. The establishment was visited twice by Charles II, in 1633 and in 1642. Ten years after the death of its founder the house was broken up by the Cromwellian Puritans, who looked with suspicion on a form of asceticism which did not seem to concern itself with political affairs.

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See *Life of Nicholas Ferrar*, by Rev. John Eyton Bickersteth Mayor (1855). He died Dec. 4, 1637.

FERRARI, GIUSEPPE, an Italian philosopher and historian, born in Milan, 1812; studied at Pavia, and gained fame by editing the complete works of Vico (6 vols., 1836–37). Having moved to France, he published *Vico et l'Italie*. In 1840 he was appointed professor of literature at Rochefort, and later at the University of Strasburg, but was removed on instigation of the Ultramontanes. In 1843 appeared from his pen the important work, *Essay on the Principles and Limits of the Philosophy of History*. In 1859 he returned to Italy, and filled chairs at Turin and Milan. His other works include *La Filosofia della Rivoluzione; Histoire des Révolutions d'Italie, or Gelfs et Gibelins; Histoire de la Raison d'État*. He died at Milan, July 1, 1876.

G.A.S.

FERRARI, PAOLO, an Italian writer of comedies; born at Modena, April 5, 1822; appointed in 1860 professor of history at Milan. His most noted works are *Goldoni e le Sue Sedici Commedie; Il Tartufo Moderno or Prosa; Dante a Verona*. He died March 9, 1889. G.A.S.

FERREL, WILLIAM, meteorologist, was born in Pennsylvania on January 29, 1817, and was educated at Bethany College (1844). He devoted his chief attention to astronomy and meteorology, and in 1857 was engaged in the office of the *American Ephemeris and Nautical Almanac*, published by the government. There he remained ten years, when he entered the service of the Coast Survey. From 1882 to 1886 he was connected with the Signal Service. He wrote *Motions of Fluids and Solids Relative to the Earth's Surface, Determinations of the Moon's Mass from Tidal Observations, Tidal Researches, Meteorological Researches, Tides of Tahiti*, and *Temperature of the Atmosphere and the Earth's Surface*. He also invented a tide-predicting device, which came into wide use and proved to be of much service. He retired from active duty in 1886, and died on September 18, 1891. W.F.J.

FERRERO, EDWARD, soldier, was born in Spain, of Italian parents, on January 18, 1831, and was brought to America at two years of age. Before the Civil War he was a teacher of dancing at West Point and in New York, and was also an officer of the New York militia. In 1861 he recruited a regiment known as the "Shepard Rifles," and led it at Roanoke Island and New Berne with much valor. He distinguished himself at the second Bull Run, Chantilly, South Mountain, Antietam, Fredericksburg, Vicksburg, Jackson, Knoxville, in the Wilderness, and at Petersburg, and was brevetted a major-general of volunteers. He died on December 13, 1899.

W.F.J.

FERRICYANIDES. See PRUSSIC ACID, Vol. XX, p. 29.

FERRIER, DAVID, physician and scientist; was born at Aberdeen, Scotland, in 1843, and was in 1863 graduated from the University there with the highest honors. He studied medicine at Edinburgh and at Heidelberg, and became a practitioner. In 1872 he was appointed to a professorship in King's College, London, and later became physician to its hospital and to other institutions in London. He was elected to the Royal Society in 1876, and to the Royal College of Physicians in 1877, and received the degree of LL.D. from Aberdeen in 1883. His chief work has been in connection with the brain and its physiology, and his studies of epilepsy have also been of great value to the medical profession. His work has often brought upon him the criticism of anti-vivisectionists, but appears to have been justified by its results. Among his works are *The Functions of the Brain* (1876); *The Localization of Cerebral Diseases* (1878), and *The Effect of Lesion of Different Regions of the Cerebral Hemispheres* (1884), the last-named prepared in conjunction with Professor Yeo and published in the *Transactions* of the Royal Society. He was one of the founders of the scientific periodical *Brain*.

W.F.J.

FERRIS, GEORGE WASHINGTON GALE, an American engineer; born at Galesburg, Ill., Feb. 4, 1859. Migrating with his family to California, he there received his early education, and in 1881 graduated from the Rensselaer Polytechnic Institute, Troy, New York. He started in business at Pittsburg, Pennsylvania, where he located his construction works. When the Columbian Exposition structures were building, some special structure was desired that should rival and excel the Eiffel Tower of the Paris Exhibition of 1889. At a dinner of the Saturday Afternoon Club Mr. Ferris outlined the plan of a monster wheel of a design all engineers had declared impracticable. The plan then outlined was successfully carried out. Died in Pittsburg, Pa., Nov. 22, 1896. See FERRIS WHEEL, XXVI, 634.

GEORGE W. G. FERRIS.

FERRIS, ISAAC, clergyman and educator, was born in New York City on October 9, 1798, and was educated at Columbia College and the New Brunswick, N. J., Theological Seminary. During his course at Columbia he organized a company for service in the War of 1812. In 1820 he became a minister of the Reformed Dutch Church, and was a pastor at Albany and in New York. For years he was the president of the Rutgers Female Institute, in New York. In 1852 he became chancellor of the University of the City of New York (now New York University) and did a great work for that institution, both as a scholar and as a financier. He was also its professor of moral science and evidences of Christianity, and of constitutional and international law. He was a member of the university council from 1837 to 1873, and chancellor emeritus from 1870 to 1873. He died on June 16, 1873. W.F.J.

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FERRIS WHEEL, THE, an immense structure designed and invented by G. W. G. Ferris (q.v., in these Supplements) as a popular feature in the Midway Plaisance at the World's Columbian Exposition, held in Chicago in 1893. The wheel was composed of two wheels of the same size, connected and held together by rods and struts, which, however, did not approach closer than 20 feet to the periphery. Each wheel had for its outline a curved, hollow, square iron beam 25½ by 19 inches. At a distance of 40 feet within this circle was another circle of a lighter beam. These beams were called "crowns," and were connected and held together by an elaborate truss-work. At the center of the wheel was an immense axle, 32 inches thick and 45 feet in length. Each of the twin wheels, where the axle passed through it, was provided with a large iron hub 16 feet in diameter. Between these hubs and the inner "crowns" there were no connections, except spoke-rods 2½ inches in diameter, arranged in pairs and 13 feet apart at the crown connection. At a distance these looked like spiders' webs, and the wheel appeared to be constructed on the principle of a bicycle wheel, the only difference being that it hung by its axle instead of resting on the ground. On the periphery of the wheel, and at equal intervals, were hung 36 cars, or carriages, for the conveyance of passengers. Each car was 27 feet long, 13 feet wide and 9 feet high, and had a carrying capacity of 40 passengers. The wheel, with cars and passengers, weighed 1,200 tons, and needed substantial support. The axle rested on two skeleton iron towers, each 40 by 50 feet at the base, 6 feet square at the top and 140 feet high. Each tower had four great feet, each resting on 20 cubic feet of solid concrete foundation. The wheel itself was 250 feet in diameter, 825 feet in circumference, 30 feet wide and elevated 15 feet from the ground. It was turned by steam-power and was provided with powerful brakes. The ground was broken for its erection March 20, 1893, and the completed wheel began to turn on June 20th. Up to the close of the Exposition 1,454,013 passengers were carried without accident of any kind, a complete revolution occupying about 20 minutes. The wheel cost $300,000, and at the conclusion of the Exposition was taken down and re-erected near Lincoln Park, in Chicago, where it still affords a magnificent panorama of Lake Michigan and Chicago's lofty buildings to tourists and visitors. Throughout the World's Fair it was lighted by 3,000 electric lights. A wheel for the same purpose, but different in size and construction, was completed April 27, 1895, at Earl's Court, London. Its diameter is 300 feet; its axle has a passage running through it of seven feet in diameter. The wheel hangs between two towers of four slanting columns, each 150 feet high, having saloons at the top. Forty carriages are hung on the periphery of the wheel, each being 24 feet long, 9 feet wide, and 10 feet high, and calculated to hold 30 passengers—in all 1,200. Passengers enter the cars from eight stages placed at the bottom of the wheel; the journey round takes about twenty minutes, including stoppages. The wheel is driven by two endless chains of short-link type, each being one thousand feet in length, and weighing eight tons. The motive power is taken from two fifty-horse power Robey under-type engines placed in an engine-house on the ground.

THE FERRIS WHEEL.

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FERRO. See CANARY ISLANDS, Vol. IV, p. 706.

FERRY, JULES FRANÇOIS CAMILLE, a French statesman; born at Saint-Dié, Vosges, April 5, 1832; was admitted to the Paris bar in 1854, and identified himself with the opponents of the empire. He was condemned as one of the "thirteen" in 1864. In 1869 he was elected to the Corps Legislatif. He voted against the war with Prussia, but, during the siege, he was a prominent member of the Government of National Defense, assisting in suppressing the communistic rising in October, 1870. After the war he was minister at Athens (1872), and in 1879 he became Minister of Public Instruction. He introduced a bill directed against the Jesuits, which was passed by the Deputies, but twice thrown out in the Senate. The expulsion of the Jesuits was effected by decree founded upon disused laws, and the Ministry was dissolved in 1880. He then formed a Cabinet and embarked on a policy of "colonial expansion." His Cabinet resigned in 1881 on the question of the expedition to Tunis. He became Prime Minister again in 1883, and again entered on the career of aggrandizement in Madagascar and Tonquin, but his Ministry was overthrown in 1884 by an adverse vote relative to the war with China. He was now one of the most unpopular men in France, and the adverse vote was regarded as accomplishing his political death. He continued in retirement for nine years, until, in the beginning of 1893, he was recalled to public life during the Panama canal excitement. He was elected president of the Senate, but died suddenly in Paris, March 17, 1893.

FERRY, ORRIS SANFORD, an American statesman; born in Bethel, Conn., Aug. 15, 1823. He graduated at Yale in 1844 and was admitted to the bar in 1846. He was appointed judge of probate in 1849; was a member of the State Senate, 1855–56; State attorney for Fairfield County, 1856–59; Representative in Congress from Connecticut, 1859–61; entered the Union army as colonel of the 5th Connecticut Volunteers, 1861; promoted brigadier-general, 1862, and served till the close of the war; and was United States senator from March 4, 1867, to Nov. 21, 1875, on which date he died at his home in Norwalk, Conn. E.E.T.

FERRY, THOMAS WHITE, an American statesman; born in Mackinac, Mich., June 1, 1827. He was a member of the Michigan House of Representatives in 1850; state senator, 1856; Representative in Congress from Michigan, 1865–71; and United States Senator, 1871–83. By the death of Vice-President Henry Wilson, Nov. 22, 1875, Mr. Ferry became acting-Vice-President of the United States. He died in Grand Haven, Mich., Oct. 14, 1896. E.E.T.

FERRY DE BELLAMARE, GABRIEL, better known by his assumed name of GABRIEL FERRY, French author; born at Grenoble in November, 1809; traveled extensively in America and perished on a trip to California when the ship *Amazon* burned on the open sea, January 5, 1852. Among his writings which appeared first in the *Revue de Deux Mondes* are *Le Coureur des Bois; La Chasse Aux Cossaques; Costal L'Indien; Scènes de la Vie Militaire au Mexique; Les Squatters.* His son, GABRIEL who likewise writes under the pseudonym of GABRIEL FERRY; born in Paris, May 30, 1846, published the drama *Reginah* and the novels *Les Deux Marits de Marthe; Les Exploits de César; Les Exploits de Martin Robert.* G.A.S.

FERRYLAND, Newfoundland, the seat of Ferryland district, a southeastern fishing port of entry on the Avalon Peninsula, 35 miles southwest of St. John's. It was founded by Lord Baltimore in 1623, but owing to French aggression was abandoned. Population, 1,000. C.L.S.

FERTILIZATION, in botany, a sexual process in which two dissimilar gametes (sexual cells) fuse to form an *oöspore*. The two gametes usually differ from each other in size and activity, the male gamete (*spermatozoid* or *antherozoid*) being small and active, the female gamete (*oösphere*) being relatively large and passive. In case like gametes fuse, the sexual process is termed *conjugation*, and the product a *zygospore*. See also REPRODUCTION, Vol. XX, p. 438.

FERTILIZATION, ANIMAL. See EMBRYOLOGY, in these Supplements.

FERTILIZERS. See AGRICULTURE, Vol. I, pp. 305–314.

FESA OR FASA, a town of southwestern Persia, in the province of Fars, 80 miles S.E. of Shiraz, situated in a mountain defile, and is of considerable size. It has manufactories of silken, woolen and cotton fabrics, and some trade in a kind of tobacco. Population, 18,000.

FESCENNINE VERSES. See SATIRE, Vol. XXI, p. 333; DRAMA, Vol. VII, p. 354.

FESCUE, the popular name of *Festuca*, a large and widely diffused genus of grasses, very nearly allied to brome-grass, and including many of the most valuable pasture and fodder grasses. *F. ovina*, (sheep's fescue), and *F. elatior* (meadow-fescue) are common in cultivation as lawn and pasture grasses.

FESSENDEN, THOMAS GREEN, author; was born at Walpole, New Hampshire, on April 22, 1771, and was graduated from Dartmouth College. He went to London in 1801 and while there published a satirical poem, *Terrible Tractoration*. On his return to America he founded the *New England Farmer*, and wrote *The American Clerk's Companion; The Ladies' Monitor*, and *Laws of Patents for New Inventions*. He died in Boston on November 11, 1837. W.F.J.

FESSENDEN, WILLIAM PITT, an American statesman; born in Boscawen, N. H., Oct. 16, 1806. He graduated at Bowdoin College in 1823; studied law, and commenced practice in Bridgewater, but soon afterward removed to Portland, Me. He was a member of the Maine House of Representatives in 1832 and 1840; was a Representative in Congress from Maine as a Whig, 1841–43; was again a member of the state legislature, 1845–46 and 1853–54; was elected United States Senator as a Whig (to succeed J. W. Bradbury, Democrat), taking his seat Feb. 23, 1854, and was re-elected as a Republican in 1859, serving until 1864, when he resigned, having been appointed Secretary of the Treasury

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by President Lincoln. This office he held until March 3, 1865, and the following day resumed his seat in the Senate, to which he had been re-elected, and which he occupied till his death, which occurred at Portland, Me., Sept. 8, 1869.

E.E.T.

FEUILLANTS, CONGREGATION OF, a reform of the Cistercian order, remarkable as forming part of the great religious movement in the Roman Catholic Church during the sixteenth century, probably stimulated by the progress of the Reformation at that time. The author of this reform was Jean de la Barrière, abbot of the Cistercian monastery at Feuillants, in Languedoc, who laid down for himself a new and much more austere course of life, in which he soon found many associates among the brethren of his order. The rule was approved by Pope Sixtus V. The name was adopted by a French revolutionary club which held its meetings in the convent of the order in the Rue St. Honoré in Paris. See FRANCE, Vol. IX, p. 530.

FEUILLET, OCTAVE, a French novelist and dramatist; born at St.-Lô, in La Manche, Aug. 11, 1821; died Dec. 29, 1890; educated at the College of Louis le Grand, Paris. He was for some time a literary assistant of Dumas, and began his own career with *Le Fruit Défendu*, in the *Révue Nouvelle*. In 1848 he published, in the *Révue des Deux Mondes*, a series of proverbs, comedies, tales and romances, which were collected in *Scènes et Proverbes* and *Scènes et Comédies* (5 vols., 1853–56). In 1862 he was elected to the French Academy, and was afterward librarian to the emperor. His most noted novel, *Le Roman d'un Jeune Homme Pauvre* (1858), gained great popularity throughout Europe, and *Histoire de Sibylle* (1862) was also very successful. These were followed by *M. de Camors* (1867); *Julia de Trécœur* (1872); *Un Mariage dans le Monde* (1875); *Les Amours de Philippe* (1877); *Le Journal d'une Femme* (1878); *Histoire d'une Parisienne* (1881); and *La Morte* (1886). Among his dramas are *La Nuit Terrible* (his first piece); *Le Bourgeois de Rome* (1846); *La Crise* (1848); *Le Village* (1855); *Dalila* (1857); *Montjoye* (1863); *Le Ças de Conscience* (1867); *Julie* (1869); *L'Acrobate* (1873); *Le Sphinx* (1874); *Un Roman Parisien* (1883).

FEVER BUSH (*Lindera benzoni*), also "spice-bush," a glabrous shrub, with smooth bark and slender twigs, elliptic leaves, having broad, bright yellow, fragrant flowers, growing in moist woods and thickets in the Eastern States and Canada. Also the name of *Ilex verticillata* or "Virginia winter-berry" that grows in swamps. W.R.B.

FEVERFEW, the common name of *Chrysanthemum Parthenium*, one of the *Compositæ*. It is a branching perennial, one to three feet high, with numerous pinnately divided leaves, and loose clusters of small heads with white rays. It has a strong and somewhat aromatic smell. The double varieties are common in gardens. It has been much cultivated for medicinal purposes, and is used in the cure of fevers.

FEVERWORT, the common name of species of *Triosteum*, a genus of the "honeysuckle" family, having an erect, hairy stem one to four feet high, opposite ovate or lanceolate entire leaves and axillary flowers. It is found in North America, where it is dried and the roasted berries occasionally used as a substitute for coffee. It is chiefly valued for its medicinal properties.

FEYEN, JACQUES EUGÈNE, a French painter; born at Bey-sur-le-Seille, Nov. 13, 1815; entered the School of Fine Arts in 1847, and was a pupil of Delaroche; commenced to exhibit at the Salon in 1841, and in 1866 began to attract special attention by his marine views, as well as by his Brittany subjects. Among his productions are *La Recette* (1867); *Le Jeu de Quilles à Cancale* (1877); *Berceus Berceuse Endormie* (1880); *Repas Frugal* (1883); *Lavandières Bretonnes* (1888); and *La Fiancée du Marin* (1890). Was decorated with the Legion of Honor in 1881.

FEZ, the most important city and center of trade in Morocco. Pop. 1903, 140,000. See FEZ, IX, 111.

FIBROUS TISSUE. See ANATOMY, Vol. I, p. 746; and HISTOLOGY, Vol. XII, p. 20.

FIBULA. See ANATOMY, Vol. I, p. 727.

FICHTE, IMMANUEL HERMANN, VON, a German philosopher; son of Johann Gottlieb Fichte (see Vol. IX, pp. 117–121); born at Jena, July 18, 1796. He was professor of philosophy at Bonn from 1835–42, and at Tübingen from 1842–1863. In the latter year he retired to private life at Stuttgart, where he died, August 8, 1879. He endeavored to unite idealistic monism of the realistic individualism of Hegel and Herbart together with ethic theism, and to combine Leibniz's metaphysics with the ethic theology of philosophy subsequent to Kant. His most important works are *Grundzüge zum System der Philosophie* (1833–34); *System der Ethik* (1850–53); *Psychologie* (1864 and 1873); *Die Theistische Weltanschauung und Ihre Berechtigung* (1873)

G.A.S.

FICK, ADOLF, a German physiologist; born at Cassel, Sept. 3, 1829; studied medicine at Marburg and Berlin; was professor of physiology at Zurich from 1856–68, and at Würzburg from 1868–99; died in Blankenberghe, Aug. 21, 1901. He wrote *Die Medizinische Physik* (1885); *Lehrbuch der Anatomie und Physiologie der Sinnesorgane* (1864); *Die Natur-Kräfte in Ihrer Wechselbeziehung* (1869); *Philosophisher Versuch uber die Wahrscheinlichkeiten* (1883), etc.

G.A.S.

FICK, AUGUST, a German philologist; born May 9, 1833, at Petershagen, near Minden; professor of philology at Göttingen, and in 1888 at Breslau; retired in 1891, and resided since 1892 in Meran, Tyrol. His principal work is *Das Verglcichende Wörterbuch der Indogermanischen Sprachen* (four editions 1891 and 1894). He also tried to prove that Homer's *Iliad* and *Odyssey* were originally written in the Æolic idiom, and by *Die Homerische Odyssee* (1883), and *Die Homerische Ilias* (1886). G.A.S.

FIDDMIN, a village of the Fayum, Lower Egypt, inhabited by Mussulmans and Copts. It is remarkable for a large olive tree, popularly supposed to be the first one planted in Egypt, which yields annually nearly 300 pounds of olives.

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FIDEI COMMISSUM. See ENTAIL, Vol. VIII, . 403.

FIDUCIARY, a legal term meaning in trust or onfidential. The law will not permit one standing ı a fiduciary relation to another to make any profit t the expense of the person whose interests he is ound to protect, except upon full disclosure of the ansaction. Controversy frequently arises as to hat will constitute such a relation. Trustees, ex-cutors, administrators, and those with other similar uties, occupy fiduciary relations with those who are eneficiaries to the trust. See TRUSTEE, in these upplements.

FIEF. See FEUDALISM, Vol. IX, p. 105.

FIELD, CYRUS WEST, promoter of submarine legraphy; was born at Stockbridge, Massachusetts, on November 30, 1819, son of David Dudley Field (q. v.) and received his education in the local schools. He became a dry-goods clerk, and then a paper manufacturer. In 1853 he became interested in the laying of an underground telegraphic cable across Newfoundland, and in 1854 secured the co-operation of Peter Cooper, Moses Taylor, Marshall . Roberts and Chandler White in a scheme for transatlantic cable. He was the leader in the ıterprise, and worked at it for years. Several ıin attempts were made to lay a cable before one ıally succeeded. On August 16, 1858, a cable as completed and President Buchanan and Queen ictoria exchanged messages across the ocean. n September 1 following, however, that cable ased to work. On July 27, 1866, another cable as completed, and since that time there has been ıbroken communication across the Atlantic. For is epoch-making achievement the world showed its highest honors upon Mr. Field. He was ɔo one of the promoters of elevated railroads in ew York city. Mr. Field amassed a large rtune, but in the closing years of his life met ith reverses and with distressing domestic trou-es. He gave his collection of medals, paintings d other mementos of the Atlantic cable enterise to the Metropolitan Museum in New York. e died on July 11, 1892. W.F.J.

CYRUS WEST FIELD.

FIELD, DAVID DUDLEY, clergyman, was born East Guilford, Conn., on May 20, 1871, and ıs graduated at Yale College in 1802. He beme pastor of a Congregational Church at East ıddam, Conn., in 1804, and there remained til 1818. The next year he accepted a call to ɔckbridge, Mass., but returned to his old charge East Haddam in 1837. In 1848 he went to ırope, and in 1851 he retired from the active nistry. He wrote histories of Middlesex ɔunty, Conn., and of Berkshire County, Mass., d some other works. He died on April 15, 1867. s four sons, Cyrus West, David Dudley, Jr., Henry Martyn, and Stephen Johnson, all attained eminence. W.F.J.

FIELD, DAVID DUDLEY, jurist, son of David Dudley Field (q.v.), was born at Haddam, Conn., on February 13, 1805, was graduated from Williams College in 1825, and was admitted to the bar in New York in 1828. He soon rose to prominence in his profession as a reformer of the judiciary and of legal practice. In 1839 he brought the subject of judiciary reform before the legislature, and began a campaign which led to the enactment of his Code of Procedure in 1848–50. This code effected a vast reform in the administration of law and justice in New York, and became the basis of similar codes in more than a score of the other States, and also of new judicature acts in England and several of the British colonies. In 1857 he was made by the New York legislature the head of a commission to codify all the laws of the State, in a political, a civil and a criminal code. To this work he devoted twenty-five years of labor. In 1873 he put forth an international code, which attracted wide attention and led to the formation of an association for the reform and codification of international law. He was a representative in Congress for a few weeks in 1876, and was a Democratic leader in the Hayes-Tilden electoral dispute. He died in New York on April 13, 1894. W.F.J.

FIELD, EUGENE, an American journalist and poet, styled the "Poet Laureate of the Children," was born at St. Louis, Missouri, Sept. 2, 1850. His father was Roswell Martin Field, who was the first attorney for Dred Scott. In 1868 Eugene entered Williams College, and on the death of his father in 1869, he was sent to Knox College, Galesburg, Illinois. In 1871 he entered the State University of Missouri, which he left at the commencement of his senior year on the attainment of his majority. He traveled abroad, and returning indulged his natural bent, which was for newspaper-writing. His first position was with the St. Louis *Journal* in 1873, of which he soon became city editor. He subsequently filled editorial positions on the St. Joseph (Missouri) *Gazette*, the St. Louis *Times-Journal*, the Kansas City *Times*, and the Denver (Colorado) *Tribune*. During this period his associates produced *The Denver Tribune Primer* and *The Model Primer*, which are much sought after on account of their quaint conceits. In 1882 he accepted a position on the Chicago *Morning News*, now *The Record*, where he conducted a column called *Sharps and Flats*, and in which he had absolute freedom of expression, and in which much of his best journalistic work appeared. As a poet he was most felicitous when treating of subjects interesting to childhood. His *Little Boy Blue*; *Wynken, Blynken and Nod*; *Jes' 'Fore*

EUGENE FIELD.

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Christmas; and *Seein' Things*, are child classics. He was a confirmed bibliomaniac, and his *Love Affairs of a Bibliomaniac* was one of his most serious pieces of work. He was noted as a platform reader of his own productions, and it was for one of these reading trips that he was preparing when he died. In 1873 he was married to Julia M. Comstock of St. Joseph, Missouri. His married life was happy, and his seven children were the idols of the father's heart. Field was an incorrigible practical joker. The boldness, and often effrontery, of his well-laid plans to surprise his intimates and acquaintances would appal the ordinary perpetrator, while only making him the more seriously sedate in his enjoyment. He died at his home at Buena Park, a Chicago suburb, Nov. 4, 1895. His works include *Culture's Garland; or, Memoranda of the Gradual Rise of Literature, etc., in Chicago* (1887); *A Little Book of Western Verse; A Little Book of Profitable Tales* (1889); *With Trumpet and Drum* (1892); *Second Book of Verse* (1893); *The Holy Cross, and Other Tales* (1893); *Love Songs of Childhood* (1894); *Echoes from the Sabine Farm*, in collaboration with his brother, Roswell Martin Field (1895); *Love Affairs of a Bibliomaniac*, with an introduction by Roswell M. Field; *The House; Songs and Other Verse; Second Book of Tales* (1896).

FIELD, HENRY MARTYN, clergyman and author, was born at Stockbridge, Mass., on April 3, 1822, son of David Dudley Field, and brother of David Dudley Field, Jr., Cyrus W. Field, and Stephen J. Field (q. v.). He was graduated from Williams College in 1838, and became pastor of a Presbyterian Church in St. Louis, went abroad and saw the Irish famine and the French revolution of 1848, and returned to America to become owner and editor of *The Evangelist* for forty-four years. He traveled much, in Europe and the Levant, and wrote a number of books of travel, which have had great popularity. Among them are *Summer Pictures from Copenhagen to Venice*, *From the Lakes of Killarney to the Golden Horn*, *From Egypt to Japan*, *On the Desert*, *Among the Holy Hills*, and *Gibraltar*. He also wrote several books on American topics, and lives of his distinguished brothers, David Dudley Field and Cyrus West Field. His contributions to current literature, in his own paper and elsewhere, were for many years voluminous. W.F.J.

FIELD, KATE (MARY KATHARINE KEMBLE), an American actress, journalist, author and lecturer; born in St. Louis, Missouri, in 1840. She was a daughter of Joseph M. Field, an actor, and first adopted the stage as a profession, appearing in 1874 in Booth's Theater, New York city, in *Peg Woffington*. In 1878 she went abroad as a correspondent for American newspapers and for several years contributed brilliant letters on social and political topics to the New York *Tribune*, Philadelphia *Press*, Chicago *Tribune* and other journals. In 1889 she was in Washington as a Congressional correspondent and in the following year began the publication of a weekly society and political newspaper called *Kate Field's Washington*. It was published for several years, but proving unprofitable was suspended in 1894. From 1888 to 1895 she was in great demand on the lecture platform and delivered a series of addresses in the principal cities. Her most popular lecture was on the subject of Mormonism. In 1895 her health failed and she went to the Hawaiian Islands, where she died in Honolulu, May 19, 1896. W.M.C.

FIELD, STEPHEN JOHNSON, an American jurist; born in Haddam, Conn., Nov. 4, 1816. In 1819 his family removed to Stockbridge, Mass., where he spent ten years of his boyhood. He graduated at Williams College in 1837, and in 1841 formed a law partnership with his brother, David Dudley Field, in New York, which lasted for seven years. In 1848 he travelled extensively in Europe, and on Dec. 28, 1849, he arrived in San Francisco, Cal. In 1850 he was chosen alcalde of Marysville, and soon afterward was elected to the legislature, in the judiciary committee of which he rendered valuable service in framing the Codes. From 1851 to 1857 he practised his profession, and was then elected a judge of the California Supreme Court, of which he became chief justice in September, 1859. In 1863 he was appointed an associate justice of the Supreme Court of the United States, in which position he remained until Dec. 1, 1897. He died in Washington, D. C., April 9, 1899. E.E.T.

FIELD, ELECTRIC. See ELECTRICITY, §§ 8, 9, 16, in these Supplements.

FIELD–GLASS, SOUCHARD'S, a powerful binocular glass for determining the exact distance of an object from the observer, which has recently come into use in the French army. When the glass is in focus, there are interposed, by means of the fingers, between the eye and the object, two prisms of Iceland spar. Then there are immediately brought into the field of vision two images, one of the real object, and the other a smoky fac-simile, directly in a line with and at the rear of it. The second image is more elevated, since the distance is greater. The object that serves for the adjustment of the glass as used in the French army is either a soldier of ordinary stature or one on horseback. If the head of the real image reaches to the shoulder of the fac-simile, he is distant just three hundred meters; if to the waist of the image, six hundred meters; and if to the knees, one thousand meters. If the feet of the image apparently rest upon the head of the soldier, the distance is exactly fourteen hundred meters. If there is a space between the feet of the one and the head of the other, the distance can be only approximately determined.

FIELD–MAGNETS. See MAGNETISM, Vol. XV, pp. 223, 224; and ELECTRICITY, § 82, in these Supplements.

FIELD-MATRONS. See INDIAN AFFAIRS, in these Supplements.

FIELD–MOUSE OR MEADOW–MOUSE, a name popularly given to various mice which dwell in fields, especially to members of the *Arvicolinæ*. Many are very destructive to trees and grain crops. In Europe, where they have been at times very destructive, it has been found possible to destroy

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them by artificially inoculating a specimen with a germ-disease, which soon becomes epidemic when the inoculated animals are set free in the fields.

FIELDS, JAMES THOMAS an American publisher and author; born in Portsmouth, New Hampshire, December 31, 1817. In 1834 he removed to Boston and entered the firm of Fields, Osgood and Company. He edited the *Atlantic Monthly* from 1862 to 1870. His writings include *Poems* (1849); *A Few Verses for a Few Friends* (1858); *Yesterdays with Authors* (1872); *Hawthorne* (1875); *Old Acquaintances;* (1875); *In and Out of Doors with Dickens* (1876); *Underbrush* (1881); *Ballads and Other Verses* (1881). He died in Boston, April 24, 1881. W.M.C.

FIELD-TRAIN, a department of artillery, consisting of commissaries and conductors of stores, whose duty it is to attend to the formation of proper depots of shot, etc., between the front and base of operations, and to keep a due proportion constantly at the service of each gun during an engagement; they are also responsible for the safe custody of the ammunition.

FIELD-WORKS. See FORTIFICATION, Vol. IX, p. 382.

FIFE. See FLUTE, Vol. IX, p. 307.

FIFE, ALEXANDER WILLIAM GEORGE DUFF, DUKE OF, an English nobleman; born Nov. 10, 1849; succeeded his father as sixth Earl of Fife in 1879, and was created Duke of Fife in 1889, on his marriage with Princess Louise Victoria Alexandra Dagmar, the eldest daughter of the Prince of Wales. The Duke was educated at Eton; is Lord Lieutenant of Elginshire; a member of the council of the Duchy of Lancaster, and a partner in the metropolitan banking firm of Sir Samuel Scott and Company. He sat as M.P. for Elgin and Nairn, in the Liberal interest, in 1874–79; went on a special mission to the King of Saxony in 1882; and in recognition of his diplomatic services received the first Order of Saxony; was captain and gold stick of the corps of Gentlemen-at-Arms from 1880 to 1885. The Duke and Duchess of Fife have two daughters: Lady Alexandra Victoria Alberta Edwina Louise, born at East Sheen Lodge, May 19, 1891, and Lady Maud Alexandra Victoria Georgia Bertha, born at the same place, April 3, 1893.

FIFER, JOSEPH W., an American public man born at Staunton, Virginia; removed to McLean County, Illinois, when a boy, and worked on a farm and as a bricklayer. In 1861 he enlisted in the Thirty-third Illinois Volunteers, serving in the ranks until July, 1863, when he was badly wounded at Jackson, Mississippi, but recovered, and rejoined his regiment. After the war he studied at Illinois Wesleyan University; became a lawyer in 1869; corporation counsel of Bloomington in 1871; state's attorney of McLean County from 1877 to 1880, and state senator from 1880 to 1884. He was elected governor of Illinois, as a Republican, in November, 1888, over General John M. Palmer, and was defeated for re-election in 1892 by the late John P. Altgeld.

FIFTH, in music, the interval between any note and the fifth note above it in the diatonic scale, counting the starting point as one; a note separated by this interval from any other considered in relation to that other; specifically, the fifth above the key-note; the dominant. W.R.B.

FIFTEENTH, an interval of two octaves; also a stop, or set of pipes, in an organ tuned two octaves above the open diapason. W.R.B.

FIG, a tree. See FIG, Vol. IX, pp. 135–136; and CAPRIFICATION, in these Supplements.

FIGHTING-FISH, a small fresh-water fish of the family *Anabantidæ*. It is a native of Asia, and particularly of Siam, where it is kept in glass globes on account of its pugnacity. When two of these creatures are brought together they rush immediately to combat. Fish-fights are a favorite amusement of the Siamese.

FIGUEIRA DA FOZ, Portugal, a seaport town in the province of Beira at the mouth of the Mondego which forms a good harbor, 24 miles by rail southwest of Coimbra. It is a summer-bathing resort, and has a trade in oil, wine, salt, and fruits. Population, 5,000. C.L.S.

FIGUERAS Y MORACAS, DON ESTANISLAO, a Spanish statesman; born at Barcelona, Nov. 13, 1819. In 1857 elected to the Cortes, he was an opponent to the monarchy. He was taken a prisoner in 1867 for conspiracy against Narvaez. After the successful revolution of 1868, he became the head of opposition against the monarchical constitution of 1869. On the abdication of Amadeus, Feb. 12, 1873, he became ministerial president of the Federal Republic, retiring June 8. On the election of Alfonso XII, he retired to private life, and died at Madrid, Nov. 11, 1882. G.A.S.

FIGUIER, LOUIS, a French author; born at Montpellier, Feb. 15, 1819, where he studied medicine, and where he became professor of physics in 1846. He was appointed to the same chair at Toulouse in 1850, and at Paris in 1853, where he died, Nov. 8, 1894. Among his writings are to be mentioned *Exposition et Histoire des Principales Découvertes Scientifiques Modernes* (6 editions, 4 vols., 1862); *Histoire du Merveilleux dans les Temps Modernes* (4 vols., 1859–62); *Les Merveilles de la Science* (1866–69); *Le Tableau de la Nature* (10 vols., 1867–73); *Le Lendemain de la Mort* (10th edition, 1894). G.A.S.

FIGURATE NUMBERS. See TABLES, Vol. XXIII, p. 18.

FIGURED OR FIGURATE, in music, opposed to *simple*, characterized by the use of passing notes. The term was formerly used in ecclesiastical music to distinguish chants which have been varied, and rendered more ornamental and expressive, from the original Gregorian chants, which were exceedingly plain. The term was afterward applied to elaborate pieces, in distinction from those of "strict" style.

FIGURED BASS, in music, a bass part with figures placed over the notes, which indicate the harmony to be played to each note, and serve as a guide to the accompanist.

FIGWORT, the common name of *Scrophularia*,

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a genus of plants of the large family *Scrophulariaceæ*. They are mostly herbaceous and natives of temperate regions. The roots of some are purgative and emetic. *S. nodosa* is a common species of the United States, and especially notable for its protogynous flowers.

FILAMENT. See BOTANY, Vol. IV, p. 123.

FILARIA. See NEMATOIDEA, Vol. XVII, p. 334; and VETERINARY SCIENCE, Vol. XXIV, p. 222.

FILBERT. See HAZEL, Vol. XI, p. 490.

FILDES, LUKE, a British artist; born in Liverpool, Oct. 14, 1844; studied in the schools of South Kensington, and later at the Royal Academy. He began his career by furnishing drawings on the wood to several papers and magazines, including *Cornhill Magazine*, *Once a Week* and the *Graphic*. He also illustrated books, more particularly those of Dickens and Lever. He first exhibited at the Royal Academy in 1868, when he sent *Nightfall*, followed in a few years by *The Empty Chair*, which achieved no small popularity. A still greater success was made with *Applicants for Admission to a Casual Ward*. Mr. Fildes forsook these mournful subjects for a series of gay scenes of Venetian life, single figures and brilliant portraits, but in 1891 produced *The Doctor*, one of the most popular pictures that had been exhibited at the Royal Academy. He was elected a Royal Academician in 1887. His wife also exhibited at the Academy, to which she sent, in 1878, *Peeling Potatoes* and *A Berkshire Cottage*.

FILICINÆ. See FERNS, Vol. IX, p. 89.

FILIOQUE. See CREEDS, Vol. VI, p. 496.

FILLMORE, JOHN COMFORT, an American musician and author; born in Franklin, Connecticut, February 4, 1843. He was graduated from Oberlin College, Ohio, and studied music at the Leipsic Conservatory. In 1867 he became professor of music at Oberlin and from 1878 to 1884 was professor at the Milwaukee School of Music. In 1883 he wrote a notable work, *The History of Pianoforte Music*, with which was incorporated biographical sketches of the great masters. An English edition of this work was published in London in 1885 and was favorably received. He also published *New Lessons on Harmony* (1887); based on the work of Dr. Riemann, *Lessons in Musical History* (1888), and has contributed numerous articles to the musical journals and reviews. W. M. C.

FILLMORE CITY, a growing city and the capital of Millard County, central western Utah, a few miles west of Mt. Catharine. It has a few public buildings and tanneries and flour-mills. Population, mostly Mormons, 1900, 1,037.

FILM PHOTOGRAPHY. See PHOTOGRAPHY, in these Supplements.

*FINANCES OF THE UNITED STATES. The circulation in the United States since 1861 has consisted of government and bank issues of paper, and of gold and silver coin.

When Congress convened in special session at the call of the President on July 4, 1861, the Treasury was practically empty. It was known that there was in circulation in the country $250,000,000 silver and gold and $180,000,000 of state bank notes,—in all, $430,000,000.

On July 17th, 13 days later, an act was passed providing for the issue of certain bonds and $50,000,000 Treasury notes, payable on demand, and commonly known as "demand notes." The issue of these notes was the first attempt to create a national currency. The fatal defect in the notes was the promise to pay on demand, when there was nothing to pay them with. These notes were paid out by the Treasury, but were presented for redemption in coin, or in payment of customs duties to the exclusion of coin, and thus both the banks and the government were greatly embarrassed by lack of a circulating medium, the banks suspending specie payments on Dec. 31, 1861, and the government a few days later. With the war expenditure of nearly two million dollars a day, it was apparent that a radical change in existing laws relating to our currency must be made, which should provide some form of paper money that would be available for circulation; and this was the subject of long debates in Congress.

As a solution of the problem, the act of Feb. 25, 1862, was passed, providing for the issue of United States notes to the amount of $150,000,000, not bearing interest, payable to bearer at the Treasury of the United States at Washington or New York, of which $50,000,000 were to replace the Treasury notes of the previous July. It also provided that the notes should be receivable in payment of all demands of every kind due to the United States, except duties on imports, and all claims and demands against the United States of every kind whatsoever, except interest upon bonds and notes, which was to be paid in coin, and, with these exceptions, that they should be lawful money and legal tender in payment of all debts, public and private, within the United States. It also provided that they might be converted into the six-per-cent bonds authorized by the same act, and that they might be reissued from time to time, as the exigencies of the public service should require. It was silent as to the time of payment of the notes, but each note contained a promise of the United States to pay a specific sum, and the implied obligation was to pay in coin as soon as practicable.

The measure was bitterly opposed in both Houses, all the Democrats and a few of the Republicans voting against it. Even the friends of the measure justified their action only as a war necessity, and none contemplated the retention of the notes in circulation when the exigencies which had called them into existence should have ceased. Subsequently, the amount of these notes was increased to $450,000,000, and the authority for their conversion into six-per-cent bonds repealed.

To create a market for the bonds of the government, a measure was introduced in Congress, which became a law Feb. 25, 1863, creating a system of banks under charter from the government, to issue notes to the extent of ninety per cent of the United States bonds deposited

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in the Treasury as collateral security for their payment. These notes were made redeemable in lawful money, but were not made a legal tender for debts. On the passage of this bill, one Democratic senator, Nesmith of Oregon, voted for it, and seven Republican Senators against it. In the House, two Democrats voted for it, and 25 Republicans against it. It was regarded as a peculiarly administration measure, being especially urged by the Secretary of the Treasury. Later, a tax of ten per cent per annum was imposed upon the issues of state banks, thus virtually driving them from circulation, leaving the field to the United States and national bank notes.

These acts were doubtless the most important and far-reaching of the financial measures of the war.

The great amount of the government issues, and the doubt of the ability of the government ever to redeem its notes in coin, caused them to become greatly depreciated in value, and when the Civil War ended there was a general feeling throughout the country that some steps looking to their appreciation should be taken. The House of Representatives, therefore, on Dec. 18, 1865, by a vote of 144 to 6, pledged co-operation with the Secretary of the Treasury to bring about as early a resumption of specie payments as the business interests of the country would permit; and on April 12, 1866, an act was approved directing the cancellation of United States notes to the extent of not more than $4,000,000 per month; but on Feb. 4, 1868, the act was repealed, leaving of such notes outstanding $356,000,000.

When, after the close of the war, nearly $300,000,000 of debt had been paid out of current revenue, it was proposed in Congress to refund the remaining bonds as rapidly as possible into others bearing a lower rate of interest. Here the question arose, whether the bonds known as 5–20's could be paid in lawful money after the period of five years, when, by their terms, they were redeemable. These bonds promised to pay so many dollars. Other bonds were specifically payable in coin, and still others were payable in lawful money—that is, in United States notes. These notes were then at a discount, being worth, in the market, about 86 cents in coin. But it was contended that they were an obligation of the United States, and it was the duty, and then within the power, of the United States to advance them to par in coin. This controversy as to the payment of the bonds in coin was decided by the act approved March 19, 1869, "to strengthen the public credit," which committed the government to the payment of United States notes and bonds in coin or its equivalent.

Different schemes with a view to appreciating the notes to par with coin were discussed in Congress, and many bills to that end introduced. To every such proposition, however, there arose no little opposition, and a party of considerable strength was organized which demanded further issues of the notes, regardless of their depreciated value.

At the first conference of Republican Senators held after Congress met in December, 1874, a committee, composed of John Sherman, William B. Allison, George S. Boutwell, Roscoe Conkling, George F. Edmunds, Thomas W. Ferry, F. T. Frelinghuysen, Timothy O. Howe, John A. Logan, Oliver P. Morton and Aaron A. Sargent, was appointed to formulate a bill for the purpose of advancing United States notes to par in coin, and thus return to specie payments. At first the divergence of opinion in the committee was so great that an agreement seemed almost impossible. Yet the necessity of an agreement was so absolute that a failure to agree was a disruption of the Republican party. The result was the passage of the act of Jan. 14, 1875, providing for the redemption, in coin, on and after Jan. 1, 1879, of the United States notes then outstanding. The bill was a party measure, and was passed in both houses by a party vote, no Democrat voting for it.

The act also provided for the redemption, in subsidiary silver, of the fractional notes which had been issued during the war, and of which about $40,000,000 was outstanding; for an unrestricted issue of national bank notes, and a retirement of United States notes to the amount of 80 per cent of the increase of such bank issues, and the redemption, in coin, of the United States notes at the subtreasury in New York on and after Jan. 1, 1879. To carry out the provisions of the act, the Secretary of the Treasury was authorized to use the surplus revenues of the Treasury and to sell any of the description of bonds authorized by the refunding act of July 14, 1870.

In 1876 the fractional notes were redeemed in silver coins, as provided by the act, the silver for the necessary coins being purchased by the government.

On Feb. 28, 1878, both Houses passed, over the veto of President Hayes, what was known as the Bland-Allison act, which directed the Secretary of the Treasury to purchase, at best rates obtainable, silver bullion to the amount of not more than four million, or less than two million, dollars' worth per month, and to have it coined into silver dollars of full legal-tender power, and to issue certificates, receivable for any government dues, upon the deposit of these coins in the Treasury. This act brought into circulation two new elements—silver dollars, the coinage of which had been prohibited since 1873, and the certificates. The reason for the veto of the President was his belief that to make, for all amounts, a legal tender of a dollar, the bullion in which was not of equal commercial value to the gold dollar, would greatly disturb the public credit. The requirements of the act were promptly carried into effect.

On Jan. 1, 1879, specie payments were resumed as contemplated, $140,000,000 of gold being held by the Treasury for that purpose, of which $95,000,000 had been accumulated by sale of bonds, as provided in the resumption act. There were outstanding, at the same time, of United States notes, about $346,000,000. On and

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after the day fixed they were, when presented for the purpose, redeemed with gold coin; but instead of the notes being presented for redemption, gold coin in exchange for them was deposited, thus increasing the gold in the Treasury, instead of depleting it.

Subsequently, an agitation for an increased use of silver arose in the Southern and silver-producing states. To appease this demand, the House of Representatives, in the first session of the Fifty-first Congress, passed a bill providing for the purchase of $4,500,000 worth of silver a month, to be paid for in Treasury notes. The Senate substituted a provision for the free coinage of silver as before 1873. The two propositions went to a conference committee of the two Houses, and the result was the act of July 12, 1890. It provided for the purchase of 4,500,000 ounces of silver bullion each month, and the issue in payment therefor of Treasury notes. It also repealed so much of the act of Feb. 28, 1878, as required the monthly purchase and coinage of silver bullion. It required the monthly purchase of a greater amount of silver than before, but that could be held in the form of bullion, and could be paid for by Treasury notes equal in amount to the cost of the bullion, the whole of which was held in the Treasury as security for the payment of the notes, the bullion to be coined only as necessary to redeem the notes.

These notes were designed to circulate as money, were made a full legal tender in payment of all debts, public and private, and were redeemable in either gold or silver, at the option of the Secretary of the Treasury; the law, however, declaring it to be the policy of the government to maintain a parity of value between the two metals. The requirements of this act were duly met, the Treasury purchasing and burying in its vaults nearly the entire product of the silver-mines of the country, issuing notes therefor, and coining dollars only as needed. When the notes were presented for redemption, it was thought that to refuse payment in either coin would destroy the parity, and therefore they were redeemed in gold when demanded.

In 1893 the country was in the throes of a commercial panic, which naturally still further diminished the public revenues, already reduced by the tariff act of 1890, known as the McKinley Law.

On the 8th of Aug. 1893, Congress met in extraordinary session, in pursuance of a proclamation of President Cleveland. Both Houses were Democratic. In his message the President depicted an alarming condition of the national finances, and attributed it to Congressional legislation touching the purchase and coinage of silver by the general government. He ascribed the evil of the times to the monthly purchase of 4,500,000 ounces of silver bullion, and the payment therefor with Treasury notes redeemable in gold or silver coin, at the discretion of the Secretary of the Treasury, and to the reissue of the notes after redemption. He stated that up to the 15th of July, 1893, such notes had been issued, for the purpose mentioned, to the amount of more than $147,000,000. In a single year more than $40,000,000 of these notes had been redeemed in gold. This threatened the reserve of gold held for the redemption of United States notes, and the whole financial system of the government.

A debate in Congress followed, lasting nearly four months, resulting, by the aid of the Republicans, in the passage of the act of Nov. 1, 1893, repealing the clause of the act of July 12, 1890, directing the purchase of silver bullion and the issue of Treasury notes in payment therefor.

The annual message of the President of Dec. 4, 1893, was especially urgent in recommending a revision of the tariff law. This led to the passage of what is known as the Wilson Tariff Law on Aug. 13, 1894. It was understood that this bill, as originally introduced, met the President's wishes, but it had been so changed in the course of a long debate, and in bringing the two Houses of Congress into agreement, that he refused to sign it, and it became a law without his approval. The act as passed met with no great favor in either party. The income tax therein provided was declared unconstitutional by the supreme court of the United States, and the other revenues provided fell short of a sufficiency to meet the current expenses of the government.

The gold reserve in the Treasury had been depleted by the redemption in gold of both the legal tender notes and the Treasury notes of 1890 presented for that purpose, and, to restore it, sales of four and five per cent bonds for gold were made by Mr. Cleveland's administration, to the amount of $262,000,000, for which a considerable premium was received. The President alleged that the reserve was despoiled for the benefit of those who found profit in shipping gold abroad, or whose fears induced them to hoard it at home. The difficulty, he thought, was, that, with about five hundred million dollars of currency notes of the government for which gold may be demanded, and which the law required to be reissued when redeemed and paid in gold, the same notes did duty many times in drawing gold from the Treasury. This he called "the endless chain of depletion." One remedy he proposed was, that when notes were redeemed, they should be canceled, and not reissued. On the other hand, those in favor of retaining the notes in circulation claim that such a difficulty has never occurred before, and that with a sufficient revenue there would be no necessity of reissuing notes redeemed until they were replaced by the gold which had been withdrawn for their redemption, thus destroying the "endless chain."

At the commencement of the session in December, 1895, the House of Representatives, largely Republican, promptly passed two measures intended to relieve the Treasury; one authorizing the sale of three-per-cent bonds to meet temporary deficiencies in the revenue, and the other to increase the tariff levied by the Wilson law 15 per cent, which increase it was supposed would yield about forty million dollars a year additional revenue. The bond bill was amended in the

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Senate, with a provision for the free coinage of silver, which amendment was disagreed to by the House, and as long as the differences of the two Houses remain irreconcilable, no further action can be expected on the bill. The tariff bill was also amended in the Senate committee on finance, by adding a free-coinage provision. It was so reported to the Senate and placed on the calendar, where it has thus far (1896) remained, as two attempts to call it up for consideration have been defeated by a combination of all the Democratic Senators with a few Republicans from states producing silver. Owing to conflicts of opinion between the administration and Congress, and between the Senate and House of Representatives, no financial legislation could be expected of the Fifty-fourth Congress. See also COINAGE LAWS, in these Supplements.

JOHN SHERMAN.

FINBACK-WHALE OR RORQUAL, a member of the genus *Balænoptera*, family *Balænidæ*. It is characterized by a dorsal fin, and equals the enormous Right Whale in size, although it yields much less oil than that animal. It is sometimes known as the razor-back. One or two species are found in the north Atlantic Ocean. See WHALE, Vol. XXIV, p. 553. R.W.C.

FINDING. See THEFT, Vol. XXIII, pp. 251, 252.

FINDLAY, the county seat of Hancock County, a flourishing town in the northwestern portion of Ohio. In 1885 it possessed few commercial advantages, but by the discovery of natural gas in that year it received an extraordinary impulse. By June 1, 1889, there were 43 wells in operation. The Great Karg well was the largest in the world until the discovery of the Tippecanoe in 1888. Numerous manufactories have been established; 11 glass-works employ seventeen hundred men, and two pressed-brick works have an output of forty million bricks per annum; there are also pottery-works, barrel, rake, stove, spoke, carriage and tool factories, foundries, machine-shops and mills. Findlay was one of the first places where aluminium was manufactured in commercial quantities. The city has several fine public buildings, among them a courthouse, a substantial stone structure costing over three hundred thousand dollars. There are 18 churches. Population 1890, 18,553; 1900, 17,613.

FINERTY, JOHN F., an Irish-American journalist; born in Galway, Ireland, in 1846; was educated in private schools, and became identified, while still a boy, with the Irish revolutionary movement. In 1864 he left Ireland for America, and served for about a year in the Union army. He became attached to the press of Chicago in 1865, and in this capacity witnessed the Fenian raids in Canada in 1866 and 1870. Thereafter he served in various capacities on other Chicago newspapers, and as a press correspondent visited the Rio Grande, Texas, and old Mexico, and was with General Miles during the historical campaign against Sitting Bull in 1879. Mr. Finerty organized the Irish Land League convention which met in Chicago in 1881, and which raised $500,000 for the cause of Ireland. In 1882 he began the publication of the *Citizen* newspaper, and in November of that year was elected to Congress as an independent from the second district of Illinois. He published *Warpath and Bivouac; or, The Conquest of the Sioux Indians* (1890).

FINGAL'S CAVE. See CAVE, Vol. V, p. 231.

FINGER. See ANATOMY, Vol. I, p. 726.

FINIAL. See ARCHITECTURE, Vol. II, p. 407.

FINING OR CLARIFICATION, the process of refining or purifying, referring particularly to the clarification of wines, malt liquors, etc. When wine is in good condition, it does not usually require fining, as the matter in suspension agglomerates, and is carried to the bottom shortly after the fermentation is completed; but when the wines are turbid, and contain mucilaginous matter which is inclined to remain in suspension, some material is used for securing its precipitation. Isinglass or gelatine is used for this purpose. The "fining" is mixed into some of the liquor to be fined, the mixture poured into the cask and the liquor stirred. The gelatine is coagulated or rendered insoluble by the astringent tannic acid of the liquor, and sinks to the bottom, carrying with it the suspended matter. The removal of astringent matters is, however, not in all cases advantageous, as the flavor and keeping qualities of the liquor are impaired. Albumen is preferred for fining red wines on this account, as it does not so much affect the flavor. In the clarification of syrups, albumen is used. Heat being applied, the albumen coagulates and contracts from its diffusion, forming a scum, which can be removed with the suspended matter which it has enveloped. What may settle to the bottom can be separated by means of bag-filters. Clear soups are made by the albumen of the meat itself performing the same function. Alcohol, as it coagulates albumen, may be used for fining wines or cordials without the application of heat, and it is used for fining red wines. Isinglass "fining" is made by soaking one pound of the material in three or four pints of water, sour beer or cider, adding more of the liquor until the isinglass dissolves; it is then strained through a sieve and is mixed with seven or eight gallons of the liquor to be fined. About a pint to a pint and a half is the quantity required for a barrel of ale or porter, or for a hogshead of wine. Ox-blood is used in the same manner as albumen or isinglass, especially in fining sugar. The sulphate of lime in the water at Burton-on-Trent is believed to aid in clarifying the famous ale there made. Alum is serviceable in the clarification of turbid or muddy water for drinking. A pinch of this substance will clarify a barrel of water within an hour. A strip of isinglass, or a piece of sole-leather, etc., will clarify coffee.

FINK, ALBERT, engineer, was born in Germany on October 27, 1827, and was educated in the Polytechnic School at Darmstadt. He came to America in 1849, and was employed by the Baltimore and Ohio railroad company, largely in bridge-building. He was also connected with

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the Louisville and Nashville railroad as chief engineer, and performed arduous labors on it during the Civil War. He was the designer of the earliest iron railroad bridges. In 1875 he was one of the organizers and became for a time the commissioner of the Southern Railway and Steamship Association, an organization for the reform, equalization and unifying of railroad and shipping freight rates. The system thus established was found to be of much benefit to the railroads and also to the mercantile community, and was in time extended throughout the country. After the rate wars of 1875–76 among the great trunk lines centering at New York, Mr. Fink was invited to organize a bureau called the Trunk Line Commission, to promote and maintain uniform rates and a harmonious understanding among the great trunk railroads. This commission was in time extended so as to cover nearly all railroads in the eastern and central States and Canada, and did much to put an end to costly rate wars. Mr. Fink was a member of the American Society of Civil Engineers, and its president in 1878. He died on April 3, 1897. W.F.J.

FINLAND. For the history of the grand duchy of Finland, now a Russian Province, see Vol. IX, pp. 188–92. The constitution of Finland, dating from the year 1772, reformed in 1789, and slightly modified in 1869 and 1882, provided for a national parliament, consisting of four estates—the nobles, the clergy, the burghers, and the peasants—convoked by the "Grand Duke," the Emperor of Russia, for four months. They discuss the schemes of laws proposed by the Emperor, who has the right of veto. The unanimous assent of all four chambers is necessary for making changes in the constitution and for levying new taxes. The national representatives have been regularly convoked, since 1861, every four or five years. The schemes of laws are elaborated by the "Committee for the Affairs of Finland," which sits at St. Petersburg, and consists of the state secretary and four members, nominated by the crown (two of them being proposed by the senate). The senate, which sits at Helsingfors, under the presidency of the governor-general, is nominated by the crown. It is the superior administrative power in Finland, and consists of two departments, justice and finance, which have under them the administration of posts, railways, canals, customhouses, hygiene, and the tribunals. The military department is under the Russian Ministry of War, and the foreign affairs under the Russian Chancellor. By a law of Aug. 14, 1890, the circulation of Russian rubles and silver money was rendered obligatory. Obligatory now also is military service in Russia, and a knowledge of Russian is insisted on for all senators, governors, and higher officials. "Russification" has even gone farther of late, despite the protests of the Finns, for on Feb. 15, 1899, the Russian government issued a manifesto which virtually annulled the Finnish constitution.

The following table shows the area of the several provinces, with the population for 1897:

Province.	Area.	Population.	Density per Sq. Mile.
Åbo-Björneborg	9,333	430,194	47
Kuopio	16,499	305,166	22
Nyland	4,584	276,335	61
St. Michel	8,819	186,478	26
Tavastehus	8,334	285,281	40
Uleåborg	63,957	268,226	4
Viborg	13,530	397,412	33
Vasa	16,105	446,772	30
Lake Ladoga	3,094		
Total	144,255	2,592,778	

The gradual increase of the population is seen from the following table:

Years.	In Towns.	In Country.	Total.
1870	131,603	1,637,166	1,768,769
1890	235,227	2,144,913	2,380,140
1897	291,584	2,301,280	2,592,864
1899	316,118	2,357,082	2,673,200

Of the total population, 2,620,891 were Lutherans, the others being Greek Orthodox, Roman Catholics, Methodists, and Baptists. The population includes 362,500 Swedes, 7,500 Russians, 1,900 Germans, 1,200 Lapps, and 2,300,100 Finns.

The chief towns are Helsingfors, population, with Sveaborg, 88,711; Åbo, 36,898; Tammerfors, 34,148; Wiborg, 25,235; Uleåborg, 15,526; Björneborg, 13,417; and Nikolaistad (Wasa), 14,646.

Education is well provided for. There is one university, which had, in 1900, 2,318 students, and a large number of other institutions for providing special and technical education.

The revenue for the year 1900 was $17,501,376 and the expenditure was $17,330,000. The public debt (Jan. 1, 1901), amounted to $22,709,772. The chief crops are wheat, rye, barley, flax, oats, sarrazin, peas, potatoes, and hemp. Cattle constitute the principal live-stock, there being 1,457,423. There were 1,031,181 sheep, 214,206 swine, 8,486 horses, and 119,917 reindeer. The imports in 1900 amounted to $54,151,000 and the exports to $39,546,000. The chief imports are cereals, coffee, sugar, hardware, cotton, woolens, machinery, chemicals, leatherware, tobacco, colors, and oils. The chief exports are timber, butter, paper, paper mass, cardboard, iron goods, cottons, leather, hides, tar, and pitch. The merchant marine numbered, in 1901, 4,938 vessels; aggregate capacity, 666,098 tons.

FINLAND, Gulf of, an arm of the Baltic, extending eastward along the 60th parallel of latitude for nearly three hundred miles into the coast of Russia. Its average width is 60 miles, and it is in few places over 60 fathoms in depth. St. Petersburg is situated at its eastern extremity. Its shores are rocky and its waters are only slightly salt.

FINLEY, John Park, an American meteorologist; born in Ann Arbor, Michigan, April 11, 1854. He was graduated from the State Normal School and State Agricultural School and became chief of the Signal Service Bureau of the Pacific

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Coast. He has written *Tornadoes* (1887); *Manual of Instruction in Optical Telegraphy* (1889); *Sailor's Handbook of Stormtrack, Fog and Ice Charts of the North Atlantic and Gulf of Mexico* (1889), and *Essay on the Development of Tornadoes* (1890). W.M.C.

FINLEY, SAMUEL, an American educator; born in Armagh, Ireland, in 1715. He came to America in 1734 and was licensed to preach in 1740. The first part of his ministry was much occupied with itinerant labors in promoting a revival of religion, at that time so remarkable throughout the country. In 1744 he was settled at Nottingham, Md., where he remained for seven years, and where he also conducted an academy which acquired a high reputation. In 1761 he was chosen president of the College of New Jersey (now Princeton University), an office which he held until his death. He published several sermons and theological treatises between 1741 and 1757, and edited the sermons of his predecessor, President Davies. He died in Philadelphia, July 17, 1766. E.E.T.

FINMARKEN, Norway, the northernmost province of the kingdom bounded south and east by Russian Lapland, and north by the Arctic Ocean. The coast is rugged, bold, deeply indented by fiords and fringed with islands, on the most northerly of which is North Cape; the interior is mountainous, bleak and inhospitable, affording few facilities for agriculture. Reindeer are domesticated; wild game, and the cod and other sea fisheries are the principal food resources of the natives. Hammerfest is the chief town. Area, 18,300 sq. miles; population, 33,000. C.L.S.

FINNEY, CHARLES GRANDISON, clergyman and educator; was born at Warren, Conn., on August 29, 1792, was privately educated, and was admitted to the bar. The first Bible he ever owned he purchased as a law book when he was twenty-nine years old. He read it, was converted, and at once abandoned his profession to become a preacher. He became the foremost "evangelist" and "revivalist" of his time, and was the chief figure in one of the most extraordinary revivals of religion in American history. He became a professor in Oberlin College in 1835, was its president from 1851 to 1866, and thereafter was its professor of pastoral theology. He died on August 16, 1875. W.F.J.

FINSCH, OTTO, a German ornithologist and traveler; born at Warmbrunn, Silesia, Aug. 8, 1839. After a journey of two years through Hungary and Turkey, he became assistant in the Royal Netherland Museum at Leyden in 1860, and from 1864–68 director of the Bremen Museum of Natural History and Ethnology. Having made several journeys through Europe and North America, he was appointed leader of the scientific expedition, sent out in 1876 by the Bremen Polar Exploration Society. Accompanied by Dr. Brehm and Count Waldburg-Zeil, he explored a part of Turkestan, of Northwest China and of the plateau of the Altai mountains, and proceeded along the River Obi to the Bay of Kara. Under the auspices of the Berlin Royal Academy of Sciences Mr. Finsch set out in 1879 for the South Sea, and visited the Hawaiian Islands, parts of Mikronesia, Melanesia, Australia and New Zealand, returning by way of Java in 1882. In 1884 he explored the northeast coast of New Guinea, and established the German protectorate over that territory. Since 1898 he is conservator of the Leyden Museum of Natural History. His works include *Neuguinea und Seine Bewohner* (1865); *Die Papageien* (Monography, 1867–69); *Die Vögel Ostafrikas* (1870); *Reise nach West Sibirien* (2 vols., 1879); *Samoa-Fahrten, Reisen in Kaiser-Wilhelmsland und English New-Guinea* (1888); *Ethnographische Erfahrungen und Belegstücke aus der Südsee* (in 3 parts, 1883–93); *Der Dujong* (1901). His *Gipsmasken von Völkertypen der Südsee und des Malaischen Archipels* furnished valuable material for anthropology. G.A.S.

FINSTERWALDE, a small town of central Prussia, in the province of Brandenburg; situated on an affluent of the Black Elster, 40 miles N. of Dresden. It has manufactories of cloth and machinery; spinning and weaving are also carried on. Population, 7,371.

FIORELLI, GIUSEPPE, an Italian archæologist; born in Naples, June 8, 1832. From 1845–49, he was in charge of the excavations at Pompeii, and was appointed, in 1860, superintendent of antiquities of Southern Italy, and professor of archæology at Naples. In 1862, he became director of the National Museum at Naples and of the excavations in Lower Italy, in 1875 general superintendent of the Italian Museum and of excavations, and in 1881, of Antiquities and Liberal Arts. Became a senator in 1865. He died at Naples, Jan. 29, 1896. Among his works are *Pompeianorum Antiquitatum Historia* (2 vols., 1853); *Descrizione di Pompei* (1875); *Documenti inediti per Servire alla Storia dei Musei d'Italia* (4 vols., 1878); etc. G.A.S.

FIRE-ALARMS. A modern fire-alarm telegraph consists of a central station where batteries are maintained, wire circuits connecting this station with the street signal-boxes, and the alarm apparatus, including, usually, a bell-striker in a tower and gong-strikers in engine-houses, etc. Within a few years many improvements have been introduced in the way of perfected automatic apparatus for the central station. One of them is the Gamewell automatic non-interfering repeater, which is so arranged that a signal sounded on one circuit is instantly repeated on all the others. An accidental signal caused by a break in the wire of a circuit only sounds one stroke, when it is thrown out of service, the other circuits remaining in operation. If a battery weakens, or the current on a circuit is interrupted in any manner, the one stroke of the bell-striker gives notice of the difficulty, so that it actually protects the efficiency of the entire system. The Gamewell Company have also introduced an improved signal-box, which is so guarded that two alarms cannot be sent in together and become mixed, as is possible with the older systems

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Those in use in Philadelphia are arranged to rewind by means of the pulling down of the lever that sends each alarm of fire. As a result, they are always in working order.

In 1895 the Franklin Institute of Philadelphia awarded a medal to the Goldstein pneumatic fire-alarm system, which is designed to protect factories and large buildings. The apparatus consists of a thermostat that may be influenced by the heat of a fire near by; an annunciator, receiving an alarm from the thermostat, and operating a visual floor-signal and also a bell; a transmitter, to send an alarm to the nearest engine-house. The whole system is connected by inclosed pipes, which may be laid within a building in the ordinary manner. The thermostat has disks, which remain in place until subjected to a temperature of 150° F., when the solder that holds them melts, and the disks fall apart, releasing a rod and spring, which drive a cylinder in the pipe, causing an air-pressure that affects a sort of bellows in the receiver or annunciator. When the bellows is operated, a mechanical gong is sounded and a shutter is dropped, displaying a sign indicating the room or floor on which the fire has occurred. A local alarm, wound to run for fifteen minutes, is also set in operation. The annunciator and local alarm are intended to be placed at the main entrance of a building, to attract the attention of passers-by and to notify any one investigating as to the part of the building in which the fire has started. The transmitter is a magneto-electric machine, and the impulse of air from the thermostat releases a weight, that causes the transmitter to send an alarm to the engine-house, central telephone station, or the like. A wheel geared to the armature of this machine is furnished with contact-springs, by means of which the number of the installation at the factory is telegraphically indicated at the exchange.

C. H. COCHRANE.

FIRE-ARMOR, appliances fitted for use in burning buildings to facilitate escape, or the use of fire-extinguishing apparatus, and for work in mines filled with choke or fire damp. It is of two kinds. In one the wearer breathes from a supply of compressed air carried in a suitable reservoir; in the other, the air is filtered through some porous substance, moistened and interposed between the wearer and the atmosphere. The efficacy of each has been proved beyond dispute. An esteemed invention is that of George Crofutt, from 1873 to 1874, termed the "eye and lung protector," a species of mask held over the face by an elastic band passing around the head. It weighs but a few ounces, and may be instantaneously fitted into place. The wearer breathes through a moist sponge contained in a porous cotton bag, which not only cools the air passing through it, but also eliminates dust, noxious gases, foul odors, etc. The eyes are protected by plates of transparent mica inserted in a duplex steel shell, so covered and edged with rubber as to exclude smoke and dirt.

FIREARMS. See GUNS AND GUNNERY, in these Supplements.

FIRE-BRICK. See FIRE-CLAY, Vol. IX, p. 207.

FIRE-CRACKERS, a species of fireworks, of Chinese origin, consisting of a small sealed paper cylinder charged with gunpowder, and provided with a string fuse, by which it is exploded. The smallest fire-crackers are about two and one half inches long, the largest running to a foot and longer. The tube is made of strawboard; the fuse is of spun cotton, which is soaked in a mixture of starch and fine gunpowder. The explosive mixture consists of powdered charcoal, bichromate of potash and chlorate of potash; this mixture is used for squibs, devil-chasers and explosive pin-wheels. Fire-crackers, which formerly all came from China, are now extensively manufactured in the United States. The process is simple.

The pasteboard is cut into strips, which, when rolled up, make a cylinder of the required diameter, and consisting of several thicknesses of pasteboard. Ten-inch fire-crackers are about two and one half inches in diameter. They are rolled into hollow tubes by machinery. The bottom of the tube is plugged with a piece of cork, pith or pasteboard, the top is plugged with clay or wood-pulp, and through the clay is carried the fuse, which is put in position first. This is accomplished by slipping the tube over a hollow pin, which is about three quarters of an inch shorter than the tube. Each pin has a round hole, through which the fuse is stuck. This enables the maker to have the clay packed closely down on the head of the pin and around the fuse.

The explosive compound is next dropped into the tube, and the end plugged with a piece of cork or other material. The crackers are then covered with red paper and laid aside to dry, ready for use.

FIREDAMP. See COAL, Vol. VI, pp. 67–69, 73.

FIRE DEPARTMENT AND APPARATUS, RECENT IMPROVEMENTS IN. The steam-engines of later years vary materially in construction. In one type, the boiler has inch tubes depending from its roof, like stalactites, down into the fire; thus the water in them gets the full benefit of the heat. In another, small groups of tubes are hung like tiny steam-radiators to the roof of the fire-box, and connected with the side of the box as well, so that the water circulates up through a nest of small tubes; a third type has a coil of water-pipe running around the fire and down into the side of the fire-box. Each type has its advocates. A feature not generally known is the water-tank for supplying the boiler. It is generally located under the driver's seat, and is used only when the engine is pumping salt or foul water.

The most powerful land engines have two steam-cylinders, capable of throwing solid water through a two-inch nozzle two hundred feet over level ground.

The hose is usually carried on a reel or spool, supported on two or four wheeled vehicles, or the hose may be laid flat on the bed or box of a sim-

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ple four-wheeled truck. In practice it is found that a hose so applied can be stretched for work more quickly, and when the fire is out can be loaded more readily.

A Water-Tower consists of an iron tube so pivoted over one end of a truck that its top may be raised to a height of sixty feet above the street pavement. The upper end of the pipe ends in a nozzle, controlled by a man on the truck. Two, three or four engines may be coupled at the base and their united streams forced through the pipe and out at the nozzle. They send a solid two-and-a-quarter-inch stream through the top windows of a six-story building with ease. The earliest towers were put in position by man-power; the later ones are raised by carbonic-acid gas, generated in a retort suspended near the rear axle of the truck, and acting upon the piston-rods of two cylinders, very like steam-engine cylinders. The gas is quickly generated, and in sufficient quantity to exert a pressure in the cylinder of over one hundred pounds to the square inch. A derrick is raised over the forward wheels of the truck, and with the aid of this derrick the pipe is rapidly brought into a perpendicular position by means of a metal rope working over pulleys, and a hand-winch.

The hook and ladder trucks usually carry 10 ladders, varying in length from 10 to 75 feet. Some are 92 feet long. These longest are permanently fixed to turn-tables on the trucks that carry them, and are raised by cranks, screws and pulleys.

By their use, persons on the tops of buildings or in the upper stories can be quickly and readily swung over onto the roofs of adjoining buildings, or across the street, to a place of safety.

Scaling-Ladders are unique contrivances, and consist of a single rod, with rungs passing through or bound to it, and a hook with reach enough to grasp any wall over the window-sill. Scaling-ladders are of the greatest benefit in securing an entrance to a building through the windows, and in rescuing lives. The fireman raises the ladder, drives the hook through the window of the first story, and catches it over the sill; climbs up, throws his leg over the sill, and lifts the ladder to the next story. If he discovers that the window immediately above is so full of flame that he cannot use it, he reaches with his ladder for one on either side, then swings loose, vibrating like a pendulum. He goes in this way to the proper height, when he lowers a cord to the ground, to which a life-line is attached, and people who could not otherwise escape are safely lowered.

Throwing a Line with a Rifle is a novel device for quickly reaching the top of a building. A smooth-bore Remington gun with a ten-inch wound barrel is used. The projectile is a long pear-shaped cap, that fits over the muzzle, with the end of a light line fixed fast to a ring in its base. A blank cartridge does the work. The line goes upward a distance of two hundred feet, and when it falls is caught and used to draw up the heavier line.

If the fire be such that the life-line would be burned, and thereby be rendered worthless, there is provided a wheel-shaped net, made of slender ropes, and of 10-feet diameter. It is held by as many determined men as can get hold of it. When ready, they call upon the person in peril to jump, who, with no prospect but death if he stays, rarely disobeys. While not every one escapes unhurt, there are instances where men weighing two hundred pounds have safely jumped a distance of one hundred feet.

Iron water-pipes fixed to buildings are of the greatest benefit, by reason of being constantly in place. They are put both on the outside and the inside of buildings, according to the preference of the owner, and extend from the street or sidewalk above the roof, and to the cellars and subcellars, where they are especially valuable. On the inside, short branches project from the main pipe, and to these are usually attached the necessary length of hose for protecting that story. Where buildings are thus provided for, it is only necessary to attach the engine-hose to the iron pipe built on or into the house, and the fireman goes within to find everything ready for immediate use. Such pipes are of the greatest use when fires are smoldering in a cellar. The minutes lost in carrying hose through doorways, or breaking openings through sidewalks, have resulted in the loss of many buildings.

The Air-Washer is a device for washing the smoke out of the air in any room, but is especially intended for use in cellars. It is a short section of pipe fitted with a sprinkler, after the manner of a lawn-sprinkler. In its use a hole is cut through the floor, if no other way is found, the washer is passed through, the water turned on, and showers are thrown in all directions.

Floating Engines or *Fire-Boats*, the best of which are built of steel, are about 125 feet in length, 25 to 27 feet wide, and draw about nine feet of water. They are provided with monster boilers and triple-expansion engines. There are two propeller-wheels, one being connected with the rudder and the wheel-shaft in such a way that it swings with the rudder, and aids the boat in turning almost upon her center.

The pumps are in four sets of two each. From them the water is forced into an air-chamber, thence through four standing pipes, which rise through the deckhouse—two forward and two aft. The nozzles at the ends of the pipes are so attached that they control every possible direction in which it may be desired to turn them. The floating engines are kept with fires partially banked, but steam up. At a signal, the fires are raked, the lines thrown off, the throttle thrown open, and the conflagration headed for. At a rate of nearly twenty sea-miles an hour she rushes along, dodging the sea-craft with remarkable ease by reason of the rudder-propeller attachment, and if the fire be at the water's edge, as on a pier or steamer, can run so close that the flames envelop her stem. The whole power of the boilers is quickly turned upon the pumps, with no loss of time, for there is no hose to lay. The force of

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the water driven through the five-inch nozzle is such that it carries all woodwork before it, tears off roofs, and even bursts through brick walls, thus obviating the use of axes.

On these floating engines there are always screens for protecting the men who would otherwise be exposed to the fury of the flames. The screens are made of steel plate, and are double, having an air-space between. Each section is six feet long, and four and a half feet above the rail arching over the deck. Peep-holes to look through, and other holes large enough to direct a small stream through, are also provided. If the decks or any other part of the water-engine become too hot for safety or comfort, the captain, instead of backing the boat out to cool off, turns the water on from skillfully arranged sprinklers, thus protecting the workers while they attend to the greater fire.

The imperial German government has introduced a *fire-proof suit* of such efficiency that a fireman may approach a conflagration, either in a building or on board ship, with comparative freedom from danger. It consists of a helmet, jacket, trousers, boots and mittens. The helmet is constructed of light wicker-work, covered with a composition making it perfectly air and water tight. In the front part of the helmet is a glass window, which closes hermetically, but which may be opened and closed by the wearer as may be required. Connected with the helmet are the jacket and hose or trousers, made of water-proof double material. The trousers are supported by leather suspenders. The jacket falls over the trousers at the waist, and is fastened by a belt. The sleeves of the jacket are connected with water-proof gloves. Passing through the back of the helmet is a tube for the conveyance of air, which is distributed by means of smaller tubes throughout the interior around the head of the wearer, thereby keeping the head constantly surrounded with fresh air, and also preventing the accumulations of moisture-cloudiness on the glass, thereby enabling the wearer to see and breathe freely.

The fireman thus encased is further provided with a water-tube, by means of which he is enabled to send a spray of water over himself, as an additional protection against fire or heat. By a special tube he can convey water into the helmet like a douche. Thus protected, he can approach a fire with impunity, is enabled to make his investigations, and more successfully combat the danger, whether in dense smoke or fierce flame. The new costume has been adopted by all the fire brigades in Berlin, and by those of other Continental cities, and has also been provided for all the vessels of the German navy.

In no other field of human activity is the value of time more clearly recognized than in the modern fire department. The fraction of a minute saved in the first attack upon a fire often means the saving of hundreds of thousands of dollars; while not infrequently a human life may depend upon the celerity with which the brave firemen reach the scene of a conflagration with their ladders, life-lines, nets and other life-saving appliances. Every agency known to science for economizing time is utilized. The alarm is sounded by electricity. (See FIRE-ALARMS, in these Supplements.) The same current of electricity which sounds the note of warning in the engine-house releases the fastening of the horses in their stalls. These sagacious animals, thoroughly trained in the performance of their duties, instantly spring to their places in front of the engine. The harness, suspended from hooks overhead, drops upon their backs, where it is quickly fastened with clasps, the doors of the engine-house fly open, and barely eight seconds have elapsed between the sounding of the alarm and the exit of the engine from the engine-house. The sleeping-room of the firemen is on the second floor, directly over the engine. Stairs, which are provided as a means of reaching this room from below, require too much time to descend; hence, large holes are made in the floor, in the center of each of which is a brass rod, reaching to the main floor, down which the firemen slide, in order to save an extra second or two of time. The fireman who should use the stairway, descending it as quickly as he might, would find, when he reached the ground-floor, that the horses were harnessed, the fires lighted and the

STEAM FIRE-ENGINE.

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engine half a block away. In order to make steam quickly, the water in the boiler of the engine is kept hot at all times, a stationary boiler in the engine-house keeping the water at a proper temperature when the engine is "at rest."

One of the important adjuncts of the fire department of a great city is a school for horses, where they undergo a thorough and systematic course of education. After months of patient training, only the more intelligent and sagacious horses are assigned to active duty, it being impossible to educate a large percentage of the animals to the requirements of a well-ordered fire department.

Fire-Extinguishers. Of these there is a large variety, each with its advocates. The fire-extinguisher, commonly so termed, is a metal cylinder, with a capacity of about a quarter of a barrel. (See FIRE, Vol. IX, p. 202.)

In some varieties, there are two vessels, one containing a bicarbonate, the other a strong acid, sometimes oil of vitriol. These are contained within a larger cylinder, containing water. When wanted for use, the contents of the two smaller vessels are thrown into the water, carbonic-acid gas is set free, and is absorbed by or dissolved in the water, and the whole is immediately ready for use.

In some machines other agencies are used. By opening a suitable valve in the hose or outlet, the confined gas forces out the liquid in a strong jet, while yet heavily charged with carbonic-acid gas, which, being non-combustible, materially assists the action of the water as an extinguisher.

Another, the Babcock, has its cylinder filled with a solution of bicarbonate of soda, with a vessel of acid suspended in its upper part. This smaller vessel has a stopper, which, being withdrawn, causes the vessel to tilt over, and the escaping acid, mingling with the solution, discharges the carbonic acid under heavy pressure.

The transition from the small extinguisher to one large enough to necessitate carriage by wheels and drawn by horses was easy and natural. In order to provide against the contingency of exhaustion of a cylinder, and the apparatus becoming thereby temporarily worthless, as at large fires, an additional cylinder was added, so that while one is in use, the other may be resupplied with the necessary chemicals.

Grenades, or bombs, are small glass spheres readily fitted to convenient places in halls, rooms, offices, etc., and are intended to be thrown by hand against the portions of the structure on fire, thus breaking the glass and liberating the contents for extinguishing the flames.

FIREFLY, a name applied to many "phosphorescent" insects, which are all included within the order *Coleoptera*, or beetles. Some of them (among the elaters) give forth a steady light, and these may be distinguished as fireflies proper from the glow-worms and "lightning-bugs" (among the lampyrids), which flash light intermittently. In the phosphorescent *Elateridæ*, furthermore, the production of light has its seat more anteriorily than in the *Lampyridæ*, where it is abdominal.

The most brilliant fireflies are species of *Pyrophorus*, most at home in tropical America. One form (*Pyrophorus noctilucus*) common in the West Indies and Brazil, attains a length of about an inch and a half, and has a dark rusty brown color. On the upper surface of the first ring of the thorax are two yellowish oval spots, which are brilliantly luminous during the nocturnal activity of the beetle; while on the first ring of the abdomen a still brighter organ is situated. The luminous organs are special modifications of the epidermic cells, which are disposed in two layers, of which the outer alone is luminous. The luminosity depends on a process of oxidation; the oxygen is supplied by the tracheæ, and the brilliancy varies with the respiratory activity. What the substance oxidized really is remains undiscovered.

The light of these living lamps, or cucujos, as the Mexicans call them, has frequently saved a traveler's life; the Indians "travel in the night with fireflies fastened to their hands and feet, and spin, weave, paint and dance by their light." See COLEOPTERA, Vol. VI, p. 120.

FIREHOLE RIVER is a branch of the Madison River, in the Yellowstone National Park, Wyoming. It flows from Lake Madison through the Firehole Basin, where are some of the most notable geysers in the world. W.F.J.

*FIRE INSURANCE IN THE UNITED STATES SINCE 1879. The changes in the methods of conducting fire insurance in the United States during the past 15 years have been many, some of them undoubtedly for the better, and on the whole tending toward a more scientific basis for the fitting of the rate charged to the risk assumed. Experience has enabled underwriters to make a better classification of risks, and during the past three years, at least, better results, from the standpoint of the stockholder, have been secured. Better building-construction in the large cities, better care of premises, increased efficiency of fire departments and water-supply, the installation of automatic sprinklers in large mercantile and manufacturing establishments, and vastly improved installation of electric wires used for power or lighting have been brought about by the fire-underwriters. With the introduction and now almost universal use of electricity in its application to light manufacturing, street-car propulsion by the trolley system, and for lighting purposes, general and domestic, a distinct fire-hazard has been developed, formerly unknown. This has, however, been pretty effectually met by the prompt measures taken by the underwriters. In the latter part of 1892 the Underwriters' National Electrical Association was organized, and a system of thorough inspection of risks by experts was inaugurated, and rules applied for the installation of electric wires, and the government of the use of electricity in its various forms, extra charges of premium being made for neglect to observe the prescribed regulations. More recently an electrical bureau, under the direction of the National Board of Fire Underwriters, has been established, with head-

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quarters in Chicago, to which regular descriptive reports are made, by the local boards of underwriters throughout the country, of all fires caused by electric wires, and a classified bulletin issued to all companies and agencies, containing a summary of the information received. Through the efforts of the Electrical Association and the National Board of Fire Underwriters, municipal ordinances governing the use of electricity and providing for systematic inspection have been adopted in very many of the larger towns and in the principal cities.

Classification of Risks, Supervision and Rating. Persistent attempts have been made, with more unanimity than formerly, by the fire insurance managers, for a more accurate classification of hazards, and to devise schedules of rating adequate to meet the distinct hazards of various kinds in different localities. To this end, underwriters' associations, made up of representatives of the leading companies, have been formed since 1880, having general supervision of the business in the various sections of the United States. These associations regulate rates and agents' commissions, in their respective territories, for the companies comprising them, excepting in the principal cities. There are many companies outside the general associations which make rates for themselves, but the great majority of the important companies are "tariff" companies, and adhere to agreed rates. The New England Insurance Exchange, with headquarters in Boston, was organized in January, 1883, and controls rates and commissions for the New England states, with the exception of New Hampshire (which is rated by a state board) and the city of Boston, which is under the supervision of the Boston Board of Underwriters. In 1881 the Underwriters' Association of the Middle Department was organized, its territory now being Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia. The Southeastern Tariff Association was formed in 1882, and has jurisdiction over most of the Southern states. The Western Union, as it is generally called, has for many years supervised the business of the West and Northwest for the companies composing it, and includes about all the states and territories, excepting the Pacific Coast states, west of the Alleghanies. Until 1895 the Pacific states were supervised, first by the Pacific Insurance Union, and later by the Pacific Board of Underwriters, but since 1895 that territory has been in a disorganized condition.

In New York City and vicinity, rates and commissions are regulated by the New York Tariff Association, while the balance of the state is supervised by the New York State Board. In all the cities and towns of importance, local boards of underwriters exist, subject to the control, through committees and commissions, of the above-named general associations. Diversity of interests and sharp competition have subjected these associations, at times, to a severe strain, but so far they have remained intact and efficient in maintaining adequate rates and regulating commissions. Several states maintain state boards for purposes of general co-operation, but not as rating bodies, as a rule. The Fire Underwriters' Association of the Northwest, having a continuous existence since 1871, is an influential organization, composed of the managers and fieldmen of the West and Northwest, who meet annually in convention at Chicago as a free parliament for the discussion of insurance topics, and has been of great service as an educator, but studiously refrains from attempting the exercise of supervisory functions. Of a similar character is the Underwriters' Association of the Pacific, meeting in San Francisco. The National Board of Fire Underwriters, with headquarters in New York, for a time attempted the exercise of general supervisory and rating functions, but for several years past has confined its work to the gathering and dissemination of statistical information, the inspection and improvement of fire departments, improved building construction, the detection of incendiaries, and a better system of electrical installation. Its work is broadly educational and suggestive. The work of the various supervising and rating associations above named has, it is claimed, resulted in a better classification of risks and a more scientific system of schedule rating. In the hazard on manufacturing risks, great improvements have been brought about during the past few years, through the methods adopted by the "mill mutuals" of New England. These companies were formed almost exclusively for the insurance, on the mutual plan, of cotton and woolen mills and kindred establishments, and have adopted a system of exceedingly stringent regulations for the mill-owners, involving the most approved construction of buildings and machinery, extra watchfulness of premises, internal fire-extinguishing devices and domestic fire brigades, with ample water-supply, and numerous other safeguards unnecessary to mention. The large stock companies, also, have factory insurance associations, operating under similar conditions; and as the result of this system of inspection and extra protection, the fire loss, and consequently the rate, has materially decreased on the class of risks named.

Insurance Supervision and Legislation. One of the peculiar experiences to which American insurance companies are subjected, to a great extent unknown in other countries, is a system of supervision, under a more or less intricate code of laws, administered by an insurance commissioner in each of forty-five states, in which there is great diversity of requirements. In several of the older and more important states there is uniformity in some of the regulations adopted to govern insurance companies, such as amount of capital required, license fees and standard form of policy to be used; but in a score of features the laws are widely different and constantly changing. At each session of the state legislatures numerous new bills or amendments to old laws are introduced pertaining to the supervision of insurance

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many of which the companies regard as hostile to their interests. In a few states, somewhat recently, "anti-combination" laws have been passed applying to insurance, prohibiting the existence of tariff associations, state boards and compacts of any kind designed to fix rates. In other states, special taxation of premiums for the benefit of fire departments has been prescribed; while in fourteen of the states "valued-policy" laws are now in force, providing that the full amount named in the policy, whatever the actual value of the property insured, must be paid in cases of total loss. In some cases the clause in policies, extensively used for some time past, called the "eighty per cent co-insurance clause," has been prohibited by statute. The clause provides that unless the owner carries insurance equal to eighty per cent of the value of the property, he shall become a co-insurer for the deficiency. Spasmodic efforts have been made during the past dozen years by the state insurance commissioners, who meet annually, to secure greater uniformity in the laws of the several states governing insurance, but without much success.

Classes of Companies. The great bulk of the fire-insurance business in the United States has always been transacted by joint-stock companies, of which, at the close of 1895, there were about 260 American and 26 foreign companies, 20 of these being British, two Canadian and the other four German companies. The American companies are of varying degrees of financial strength, the cash capital ranging from $100,000 to $4,000,000 each, and the assets from $150,000 to $10,000,000. The foreign companies are required to deposit $200,000 with the insurance department of some state and to place $500,000 in the hands of American trustees as a condition precedent to commencing business in this country. When a company complies with these requirements by entering one of the principal states, the commissioners of the other states (with two or three exceptions, where a special deposit is required) admit it to do business on the same terms as are applied to a domestic company of another state. As a matter of fact, most of the foreign companies are first admitted to New York state, though several have first been authorized elsewhere. Since 1892 a class of combinations have sprung up, mostly in New York, offering fire insurance protection under the name of the "Lloyds." These are simply associations of individuals, each of whom becomes responsible for a definite amount, and who jointly appoint an "attorney," who acts as the insurance manager of the concern. These combinations have, as a rule, refused to report or become amenable to the state insurance departments, claiming immunity from supervision on the plea of "individual rights." A large number of these "Lloyds" have appeared during the past two years, and they have transacted a very considerable business. At this writing (June, 1896), the authorities of the state of New York have pending vigorous legal proceedings against a large number which have been doing business, it is claimed, in violation of a law formed expressly to apply to this class of insurers. The immediate result is the cessation of business by the class affected, though a small number of Lloyds financially strong and obedient to legal requirements continue successfully in the field. There has always been a large number of mutual fire insurance companies in this country, ranging in importance from the "township mutual," as a local affair, to the company seeking business in an entire state, or in several states. The number has widely varied at different periods, hundreds having disappeared during the past decade, and many new companies coming into existence. The most stable and the strongest of the mutuals are the mill mutuals of New England, above referred to. In 1895 the number of mutuals, not including any of the township mutuals, or others purely local, was about two hundred, altogether writing probably about one twentieth in amount of the risks written throughout the country by all companies.

Statistics of the Business. The growth of property values, and he consequent increase of the insurance area in the United States, has been rapid, but insurance facilities have increased in about the same proportion. Comparing 1880 with 1895, the number of companies in existence shows a decrease, but the assets reported show a large increase. In 1880 the total assets of all classes of companies, home and foreign (the assets of the latter being only those held in the United States), amounted to $216,000,000, in round numbers, and in 1895 to $350,000,000. The capital of the stock companies has been exceedingly variable: reported at a little over $73,000,000 in 1880, at $93,000,000 in 1885, decreasing to $85,000,000 in 1890, and to $70,000,000 in 1895. The number of American stock companies was about 295 in 1880; in 1885, about 270, rising to 325 in 1890, and decreasing to 260 in 1895. Concentration has of late years been the order of the day, fewer companies transacting the business, many of the smaller companies being crowded out. It is estimated that since 1875 about 265 companies have retired, most of them reinsuring with other companies, causing the withdrawal of about $50,000,000 of capital. A considerable number has failed outright, while a good many new companies have come in to supply the vacancies made. The number of foreign companies has not varied materially, those doing business ranging from 23 to 27 each year since 1880, but their operations have steadily grown in importance, as indicated by the fact that their assets in the United States have increased from $27,392,000 in 1880 to $61,260,973 in 1895, and that the volume of risks written has increased in proportion.

STOCK COMPANIES (INCLUDING FOREIGN).

Year.	Nos. of Cos.	Insurance Written.	Premiums Rec'd.	Losses Paid.
1880	319	$7,822,655,000	$62,793,575	$36,858,495
1885	304	10,645,250,500	99,265,600	53,650,800
1890	350	13,602,300,000	115,235,075	61,791,350
1895	285	15,068,250,000	139,350,200	74,156,400

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The record of the mutuals (excluding township and other obscure local companies) has been, as nearly as can be ascertained, as follows:

MUTUAL COMPANIES.

Year.	No. of Cos.	Insurance Written.	Premiums Rec'd.	Losses Paid.
1880	275	$630,600,500	$5,760,000	$3,508,550
1885	200	450,560,000	4,665,000	2,530,220
1890	192	535,300,250	15,870,325	8,256,500
1895	203	660,400,000	17,230,425	9,390,386

The above tables indicates the trend of the business since 1879 in the entire country, as transacted, respectively, by the joint-stock and mutual companies. The combined capital of both stock and mutual companies was in 1901 $73,150,875.

The grand total for 1900 for all stock companies and mutuals combined was: Risks written, $20,000,000,000; premiums received, $182,130,774; losses paid, $108,357,171. The average ratio of losses to premiums from 1880 to 1895, inclusive, has been about 58 per cent. The rate of premium charged has varied from 86 cents on each $100 of risks in 1880 to $1.02 in 1885, standing at $1.00 in 1890, and increasing to $1.08 in 1895. The rate question is the ever-present one in fire insurance, and will continue to be, as it has been, subject to marked variations from a variety of causes.

FIRE ISLAND, a small island in eastern Great South Bay, Long Island, belonging to Suffolk County, New York. It is a favorite summer resort. Fire Island Beach, 30 miles long, with a fine lighthouse, separates Great South Bay from the Atlantic. Fire Island has served as a special quarantine station to prevent the invasion of cholera.

FIRE-PROOF BUILDING. See Architecture, in these Supplements.

FIRESHIP, a vessel, usually an old one, filled with combustibles, sent in among a hostile squadron, and there set on fire in the hope of destroying some of the ships. W. R. B.

FIREWORKS. See Pyrotechny, Vol. XX, pp. 141–143.

FIRE-WORSHIPPERS. See Parsis, Vol. XVIII, p. 332; Hestia, Vol. XI, p. 698.

FIRKOWITSCH, Abraham, a Karaitic archæologist; born at Lutzk in Volhynia, September 27, 1786; died at Dschufut-Kale in the Crimea, June 7, 1874; known as a zealous collector of literary and epigraphic monuments pertaining to ancient Karaitic history of which a number were bought for the imperial library of St. Petersburg. After his death the unreliability, nay intentional forgery of many statements in his *Massa-u-Meriba* and *Abne-Likkaron* were clearly proven. G. A. S.

FIRMAN, a word of Persian origin, signifying an order, used by the Oriental nations for any permit to travel or do business, and by the Turks to denote any official decree emanating from the Ottoman Porte. The right of signing any firman relating to affairs connected with his special department is exercised by every minister and member of the divan; but the office of placing at the head of the firman the *thograï*, a cipher which contains the name of the sultan in interlaced letters, and which alone gives effect to the decree, is committed to the hands of a special minister, called *nichandji-effendi*.

FIRST-BORN (Heb., *bekor;* Gr., *prototokos;* Lat., *primogenitus*), in Scriptural use, the first male offspring, whether of man or of other animals, due to the Creator, by the Mosaic law, as a recognition of his supreme dominion. The first-born male child, being devoted from the time of birth to God, was to be redeemed within one month after birth by an offering not exceeding in value five shekels of silver (Exod. xiii, 13). The headship of the family was vested in the first-born son by the Mosaic law, and he had a double portion of the inheritance. See, for other laws and usages not Scriptural, Primogeniture, Vol. XIX, pp. 752 et seq.

FIRST-FRUITS, that portion of the fruits of the earth which, by the usage of the Jews and other ancient nations, was offered to God as an acknowledgment of his supreme dominion, and as a thanksgiving for his bounty. See Tithes, Vol. XXIII, p. 438.

FIR-WOOL, a species of fibrous material manufactured from the leaves of various species of the genera *Pinus* and *Abies*, and woven into cloth for use in the treatment of skin diseases. Fir-wool extract and fir-wool oil are prepared from similar pine leaves. W. R. B.

FISCHER, Ernst Kuno Berthold, a German philosopher; born in the Silesian village of Sandewalde, July 23, 1824; and educated at Posen, Leipsic and Halle, taking his degree of Ph.D. at the latter place in 1847. In 1850 he became a privat-docent of philosophy at Heidelberg. Suddenly, however, in 1853, presumably because of private charges of pantheism made against the first volume of his *History of Modern Philosophy*, the Baden government, without explanation, deprived him of his position. In 1856 he received a call to the chair of philosophy at Jena, where he remained until 1872, in which year, Zeller having succeeded Trendelenburg at Berlin, he obtained Zeller's post at Heidelberg. Fischer's chief work is his *History of Modern Philosophy* (1852–77). His other great philosophical achievement is his *System of Logic and Metaphysics* (1852; new ed. 1865). Of his smaller works, the most noteworthy is a *Critique of Kant*, which, like *Descartes and His School*, has been translated into English.

HAMILTON FISH.

FISH. See Ichthyology, Vol. XII, pp. 660–733.

FISH, Hamilton, statesman, was a member of a distinguished New York family, and was born in New York on August 3, 1808, and was graduated from Columbia College in 1827. He became a lawyer, held various local offices, was elected to the legislature in 1837 and to Congress in 1843,

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being then a leader of the Whig party. He was governor of New York in 1848–50, and U. S. Senator in 1851–57. In 1869 he became Secretary of State of the United States, and had a distinguished career, making the treaty of Washington in 1871 and settling under it the Alabama claims by arbitration at Geneva, and managing the troubles with Spain over the *Virginius* affair. He presided over the peace conference between Spain and Chili, Peru, Ecuador and Bolivia, and performed many other great public services. He died on Sept. 7, 1893. W.F.J.

FISH, NICHOLAS, soldier, was born in New York on August 28, 1758, and studied at Princeton. He entered the Revolutionary army in 1776, served at Saratoga, Monmouth and Yorktown, and rose to be lieutenant-colonel. He was a brave fighter, a fine disciplinarian, and a close friend of Washington and Hamilton. In 1786 he was adjutant-general of the State of New York, and from 1806 to 1817 an alderman in New York City. He was the father of Hamilton Fish (q.v.). He died on June 20, 1833. W.F.J.

FISH-CULTURE. For a general historical discussion, see PISCICULTURE, Vol. XIX, pp. 135–138. Fish-culture in the United States is under the jurisdiction of the United States Fish Commission. This commission is a bureau established by act of Congress of Feb. 9, 1871. The executive work of the bureau is in the hands of the Commissioner of Fish and Fisheries. The object of the establishment was to investigate the condition of the food-fishes of the sea-coast and inland waters of the United States. The offices of the bureau have gradually been extended, until the commission now supervises the propagation and distribution of useful fishes, and promotes the fishing industries of the country. The bureau is now one of the most important of the government service. From a single commissioner it has grown into four divisions for carrying on the work —the divisions of administration, of inquiry respecting food-fishes, of statistics and methods, and of fish-culture.

In the division of administration is included the department of publications, which, in 1893, distributed 2,700 bound volumes of reports and bulletins and about 11,000 copies of separate treatises. Every state in the Union is entitled to an allotment of fish and fish-eggs for culture. During 1893 19 states received such supplies, and in 1892–93 there were distributed of the various kinds of fish a total of about 180,000,000 eggs and fish, divided as follows: 12,000,000 eggs, 165,000,000 fry and 1,500,000 adult fish. Fish-hatcheries and stations are maintained as distributing-points in various sections of the country. Fish-culture is carried on by the authorities of almost every state. In a number of states a special officer, entitled the fish commissioner, is appointed by the executive and paid by the state for his services. The duties of this officer consist mainly in the enforcement of the laws enacted by the legislature for the protection of the fish. Fishing with seine is forbidden in most states, and in some cases the time for the catching of certain fish is limited by law.

FISHER, FORT, a Confederate fortification for the protection of Wilmington, North Carolina, during the Civil War. It was situated on an embankment at the mouth of the Cape Fear River, and was, in the fall of 1864, the only fortification of importance remaining to the Confederacy. Early in December, 1864, the Union generals decided to assault it by a combined military and naval attack. Accordingly, December 15th, an attack was made by General Butler and Admiral Porter. They were repulsed on the land side, and the project abandoned for the time. Again, on January 13th, an attack was made, General Terry in command of the land forces. This was successful. The loss to the Union was 646 killed and wounded; to the Confederacy, 217 killed and wounded, and 2,083 made prisoners.

FISHER, GEORGE JACKSON, physician, was born in Westchester County, New York, on November 27, 1825, and was educated at the Medical College of New York University. He became physician of the state prison at Sing Sing in 1853–4, was president of the Westchester County Medical Society in 1857–8, and was president of the Medical Society of the State of New York in 1874. He was the author of various works on professional topics, including a history of surgery and biographies of the physicians of Westchester County. He died at Sing Sing, New York, on February 3, 1893. W.F.J.

FISHER, GEORGE PARK, clergyman and educator, was born at Wrentham, Mass., on August 10, 1827, and was educated at Brown University (1847), and the Yale and Andover theological seminaries. He pursued further studies in Germany. In 1854 he became professor of divinity, and in 1861 professor of ecclesiastical history, at Yale, which latter chair he still occupies. His bibliography is a voluminous one, including biographical, historical, theological and controversial works, and a multitude of contributions to the leading magazines and reviews. He has received honorary degrees from various universities, in America and Europe, and ranks as one of the foremost Christian essayists and philosophers of the age. W.F.J.

FISHERIES QUESTION, THE. For a summary of the fisheries dispute between Canada and the United States up to 1887, see FISHERIES, Vol. IX, pp. 234, 235. In 1887 a conference was arranged, to be held at Washington, at which all vexed questions should be discussed, and, if possible, some amicable and lasting conclusion arrived at with regard to outlines and boundaries, modes of preventing unjust seizure and detention of vessels, the question of obtaining bait and supplies, and also the question of payment of damages resulting from wrongful acts of officials. The members of this conference were Sir Charles Tupper, Canadian plenipotentiary; the Right Honorable Joseph Chamberlain, British commissioner, and Sir Lionel Sackville West, the British Minister at Washington, representing British

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and Canadian interests, while Secretary Bayard, William L. Putnam of Maine and President James B. Angell of Michigan University associated to guard American interests. The conference was opened in Washington in November, 1887, and on Feb. 15, 1888, a treaty was signed, subject to ratification or rejection by the United States Senate within two years. It was rejected by that body on Aug. 21, 1888. Under the *modus vivendi* clause of the treaty, however, the Canadian government continued to grant licenses to United States fishermen, which, in 1890, numbered 119, costing $14,461. In 1895 47 licenses were granted, costing $5,570. In November, 1895, the section (14) of the acts of 1888 under which the licenses were granted was declared, by the Canadian government, to be without force and no longer operative. Licenses for 1896 were granted under an old act of the Canadian Parliament. For an account of the Bering Sea fisheries question, see BERING SEA QUESTION, in these Supplements.

FISHERY LAWS. By the common law, the owner of the soil on streams or bodies of water is entitled to the exclusive right to fish in such waters. The owner, therefore, of the adjacent land on both sides of a stream enjoyed the sole right to fish in the stream within the limits of the boundary of his land, and the owner of the land on one side had the same right, but only to the exact center of the stream. This common-law right still prevails in the United States, except where restricted by statute or by well-defined local custom or usage. This right is so well established as to streams which are not navigable as to be the subject of separate transfer, but the right will pass with the land, unless specifically reserved. On navigable streams the owner's rights are subject to the right of navigation by the public, and no obstructions will be permitted which will prevent the free use of the stream as a highway for boats. The right of fishing in the sea, or in any bay or arm of the sea, or in tide-waters, belongs to the public in general.

Wherever the owner of adjacent land has the exclusive right to fish in contiguous waters, this right is always subject to the right of the state legislature to regulate the manner in which such right shall be exercised, and such owner has no right to obstruct the free passage of fish along such waters. The legislature may prohibit fishing, except at certain periods of the year, even in private bodies of water. By act of Congress the office of Fish Commissioner is created, and a similar office is provided for by statute in many of the states. The duties of such officer are to prosecute investigations to ascertain any diminution of food-fish in lakes and other coast waters, and report any failure of the supply thereof to the legislative body. Such officers in the various states are empowered to keep the stock of food-fish replenished in waters within the state. It is generally agreed, in international law, that the exclusive right to take fish in the sea over which a nation has jurisdiction belongs to the subjects of such nation for a distance of three miles, or at most within the range of a cannon-shot, from the shore. These rights, however, are frequently regulated by treaty. Many controversies have arisen between Great Britain and the United States relative to the fishery rights along the northern shores of the British possessions in America, but these rights have now become quite well defined by treaty.

FISH-HAWK. See OSPREY, Vol. XVIII, p. 59.

FISHKILL-ON-THE-HUDSON OR FISHKILL LANDING, a village of Dutchess County, southern New York, on the New York Central and Hudson River railroad, 50 miles N. of New York City. It has good public schools, a hat factory, machine and boiler factory and an insecticide factory. Historically, Fishkill is full of interesting associations. The district was purchased from the Indians toward the end of the seventeenth century. By the time of the Revolution the whole district was well cultivated, populous and prosperous, with a community mainly Dutch and English. Fishkill village served as the meeting-place of the provincial convention, and held the patriots' treasury and state archives. It was one of the principal camps for the American army, and in the Verplanck House was framed the constitution of the Society of the Cincinnati. The Beacon Hills, northeastward of Fishkill, were used as alarm-posts in the struggle for freedom. Population 1890, 3,617; 1900, 3,673.

FISH-LOUSE, a name applied to any of the copepod crustaceans which occur as external parasites, both on fresh-water and marine fishes.

FISHPLATES. See RAILWAY, Vol. XX, p. 251.

FISHWAY. An improved form of fishway, or fish-ladder, was exhibited at the Columbian Exposition in Chicago by the Pennsylvania State Fish Commission. It has been patented by William H. Rogers, and is in use in numerous rivers in Pennsylvania, New York, Canada and elsewhere. Its introduction has been very successful in causing shad to ascend dams that previously blocked the rivers above. Many rivers in Nova Scotia have been populated with gaspereaux and salmon through the medium of these fishways. Their construction is simple, consisting of a sluiceway five feet wide and three deep, running through the dam at a grade of one foot in ten, and provided with a series of fences or buckets, set alternately in either side, in such a manner that several inches of water are maintained throughout the whole of the sluiceway. Only a small quantity of water is let in from above, and its force is reduced to a minimum by the obstructions caused by the fences, which form a series of little pools. This sluiceway is made quite strong with timber cribwork, bolted to the bedrock and to the dam, and ballasted with stone. Provision is made for the admission of light, so that the fish may be attracted to the sluiceway. The head of the fishway is sloped so as to turn away floating ice, and a breakwater is usually arranged to keep it free from *débris*.

C. H. COCHRANE.

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FISK, CLINTON BOWEN, an American soldier and educator; born in Greigsville, New York, Dec. 8, 1828. In 1830 he was taken to Michigan, where his father founded the town of Clinton. He was educated at Albion and Ann Arbor and afterward settled in business at Coldwater, Michigan, and St. Louis, Missouri. He entered the army in 1861, rose rapidly to the rank of brevet major-general, and was commander of the Missouri district. After the war he was a commissioner of the Freedman's Bureau, and founder of Fisk University at Nashville, Tennessee, for colored men and women, with which he remained as president until his death. From 1874 until his death he was president of the Indian Commission. He was prominently connected with many educational and religious institutions. In 1888 he was the candidate of the Prohibition party for President of the United States. He died in New York July 9, 1890.

CLINTON B. FISK.

FISK, JAMES, an American jurist; born in Vermont in 1762. He practised law at Swanton; sat as a Democrat in the national House of Representatives, 1805–09 and 1811–15; declined the office of United States judge for the Territory of Indiana in 1812; was judge of the Supreme Court of Vermont, 1815–16; United States senator from Dec. 1, 1817, to November 16, 1818; and was collector of customs for the district of Vermont, 1818–26. He died at Swanton, Dec. 1, 1844.

E.E.T.

FISK, WILLBUR, an American clergyman and educator; born in Brattleboro, Vt., Aug. 31, 1792. He graduated at Brown University in 1815. He studied law, but in 1818 joined the New England Conference of the Methodist Episcopal Church. He was stationed at Charlestown, Mass., 1819–20; presiding elder of the Vermont district, 1823–27; chaplain to the Vermont legislature, 1826; principal of Wesleyan Academy, Wilbraham, Mass., 1826–31; and was president of Wesleyan University from 1832 till his death, which occurred at Middletown, Conn., Feb. 22, 1839.

E.E.T.

JOHN FISKE.

FISKE, JOHN (EDMUND FISKE GREEN), an American historian and philosopher; born in Hartford, Connecticut, March 30, 1842. At the age of thirteen he assumed the name of his great grandfather, John Fiske. He was graduated from Harvard in 1863 and from the Harvard Law School in 1864. He was admitted to the bar in the same year but never practiced. His first contribution to literature was in 1861 when he wrote a criticism of Buckle's *History of Civilization in England*. In 1869 he was appointed a lecturer at Harvard and in 1872 became assistant librarian. In 1879 he went to England and delivered a series of lectures on American history. In 1884 he was appointed to the chair of American history in Washington University at St. Louis, where for some years he held annual lecture courses. He had by this time established an international reputation as a thinker and writer in evolutionary philosophy and as the foremost expounder to English-speaking students of Herbert Spencer's philosophical system. His *Outlines of Cosmic Philosophy, Based on the Doctrine of Evolution* (1874) won strong approbation from Darwin. In 1879 his attention was turned toward American history and thereafter his philosophical studies took a secondary place. In his *Idea of God* (1885) and *Origin of Evil* (1886) he gave ultimate presentation of his confirmed views on questions of philosophy and religion. In his historical work he is particularly strong in early American research and his writings are in a most pleasing narrative style and particularly dramatic. His published works, in addition to the volumes already mentioned, include *Myths and Mythmakers* (1872); *The Unseen World* (1876); *Darwinism and Other Essays* (1879); *Excursions of an Evolutionist* (1883); *The Destiny of Man* (1884); *American Political Ideas, Viewed from the Standpoint of Universal History* (1885); *The Critical Period of American History* (1888); *The War of Independence* (1889); *The Beginnings of New England; or the Puritan Theocracy in Its Relation to Civil and Religious Liberty* (1889–98); *Civil Government in the United States* (1890); *The American Revolution, Considered with Some Reference to Its Origin* (1891); *The Discovery of America, with Some Account of American Antiquity and the Spanish Conquest* (1892); *History of the U. S. for Schools* (1894); *Edward Livingston Youmans* (1894); *Old Virginia and Her Neighbors* (1897); *The Dutch and Quaker Colonies in America* (1899); *Through Nature of God* (1899); *New France and New England* (1902), and *Essays, Literary and Historical* (1902). Died in Gloucester, Mass., July 4, 1901. W.M.C.

FISKE, MINNIE MADDERN, an American actress; born in New Orleans in 1860, daughter of Thomas Davey, a Southern manager, and Lizzie Maddern, of an English family of stage people. At the age of three she appeared on the stage at Little Rock, Arkansas, as the Duke of York in *Richard III.* Her education was supervised carefully by her mother, who devoted her life to the purpose. Miss Maddern appeared with Laura Keene, in New York, in *Hunted Down;* as Prince Arthur in *King John*, at Booth's Theater; as François in *Richelieu;* as Louise in *The Two Orphans.* She was the original Ralph Rackstraw in Hooley's Juvenile Pinafore Company, and at the age of 16 appeared as Clip in *A Messenger from Jarvis Section*, and continued the success made

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therein by appearing in *Caprice*. In 1890 she married Harrison Grey Fiske, editor of the New York *Dramatic Mirror*, and retired from the stage to prepare for a career in more pretentious plays. She was recognized at once as a powerful actress on her reappearance, her later successes being in *Marie Delroche; A Doll's House; A Light from St. Agnes; The White Pink; Cesarine; Divorçons; Tess of the D'Urbervilles;* and *Becky Sharp*.

FISK UNIVERSITY, Nashville, Tenn., a co-educational institution for the higher education of colored persons, founded in 1867 by Clinton Bowen Fisk, after whom it is named, and nominally under the control of the Congregational Church. In 1901 there were 30 instructors, 502 students, and about 7,142 volumes in the library. Inclusive of 1901, 433 had been graduated. The institution has a small endowment, which is augmented by yearly contributions of various benevolent societies. In 1901 its total income was $44,230. The majority of the students are supported by means of the manual-labor department. A complete industrial system is taught, and, in addition to the collegiate course, special instruction in medicine, theology, and normal teaching is given.

FISSIROSTRES, a name formerly used to denote a large group of birds included in the order *Passeres* or *Insessores*. The word means "split-beaked," and refers to the habit of catching insects on the wing. Such birds as the swallows were included in this title. R.W.C.

FISTULINA, a genus of fungi, allied to *Boletus*, common on old oaks and various other trees. *F. hepatica*, the "beefsteak fungus," has a red, fleshy, edible body, with red juice, and is much esteemed in some parts of Europe and America as an esculent, being wholesome and nutritious.

FITCH, Asa, an American physician and entomologist; born in Clinton County, New York, February 24, 1809. He was graduated from the University of New York, studied medicine and became a practicing physician. He had meanwhile studied natural history and especially entomology. In 1837 he abandoned his profession to devote his time to natural science. He was made state entomologist in 1854. He died in Salem, New York, April 8, 1878. W.M.C.

FITCH, Ashbel Parmelee, lawyer and publicist, was born in Clinton County, N. Y., on October 8, 1848, and was educated in the universities of Berlin and Jena, Germany. He became a lawyer and politician in New York City, and was elected a representative in Congress, as a Republican, in 1886. Being opposed to the Protectionist policy, he was never in full agreement with the Republican party, and during his Congressional term he separated himself from it on the tariff issue and became a Democrat. He was three times reelected to Congress as a Democrat, and was a conspicuous member of the House. In 1893 he was elected controller of the City of New York, and served until 1898, showing high ability as a municipal financier. He was a student of literature, and collected a notably fine library. He died on May 3, 1904. W.F.J.

FITCH, Ebenezer, educator, was born at Norwich, Conn., on September 26, 1756, was graduated from Yale College in 1777, and was a tutor there for eight years. Thence he went to Williamstown, Mass., and became principal of a school, which was presently developed into Williams College, of which he was the first president, from 1793 to 1815. Thereafter he was pastor of a Presbyterian Church at Bloomfield, N. Y., until 1827. He died at Bloomfield on March 21, 1833. W.F.J.

FITCH, Joshua Girling, a British inspector of schools; born in 1824. He graduated from the University of London, and entered immediately into educational work. From 1852 to 1856 he was vice-principal of the Normal College. He became principal, and in 1863 was appointed a government school inspector. He was active in the service until 1894, when he retired from public life. He was at various times special commissioner, and in 1888 visited America. He published *Notes on American Schools and Colleges* (1888) and a number of essays on teaching.

FITCH, John Lee, artist, was born at Hartford, Conn., in 1836, and studied art in Europe. For a number of years he was settled at Hartford, but the latter portion of his life was spent in New York City and its suburbs. His best paintings were woodland scenes, such as *In the Woods*, *A Mountain Brook*, *Twilight on the Brook*, etc. Most of his works were exhibited in New York. He died at Yonkers, N. Y., in 1896. W.F.J.

FITCHBURG, a city of north-central Massachusetts, in Worcester County, on the Nookagee River, and on the Fitchburg and New York, New Haven and Hartford railroads. The growth of the city during the last decade has been considerable. A well-equipped fire department has been established, with 60 telegraphic fire-alarm stations. There were, in 1890, 12 churches and 24 school buildings, the latter being valued at $275,000. A public library and art-gallery building costing $90,000 has been donated to the city by one of its public-spirited citizens, and another has given $450,000 for the establishment and endowment of a public hospital. The library contains 22,310 volumes. Manufacturing is carried on extensively, the principal establishments being paper-mills, machine-shops, iron foundries, saw factories, cotton, woolen and flour mills, shoe factories, wood-turning establishments and shirt factories. It has street-railways, electric lights and other modern city conveniences. Population 1880, 12,429; 1890, 22,037; 1900, 31,531. See also Fitchburg, Vol. IX, p. 236.

FITZGERALD, Augustus Frederick, Duke of Leinster, an Irish nobleman, the third of his title; born in London, Aug. 31, 1791. He succeeded to his title and estates when he was 13 years of age. He took part in British politics as a Liberal, but in Irish politics he was a Conservative. He received the appointment of lord-lieutenant of County Clare, Ireland, in 1831, and was a mem-

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ber of the Queen's Privy Council. He died in London, Oct. 10, 1874.

FITZGERALD, EDWARD, chiefly known as the translator of the quatrains (*Rubdiydt*) of the Persian poet, Omar Khayyám, was born near Woodbridge, in Suffolk, England, March 31, 1809, and died at Mereton Rectory, Norfolk, June 14, 1883. His father, John Purcell, took his wife's family name of Fitzgerald on the death of her father, in 1818, and with the name he assumed the family arms. In 1816 the family, who were in good circumstances, went to France, where they resided for some years, partly at St. Germains and partly in Paris. In 1821 young Fitzgerald was sent to King Edward VI's School at Bury St. Edmunds, and from there he proceeded to Trinity College, Cambridge, where he took his university degree in 1830. At both school and college he formed valued friendships, the more notable of which were with Thackeray, James Spedding (the editor of Lord Bacon's works) and the brothers Tennyson. Another fast friendship was that formed later in life with a grandson of the poet Crabbe, which had much to do in influencing his literary and social career. After a period of travel abroad, Fitzgerald settled down in England to the life of a country gentleman, with ample leisure for reading and study, which began to bear fruit in the 50 s, when he published, anonymously, *Euphranor*, a platonic dialogue on chivalry, and a collection of apothegms, entitled *Polonius*. His scholarly and *dilettanti* tastes at the same time attracted him to Spanish and Persian literature, the immediate fruit of which were his translations of *Six Dramas of Calderon*, and a translation from the Persian of Jámi's *Sálámán and Absál*. Meanwhile, he pursued his reading in Persian, and came across the writings of the astronomer-poet of the eleventh century, Omar Khayyám, whose work so fascinated him that he soon produced a matchless translation of his now famous quatrains. *Rubdiydt* first appeared in its English dress in 1859, but the work took nearly ten years to be at all widely known, and then their thoughtful philosophy, akin to that of Lucretius, and the wonderful felicity of the translation, attracted many admirers, whom later years have largely increased. A second edition appeared in 1868, a third in 1872, and a fourth in 1879—all published anonymously. American editions of the *Rubdiydt* were published in Boston in 1878 and 1888, and in 1884 appeared the sumptuous folio edition, with 56 full-page illustrations and ornamental title by Elihu Vedder. In 1889 Fitzgerald's *Letters and Literary Remains*, a collection of rare charm to men of letters, were edited, in three volumes, by Dr. W. Aldis Wright, and show the manifold gifts of their author as a scholar and poet. Readers of current literature need hardly be told that Fitzgerald was, throughout his life, the intimate friend, and, at times the severe but cultured critic, of the laureate Tennyson.

FITZGERALD, EDWARD, clergyman, was born at Limerick, Ireland, in 1833, and came to the United States in his boyhood. He was educated at the College of the Barrens in Missouri, and at Mount St. Mary's College, Emmittsburg, Maryland. He became a priest of the Roman Catholic Church in 1857, and was settled over a parish at Columbus, Ohio. There he spent ten years, attracting much attention by his ability and efficiency. In 1867 he was appointed bishop of Little Rock, Arkansas. W.F.J.

FITZGERALD, OSCAR PENN, an American clergyman and auther; born in Caswell County, North Carolina, August 24, 1829. He removed to California in 1855 and became editor of the *Pacific Methodist and Christian Spectator*. He was state superintendent of public instruction in California from 1867 to 1871 and in 1878 was appointed editor of the Nashville *Christian Advocate*. He was made a bishop of the Methodist Episcopal Church South in 1878. His works include *California Sketches; Christian Growth; The Epworth Book; Sunset Views* (1900); *The Day and the Word* (1898). W.M.C.

FITZGERALD, PERCY HETHERINGTON, author; was born in County Louth, Ireland, in 1834, was educated at Trinity College, Dublin, and was called to the bar and made crown prosecutor in northeastern Ireland. He is best known as a most prolific writer of novels and biographies, his bibliography comprising more than 200 titles. Many of his novels have been published as serials in *All the Year Round* and *Once a Week*. His biographies include those of Wilkes, the Sheridans, Kitty Clive, King Theodore of Corsica, Sterne, Garrick, Charles Lamb, Dr. Dodd, Henry Irving, King William IV, King George IV, and many others. He has also written some plays, including *Vanderdecken*, produced by Henry Irving. W.F.J.

FITZPATRICK, WILLIAM JOHN, an Irish writer; born in Griffinrath, County Kildare, Ireland, Aug. 31, 1830. He received his education in Ireland, at both Protestant and Roman Catholic schools, and became a lawyer, and a magistrate for the counties of Longford and Dublin. His fame, however, rests upon his work as a biographer and miscellaneous writer. Two of his later historical works, *Correspondence of Daniel O'Connell: His Life and Times* (1888) and *Secret Service under Pitt* (1892), attracted widespread comment, and placed him among the best of British historians. Others of his works are *Ireland before the Union* (1869); *Irish Wits and Worthies* (1873); and *The Sham Squire and the Informers of 1798* (1866). Died in Dublin, Dec. 24, 1895.

FIVE FORKS, BATTLE OF, fought April 1, 1865, between the Confederates under Pickett and the Federals under Sheridan, at Five Forks, Dinwiddie County, Virginia. It was a decisive battle, being an immediate step toward the capture of Petersburg and the surrender at Appomattox. Grant had decided to move upon Lee's right and cut him off from Petersburg. To this end he sent Warren with the infantry and Sheridan with the cavalry around to the extreme left. Lee had concentrated a large force at Five Forks, determined to hold what he thought the key to

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the situation. On May 31st Warren fought the battle of White Oak Ridge with a severe loss. Sheridan attacked the intrenchments at Five Forks, where Pickett's corps was stationed. At first Sheridan was driven back, but, being reinforced the next day, April 1st, by Warren's corps, carried the fortifications, and the entire remaining Confederate force of over 5,000 was captured. The Federal loss was about 1,000.

FLACOURTIACEÆ, a family of plants of a single genus (*Flacourtia*), and consisting of shrubs and small trees, almost exclusively confined to the Oriental tropical regions. Many of the species produce pleasant, sweet or subacrid fruits. The family is sometimes included in *Bixaceæ*, in which *Bixa orellana* of tropical America is the best-known species, the testa of whose seeds yields the well-known orange or yellow dye *arnotto*, or *annatto*.

FLAD, Henry, a German-American civil engineer; born in Bavaria, November 12, 1823. He was graduated from the University of Munich in 1846 and in the following year removed to the United States. He was chief engineer of construction of the Ohio and Mississippi railroad from 1849 to 1861. In the Civil War he began service as a private and was promoted to the rank of colonel of engineers. In 1870 he was engineer of the bridge over the Mississippi River at St. Louis and constructed the park and water system there. In 1885 he was elected president of the American Society of Civil Engineers. He was appointed a member of the Mississippi River Commission in 1892. W.M.C.

FLAG, The American. Prior to the separation of the American colonies from England, the flags used were generally those of the mother-country; but in 1774 Captain Markoe of the Philadelphia Light Horse used a flag with a canton of 13 stripes. In the latter part of 1775 Dr. Franklin and Messrs. Lynch and Harrison were appointed to consider the subject of a national flag. The result of this conference was a flag like that of the East India Company and the Sandwich Islands—the king's colors, or union jack, representing the yet recognized sovereignty of England, with a field of 13 stripes, alternate red and white, emblematic of the union of the 13 colonies. The new flag was hoisted for the first time, Jan. 2, 1776, over the camp at Cambridge. When independence was determined on, the British jack was dropped, and 13 stars substituted, representing a new constellation. Nothing further of importance was done on the question of a national flag until April 4, 1817, when Congress enacted,—1. That from and after the Fourth of July, 1818, the flag of the United States be 13 horizontal stripes, alternate red and white; that the union be 20 stars, white in a blue field; 2. That on the admission of every new state in the Union, one star be added to the union of the flag; and that such addition shall take effect on the Fourth day of July then next succeeding such admission. The first flag unfurled under the new law was hoisted over the United States House of Representatives, April 14, 1818. The law of 1817 remains unchanged to the present day, the number of stars having increased with the admission of states. See also Flag, Vol. IX, pp. 241–244.

FLAGELLATA. See Protozoa, Vol. XIX, pp. 881–886.

FLAGELLUM, a whiplike appendage of certain infusoria, bacteria, etc., which acts as an organ of locomotion. It may be defined as an isolated and greatly enlarged cilium. See Histology, Vol. XII, p. 6.

FLAGEOLET. See Flute, Vol. IX, p. 307.

FLAGET, Benedict Joseph, clergyman, was born in France on November 7, 1763, and was educated at Clermont and Issy. He became a Roman Catholic priest, and professor in the seminary at Nantes. At the outbreak of the French Revolution he came to America, was a missionary in Indiana, and became a professor in Georgetown and St. Mary's colleges. In 1810 he was made bishop of the diocese of Bardstown, Kentucky. His diocese was of vast extent, reaching from the Mississippi River to the Alleghany Mountains, and from the Great Lakes to Louisiana, but it was a wilderness, containing only six priests besides himself, but he labored earnestly and the church grew. In the course of twenty-five years he founded four colleges, and many seminaries and other institutions, and saw two new dioceses formed from parts of his. In 1841 his seat was changed to Louisville, where he laid the cornerstone of the cathedral in 1849. He died there on February 11, 1850. W.F.J.

FLAGG, Edmund, author and journalist, was born at Wiscasset, Maine, on November 24, 1815, and was graduated from Bowdoin College in 1835. He was for some time a teacher at Louisville, Ky., and then studied law and admitted to the bar but devoted his attention to journalism and authorship. He edited papers at St. Louis, Mo., and Louisville, Ky., at the latter city being associated with George Denison Prentice, and was secretary of legation at Berlin in 1848 and consul at Venice in 1850. He was also for a year the chief of the U. S. Bureau of Statistics. He wrote in addition to official reports *The Far West; Venice, the City by the Sea; Northern Italy Since 1849*, and numerous novels, including *Carrero*, *Francis of Valois*, *Blanche of Artois*, *The Howard Queen*, and *Mary Tudor*. He died in 1890. W.F.J.

FLAGG, George Whiting, artist, was born at New Haven, Conn., on June 26, 1816, and studied art in the United States and England. He was elected an associate of the National Academy in 1843, and a member in 1851. He produced a variety of works, comprising portraits, historical scenes, and genre paintings. His best-known works are *The Princes in the Tower*, *Columbus and the Egg*, *Washington Receiving His Mother's Blessing*, *The Execution of Lady Jane Grey*, and *The Landing of the Pilgrims*. He spent much time on the island of Nantucket, and died there on January 5, 1897. W F.J.

FLAGG, Isaac, an American educator and

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author; born in Beverly, Massachusetts, September 7, 1843. He was graduated from Harvard in 1864 and studied in Berlin and Gottingen. From 1871 to 1888 he was professor of Greek at Cornell, and 1891 was appointed professor of classical philology in the University of California. He has written *Vercicles; Lines of Cornelius Nepos; Outlines of Attic Prose; The Seven against Thebes; The Hellenic Orations of Demosthenes; Iphigenia among the Taurians*, and has edited other classical works. W.M.C.

FLAGG, WILSON, naturalist, was born at Beverly, Mass., on November 5, 1805, and was educated at Harvard College but was not graduated there. He became a political and general writer for various newspapers and magazines in Boston, including the *Atlantic Monthly*, and at length turned his attention to natural history, agriculture and horticulture. He was an officer of the custom-house in Boston from 1844 to 1848, and a few years later settled at North Cambridge, Mass., where he spent the rest of his life engaged in literary work and observations of natural history. His published books include *Studies in the Field and Forest*, *Woods and Byways in New England*, *Birds and Seasons of New England*, and others of similar character. He died at North Cambridge on May 6, 1884. W.F.J.

FLAG-OFFICER. See NAVY, Vol. XVII, pp. 300–301.

FLAGSTAFF, a village and the capital of Coconino County, northern Arizona, just south of the San Francisco Mountains, in a region of superb scenery. It is reached by the Atchison, Topeka and Santa Fé and Central Arizona railroads. Mining, lumbering, farming, and stock-raising are its occupations. Population 1890, 963; 1900, 1,271.

FLAGSTONE. See GEOLOGY, Vol. X, p. 212.

FLAMBOROUGH HEAD, a promontory of the Yorkshire (northeastern England) coast, forming the northern boundary of Bridlington Bay. It terminates a range of white perpendicular chalk cliffs, six miles long, containing fossil sponges, crinoids, etc. On the headland is a lighthouse 214 feet high.

FLAMBOYANT. See ARCHITECTURE, Vol. II, pp. 377, 408.

FLAME, LUMINOSITY OF, a flame may be very hot without much brilliancy, *i. e.*, when the products of combustion are gaseous. Hydrogen burns very pale until a thread of platinum is introduced. A bit of chalk in the blow-pipe flame produces brilliant light. But when, as in the Bunsen burner, air is introduced into a gas flame, the light disappears. A candle or gas flame is not homogeneous, the interior is dark and filled with vapors which do not burn, the next area is the most brilliant because air comes in, while the exterior is dim and feeble because it is in contact with the air. The lower area is blue because the air lowers the temperature and the carbon is only partly burned. Within the flame molecules of hydrocarbon lose hydrogen by destructive distillation, the residues are carbon which oscillate within and become sources of light until they reach the outer zone of perfect combustion. Brightness is favored by external pressure, small internal pressure and velocity of outflow, by particles of carbon, etc., continuing in the flame. A candle flame casts a shadow in sunlight. Certain bodies give the flame characteristic colors which pyrotechnists utilize to produce picturesque effects. W.R.B.

FLAMES, TEMPERATURE OF. The heat disengaged by a flame is due to the combination of combustible products with the oxygen of the air, or other burning agent. According to the researches of Becquerel the temperature of the central zone of the flame of a candle is 900° C., that of the brilliant zone 1,200° C., and the outer zone 1,500° C. Other flames as determined by Rosetti in 1878 by his ingenious colorimeter have the following temperatures: Stearine candle, 940° C.; Locatelli lamp, 920° C.; petroleum lamp, without chimney, illuminating part, 920° C.; smoky envelope, 780° C.; petroleum lamp, with chimney, 1,030° C.; alcohol lamp, 1,170° C.; Bunsen burner, 1,360° C. The temperature of the electric arc is in the neighborhood of 3,500° C. W.R.E.

FLAMINIAN WAY (VIA FLAMINIA), the great northern road of ancient Italy, leading from Rome to Ariminum (Rimini), on the Adriatic. It was constructed by C. Flaminius during his censorship (220 B.C.), in order to secure a free communication with the recently conquered Gaulish territory. When Augustus (27 B.C.) appointed persons of consular dignity surveyors of roads for the other highways of his dominions, he reserved the care of the Flaminian Way for himself, and renewed it throughout its whole length. See ROME, Vol. XX, p. 829; FLAMINIUS, Vol. IX, p. 252.

FLAMMARION, CAMILLE, a French astronomer; born at Montigny-le-Roi, Feb. 25, 1842; entered the Paris Observatory in 1858, and became a popular lecturer on astronomy. Retiring in 1865, he devoted himself to the popularization of science in periodicals and books. His principal publications are *The Plurality of Inhabited Worlds* (1862; 30th ed. 1884); *Imaginary Worlds and Real Worlds* (1864; 19th ed. 1884); *God in Nature* (1866; 18th ed. 1882); *Celestial Marvels* (1865); *Studies and Lectures on Astronomy* (9 vols., 1866–81); *History of the Heavens* (1872); *The Atmosphere* (1872); *The Stars and the Curiosities of the Heavens* (1881); *The Marvels of the Heavens* (8th ed. 1882); *Popular Astronomy* (1880); *Urania* (1889) and *Earth and Sky* (1893). Flammarion made many balloon ascensions for the study of aërial phenomena, and published a work, entitled *Travels in the Air*. In 1892 Flammarion

CAMILLE FLAMMARION.

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took a deep interest in the observations of the planet Mars, and was among those who held the sensational, as well as insensate, theory that communication between the earth and our nearest celestial neighbors is not impossible.

FLANDERS, HENRY, lawyer, was born in New Hampshire on February 13, 1826, became a lawyer in Philadelphia, and won distinction in practice. He is the author of *Maritime Law*, *The Law of Shipping*, *Lives of the U. S. Chief Justices*, *Law of Fire Insurance*, and other works. W.F.J.

FLATHEAD INDIANS, a tribe of North American Indians, sometimes fictitiously called Salish. This tribe was confused by early explorers with the Oregon tribes who compressed the heads of their children and deserved the title *Flatheads*, but this tribe, although the name remains with them, and is applied to them almost entirely, never treated their children in such a manner. They live around Flathead Lake, in Montana, and along the valley of the Flathead River. They numbered in 1895 about five hundred.

FLATHEAD RIVER. See MONTANA, Vol. XVI, p. 799.

FLATTERY, CAPE, a promontory on the east coast of Australia, in lat. 14° 52′ S., long. 154° 20′ E. It is about thirty miles to the north of Endeavor Bay.

FLATWORMS. See TAPEWORMS, Vol. XXIII, pp. 54–61.

FLAUBERT, GUSTAVE, a French novelist; born at Rouen, France, Dec. 12, 1821; died in Paris, May 9, 1880. He belonged to the realistic school of novelists, was a pupil of Balzac, and is well known in America by his *Madame Bovary* (1857); and *Salammbô* (1862), which have been translated and extensively circulated. The first of these deals with Parisian life, and created a sensation and aroused opposition on account of its moral teaching. The other attracted attention by its archæological statements, many of which were in opposition to the beliefs of the time.

FLAX. See Vol. IX, pp. 256–260; and AGRICULTURE, in these Supplements.

FLAX, NEW ZEALAND (*Phormium tenax*), a stemless, permanent, sword-leaved plant of the lily family *Liliaceæ*, native to New Zealand, The leaves are smooth, 4 to 6 feet long, and 2 inches wide, and possess a stout fiber, which is used for making ropes, sailcloth, etc., for which it is well adapted by virtue of its strength and durability. It has been introduced into the U. S. W.R.B.

FLEABANE, the common name of various species of the family *Compositæ*, notably species of *Erigeron* in the United States and species of *Inula* in Europe. The latter is the original "fleabane," has yellow flowers, the whole plant emitting a peculiar aromatic smell, sometimes compared to that of soap, which is said to be efficacious in driving away fleas.

FLEAWORT (*Senecio palustris*), an annual or biennial with long spatulate leaves, having a cluster of short-stemmed floral woods with corymb flowers, growing in swamps. W.R.B.

FLEET PRISON OR THE FLEET, for centuries a notorious London jail, stood on the east side of Farringdon Street, on the banks of the Fleet stream, formerly a rapid affluent of the Thames, and now embraced within the system of the sewerage of the city. It was king's prison and also debtors' prison from before the commencement of the thirteenth century. Here the religious martyrs of the reigns of Mary and Elizabeth were confined, and later the victims of the Star Chamber. The building was several times renewed. It was destroyed in the great fire of 1666, again burnt by the Gordon rioters in 1780, and was finally deemed a public nuisance. It was the scene of much irregularity and brutality, arising mainly from the extortions of the keepers, and of the Fleet marriages, which were contracted chiefly from the middle of the seventeenth to the middle of the eighteenth century. Prior to the passing of the Marriage Act of 1754, all that was required to render a marriage valid in England was the verbal and expressed consent of the parties; and as the Fleet at the time contained a number of dissolute ex-parsons, who were ready to celebrate a secret marriage for half a crown, or, according to Pennant, "for a dram of gin or a pipe of tobacco," persons wishing to marry, yet to keep their marriage secret, flocked to the Fleet. The Marriage Act of the 27th of March, 1754, put an end to the trade of the Fleet parsons; yet, as a sign of the popularity of the Fleet marriage, it is said that over two hundred marriages were entered in one register on the day before the act came into force. It became the great debtors' prison, and was the scene of many horrors. The prison was abolished in 1842. The buildings were demolished in 1845–46, and part of the site is now occupied by the Congregational Memorial Hall. The prison has had its history well told, with quaint illustrations, in John Ashton's entertaining book, *The Fleet: Its River, Prison and Marriages* (1888)

FLEGEL, EDUARD ROBERT, a German African explorer; born in Wilna, Russia, Oct. 13, 1855. He devoted his life to the exploration of the Niger and Benue Rivers and the Cameroon country in general. In addition to the scientific side of his labors, he constantly had in mind the acquisition of territory for Germany. He ascended the Niger in 1879, and again in 1880, by a hitherto untraversed tributary. In 1883 he discovered the source of the Benue, which is navigable for steam-vessels from the sea to the central portions of Africa. He died Sept. 11, 1886, while on an expedition across the country between the Benue and the Congo.

FLEISCHER, HEINRICH LEBERECHT, a famous German Orientalist; born at Schandau on the Elbe, Feb. 21, 1801; studied at Leipsic and Paris; was appointed, in 1836, professor of Oriental languages at Leipsic, where he died, Feb. 10, 1888. Besides an edition of a catalogue of Oriental manuscripts contained in the Leipsic and Dresden libraries, he published an edition of Abulfeda's *Historia Ante-islamica* (1831); *Ali's Hundred Sayings* (1837); a continued edition of the Arabic text of *Thousand and One Nights*, (1842–43); a

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Grammar of Living Persian Languages (1875); *Contributions to Arabian Philology* (1863–83), etc. G.A.S.

FLEMING, JOHN AMBROSE, a British electrical engineer; born in Lancaster, England, Nov. 20, 1849. He graduated from the University of London in 1870. After a short time spent in the chemical laboratories of the South Kensington Normal School, he entered St John's College, Cambridge, in 1877, graduating in 1880. He was elected to the chair of mathematics and physics in the University College, Nottingham, but resigned in 1881 to become electrical engineer for the London Edison Electric Lighting Company. He was instrumental in the organization of electrical engineering departments of various colleges, and of the London Board of Trade electrical laboratory. He published *Molecular Shadows in Incandescent Lamps; Problems of Electric Flow in Networks of Thin Conductors;* and other treatises. His main work, however, is *Alternate Current Transformer* (1889).

FLEMING, (SIR) SANDFORD, engineer, was born at Kirkcaldy, Scotland, on January 7, 1827, and settled in Canada in 1845, where he soon engaged in engineering work on railroads. He was chief engineer of the Intercolonial railroad during its construction period, conducted some of the early surveys for a Canadian railroad across the continent, and surveyed and planned the railroad system of Newfoundland. In 1880 he retired from railroad work and became chancellor of Queen's University at Kingston, Canada, to which office he has been repeatedly re-elected. He took a leading part in the movement for making Greenwich the center of time-reckoning and of longitude for all the world. He was also the chief mover for the laying of the British Pacific cable, which for the first time put an unbroken system of telegraphs around the world. He is the author of numerous books and contributions to current literature on scientific topics. W.F.J.

FLEMINGSBURG, a town and the county seat of Fleming County, Kentucky, in the northeastern part of the state. It lies between the Ohio and Licking rivers, 65 miles southeast of Cincinnati, Ohio, on the Covington, Flemingsburg and Ashland railroad. Its population in 1900 was 1,268. W.F.J.

FLEMINGTON, a village and the county seat of Hunterdon County, New Jersey, in the western part of the state. It is 22 miles north of Trenton, and is reached by the Lehigh Valley railroad and the Central railroad of New Jersey. Its population in 1900 was 2,145. W.F.J.

FLEMINGTON, a village of Taylor County, in the northeastern part of West Virginia, the seat of West Virginia College (Free-will Baptist).

FLEMISH LANGUAGE AND LITERATURE. See HOLLAND, Vol. XII, pp. 87–101.

FLEMMING, FRIEDRICH FERDINAND, musician; was born at Neuhausen, Saxony, on February 28, 1778, and became a physician. He devoted much attention to musical composition, and is best remembered by his work in that realm. He composed the music identified with Horace's ode *Integer Vitæ*, for many years one of the best known college and university songs in the world. There is a striking likeness between it and Webbe's *Glorious Apollo*, which was doubtless fortuitous, since Webbe's work was certainly unknown to Flemming. He also wrote many other part songs, for male voices. W.F.J.

FLESH-FLY, (*Musca vomitoria*), an insect of the same genus as the house-fly, which it much exceeds in size. The forehead is rust-colored, the thorax grayish, the abdomen blue, with three black bands; the expanse of wings nearly one inch. It deposits its eggs on flesh; and notwithstanding preventives, the maggots are of very frequent occurrence on meat in summer. There are several allied species. See *Brachycera*, under INSECTS, Vol. XIII, p. 157.

FLETCHER, JOHN, dramatist. See BEAUMONT AND FLETCHER, Vol. III, pp. 405–410.

FLETCHER, JOHN WILLIAM, originally DE LA FLÉCHÈRE, theologian; was born in Switzerland on September 12, 1729; was educated for the ministry at Geneva. He went to England, became associated with John Wesley, and with Whitefield, and with them was among the founders of the Methodist Church. He visited Italy and Switzerland in 1770, was chosen by Lady Huntingdon to be principal of a theological school which she founded in Wales, and in that place became so strong a defender of Arminianism that he presently wrote an elaborate work upon the subject. All this time he remained in the ministry of the Established Church of England, as rector of Madeley, but his sermons and writings are among the classics of Methodism, ranking second to those of Wesley himself. He died at Madeley on August 14, 1785. His works, in eight volumes, were published in 1803 and have often since been reprinted. W.F.J.

FLETCHER, ROBERT, an American physician and anthropologist; born in Bristol, England, March 6, 1823. He was educated in private schools and was graduated from the Royal College of Surgeons of England in 1844. He removed to the United States in 1856 and was an army surgeon during the Civil War. For several years he was lecturer on medical jurisprudence at the Columbia University in Washington. He has written *Prehistoric Trephining* (1882); *Human Proportion in Art and Anthropology* (1883); *Tatooing among Civilized People* (1884), and *The New School of Criminal Anthropology* (1891). He is the editor of the *Index Medicus* and lecturer at Johns Hopkins University. W.M.C.

FLEURUS, a small town of south Belgium, in the eastern part of the province of Hainault, situated north of the left bank of the Sambre, and fifteen miles west of Namur. It has been the scene of several contests. The population is 2,300.

FLEURY, ÉMILE FELIX, a French general and diplomat; born Dec. 23, 1815, at Paris; entered the service in 1837. In 1851 he took part in the ex-

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pedition against the Kabyles, became, in 1861, adjutant to the emperor, was in 1862 appointed director-general of the imperial studs, in 1865 a Senator, and, in 1866, received the title of grand master of the horse. In 1866 he was sent on a diplomatic mission to Florence, and in 1869 ambassador to St. Petersburg, which post he held during the war of 1870 up to the downfall of Napoleon III. Returning then to France, he retired from public life, and died in Paris, Dec. 11, 1884. He wrote *Souvenirs du Général Comte de Fleury* (2 vols., 1897–98). G.A.S.

FLEURY, JULES FRANÇOIS HUSSON, a French author; born at Laon, Sept. 10, 1821. In a number of early pieces for the theater, as well as later romances, he achieved some distinction as a realistic writer. Of his works in that line, those worthy of mention are *Contes d'Été* and *Contes d'Automne*. Works of greater value, however, were those on the history of caricature, of literature, and of art, from 1825 to 1840, and his *Bibliographie Céramique* (1882). He died at Sèvres Dec. 6, 1889.

FLEURY, LOUIS, VISCOUNT DE, soldier; was born in France about 1740, and was among the first Frenchmen to come to America and offer service in the Revolutionary War. Washington accepted and commissioned him, and he did good service under Washington until the arrival of Rochambeau's army. He then joined the latter, and distinguished himself at Yorktown so brilliantly as to cause Congress to give him a vote of thanks and a medal. He returned to France after the revolution, and served in the army of his native land with zeal and loyalty, but fell under the ban of the Reign of Terror, and was arrested and put to death in 1794. W.F.J.

FLEXIBLE SANDSTONE OR ITACOLUMITE. See *Diamond*, under MINERALOGY, Vol. XVI, p. 396.

FLEXURE OF BEAM. See ELASTICITY, Vol. VII, pp. 700, 701.

FLIES. See DIPTERA, Vol. VII, pp. 222, 223.

FLINDERSIA, a genus of Australian trees of the family *Meliaceæ*. It yields timber which is little inferior to mahogany.

FLINT, a city and the county seat of Genesee County, Michigan, in the east-central part of the state, 57 miles northwest of Detroit and 31 miles south by east from Saginaw. It is the site of the state asylum for the deaf and dumb. It lies on the Flint River, and is reached by the Chicago and Grand Trunk and the Flint and Pere Marquette railroads. Its population in 1900 was 13,103. W.F.J.

DR. AUSTIN FLINT.

FLINT, AUSTIN, physician, was born at Petersham, Mass., on October 20, 1812, the son and grandson (as he became the father and grandfather) of prominent physicians. He was educated at Amherst and Harvard, being graduated from Harvard Medical School in 1833. He settled in Buffalo, N. Y., where he became eminent; founded the Buffalo Medical College in 1847, and was its professor of the principles and practice of medicine. He also filled professorships at Chicago, Louisville, Ky., and New Orleans. He removed to New York in 1861, and became a professor in the Bellevue Hospital Medical College and in the Long Island College Hospital in Brooklyn. He was president of the New York Academy of Medicine from 1872 to 1885, and of the American Medical Association in 1884, and a member of the International Medical Congress at Philadelphia in 1876. He wrote a number of works, which have the highest rank in professional literature, including *Principles and Practice of Medicine*, *Phthisis*, *Physical Exploration of the Lungs*, and *Medical Ethics and Etiquette*. He died in New York on March 13, 1886. W.F.J.

FLINT, AUSTIN (2nd), physician, son of Austin Flint (q.v.), was born at Northampton, Mass., on March 28, 1836, and was educated at Harvard College and the medical department of the University of Louisville, Ky., and Jefferson Medical College, Philadelphia. He began practice at Buffalo, N. Y., in 1857, quickly attained eminence in his profession, edited *The Buffalo Medical Journal* in 1857–60, and was professor of physiology in the University of Buffalo in 1858–59. He removed to New York in 1859, and for a time was professor in the New York Medical College, and in 1860 was professor of physiology in the New Orleans School of Medicine. He then studied in Europe, was a surgeon in the U. S. army in the Civil War, was one of the founders of and professor in the Bellevue Hospital Medical College, New York, professor in the Long Island College Hospital, and professor, since 1898, in Cornell University Medical College. He is the author of several important medical and physiological works, chief among which are *The Physiology of Man*, *A Textbook of Human Physiology*, and *Sources of Muscular Power*. W.F.J.

FLINT, ROBERT, theologian; was born at Dumfries, Scotland, in 1837, and was educated at Glasgow. He became a minister in 1859, professor of moral philosophy at St. Andrews in 1864, and professor of divinity at Edinburgh in 1876. His *Philosophy of History in France and Germany* (1874) caused his election as corresponding member of the Institute of France. He has written several other works, and articles for the ENCYCLOPÆDIA BRITANNICA. W.F.J.

FLINT GLASS. See GLASS, Vol. X, pp. 585, 586.

FLINT IMPLEMENTS. See ARCHÆOLOGY, Vol. II, pp. 296, 297.

FLINT RIVER, a large stream in Georgia, rising in the northwestern part of the state, near Atlanta, and flowing southward to join the Chattahoochee at the Florida line, the two there forming the Appalachicola. W.F.J.

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FLINT RIVER, a large stream in Michigan, which rises in Lapeer County and flows a hundred miles into the Shiawassee River near Saginaw, the two then forming the Saginaw River. W.F.J.

FLOATING ISLAND, the formations caused either by the aggregation of driftwood in the creeks and bays of tropical rivers and the deposition thereon of soil and vegetable matter, or by the detachment of portions of a river bank or lake shore, on which the interlacing roots of plants constitute a foundation sufficiently strong to support soil whereon herbage, and occasionally even trees, are able to grow. Floating islands are sometimes seen 50 or 100 miles from the mouth of the large rivers of America, Asia and Africa.

FLODDEN FIELD. (SCOTLAND, XXI, 519.)

FLOOD PLAINS. See GEOLOGY, X, p. 246.

FLOODS. See RIVER-ENGINEERING, XX, 586.

FLOOR OR FLOORS. See BUILDING, Vol. IV, pp. 404, 407, 432, 441.

FLOQUET, CHARLES THOMAS, French statesman; born in St. Jean-de-Luz, France, Oct. 5, 1828, and called to the Parisian bar in 1851. After the fall of the empire he was deputy mayor and member of the National Assembly, but, having resigned during the Commune, was suspected of disloyalty and interned at Pau until 1872. He held various offices; was vice-president of the Chamber in 1881; prefect of the Seine in 1882; and was president of the Chamber in the Brisson Cabinet. He formed a ministry on the resignation of the Tirard Cabinet in 1888, and was president of the Council and minister of the Interior. He was elected president of the Chamber Nov. 16, 1889, but in 1892 resigned under charges connected with the Panama scandal, from which he was afterwards exonerated. Died in Paris, Jan. 18, 1896.

FLORÉAL, the name adopted for the eighth month of the year in the calendar of the French republic, introduced in 1793; it extended from April 20 to May 19. It was used up to 1805 in place of the Gregorian. W.R.B.

FLORENCE, COUNCIL OF. See POPEDOM, Vol. XIX, p. 517.

FLORENCE, a city of Italy, famed in science and art. Recent improvements in streets, sanitation and buildings have been made. In remodeling its structures, care has been taken to preserve its historic monuments, statues and art collections. A site in the center of the city for a magnificent library edifice was recently authorized. The library is the largest in Italy—about a million books and pamphlets, nearly 20,000 manuscripts, 1,000 parchments, 300,000 letters and autographs and numerous musical works, portraits and maps. Pop. 1901, 205,589. See FLORENCE, IX, 289.

FLORENCE, a city and the capital of Lauderdale County, Alabama, situated at the head of navigation on the Tennessee River, and on the L. & N. Ry. Here is a state normal school, the Southern University for women, an academy and Synodical Female College. In the vicinity are several cotton factories. Pop. 1900, 6,478.

FLORENCE, a village and the capital of Pinal County, southeastern Arizona, on the Gila River, 50 miles S.E. of Phœnix. It has a United States land-office, a smelting-furnace for silver, and an agricultural trade. Pop. (county), 1900, 6,884.

FLORENCE, a city of Marion County, Kansas, in the east-central part of the state on the Atchison, Topeka and Santa Fé railroad. Its population in 1900 was 1,178. W.F.J.

FLORENCE, a town and the county seat of Florence County, South Carolina, in the eastern part of the state, 96 miles north of Charleston. It is reached by the Cheraw and Darlington, the Northeastern and the Wilmington, Columbia and Augusta railroads. Its population in 1900 was 4,647. W.F.J.

FLORENCE, the capital of Florence County, northeastern Wisconsin, located in the vicinity of iron-ore mines, on the Chicago and North Western railroad. The lumber trade and iron business are the sources of business in the town. Population 1890, 1,709; 1900, 1,824.

FLORENCE, WILLIAM JAMES, actor. See CONLIN, BERNARD, in these Supplements.

FLORER, WARREN WASHBURN, educator, was born at Lodi, Ill., on May 17, 1869; was educated at DePauw University, Cornell University, and Leipsic. Since 1897 he has been an instructor in German in the University of Michigan, and has written several works on German literature. W.F.J.

FLORES ISLE. See AZORES, Vol. III, p. 149.

FLORES, JUAN JOSÉ, soldier, was born in Venezuela in 1801, and as a young man was a conscript in the Spanish army, but deserted it and thereafter fought with valor in the war of independence. Upon the division of the old Columbian Republic into three in 1830–31 he became first president of the republic of Ecuador, serving until 1835. He was again president of Ecuador in 1839–45, led a successful revolution against President Franco in 1860, and died in 1864. W.F.J.

FLORES, VENANCIO, statesman, was born in Uruguay, participated in various revolutions, was President of the republic of Uruguay in 1854 and 1866, waged war against Paraguay in 1865, and was finally deposed from the Presidency of Uruguay and assassinated in 1868. W.F.J.

FLORESVILLE, a village and the capital of Wilson County, central southern Texas, on the San Antonio and Aransas Pass railroad, and on the Ansonio River, 45 miles S.S.W. of Austin. Cotton and live-stock are its leading products. Population, 1900, 895.

FLORICULTURE. While floriculture has been carried on as a business in the United States for more than one hundred years, its extent was not of large proportions until during the last score of years. It was not made a subject of official census investigation until 1890. The government report, April 21, 1900, shows the recent growth of the business to have been remarkable.

The area devoted to the cultivation of flowers and ornamental plants in the U. S. in 1899 was 9,314 acres, and the value of the products sold therefrom

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was $18,759,464. These flowers and plants were grown by 8,799 farmers and florists, of whom 6,159 made commercial floriculture their principal business, having a capital of $52,462,419 invested in land, buildings, implements and live stock. Of this sum, $28,024,715 represents the value of land and improvements, other than buildings, $22,683,956 the value of buildings, $1,366,887 the value of implements and machinery, and $386,861 the value of live stock. Their sales of flowers and plants amounted to $17,377,860, and of other products to $1,044,662, making a total value of $18,422,522, or an average of $2,991 for each florist. This is exclusive of the value of products fed to live stock, which was $83,359.

The rank of the leading states in the number of establishments is as follows New York, 983; Pennsylvania, 734; Massachusetts, 597; Ohio, 505; Illinois, 499; and New Jersey, 494.

From the census report, it appears that the largest number of square feet of glass in one establishment in the United States is in the District of Columbia; the oldest establishment was started in New York; the largest number of roses propagated were, respectively, in Pennsylvania, Illinois and Ohio; the largest number of hardy plants propagated were, respectively, in Illinois, New York and Kansas; the largest total value of plant sales were, respectively, in New York, Pennsylvania and California, and the largest total value of cut-flower sales were, respectively, in New York, Illinois and Pennsylvania. In the number of establishments, New York heads the list with 793, and Pennsylvania second with 544. The New York greenhouses were valued at $10,000,000; those of Pennsylvania, about $6,000,000.

In addition to the Society of American Florists, 965 state and local floral societies and clubs and 358 horticultural societies, aided by the agricultural and horticultural press, helped to develop this industry to its present large proportions.

New Jersey, situated, as it is, between the New York and Philadelphia city markets, makes the largest showing of any state in the Union in proportion to its size.

FLORIDA.—For a general account and history prior to 1880, see Vol. IX, p. 296. In 1870 Florida was divided into 39 counties; in 1904 into 45. The total population at each decennial period since 1870 was, 1880, 266,566; 1890, 391,422; 1900, 528,542. The population was divided by race at these periods as follows: 1880, white, 141,249, colored, 125,317; 1890, white, 224,949, colored, 166,180; 1900, white, 297,333, colored, 230,730.

Agriculture.—According to the United States census of 1900 there were 40,814 farms in the State, comprising an aggregate of 4,363,891 acres, of which 1,511,653 acres were classified as improved. The valuations were: Land improvements, and buildings, $40,799,838; implements and machinery, $1,963,210; live-stock, $11,166,016—total, $53,929,064. All products in the previous year were valued at $18,309,104, divided as follows: Animal products, $4,810,524; forest products, $648,412; crop products, $12,850,168. Dairy products were valued at $1,468,603, and all fruit products at $1,384,787. In the calendar year 1903 the acreage, production, and value of the ordinary farm crops were as follows: Corn, 614,448 acres, 6,083,035 bushels, $4,440,616 value; oats, 33,227 acres, 438,596 bushels, $263,158 value; potatoes, 3,489 acres, 286,098 bushels, $360,483 value; hay, 13,297 acres, 19,547 tons, $367,875 value; and tobacco, 3,726 acres, 2,608,200 pounds, $834,624 value—total acreage, 668,187; total value, $6,270,756. On Jan. 1, 1904, the farm animals comprised the following: Horses, 45,589, value, $3,144,392; mules, 15,118, value $1,467,672; milch cows, 86,149, value, $2,014,164; other cattle, 522,526, value $4,749,132; sheep, 110,955, value $238,909; and swine, 387,617, value $1,348,907—total head, 1,167,954; total value, $12,963,176.

Manufactures.—The manufacturing interests of the State have had a remarkable development since 1870, considering the natural and financial conditions that have prevailed. In 1880 there were 426 establishments reported, having a combined capital of $3,210,680, employing 5,504 persons, paying $1,270,875 for wages and $3,040,119 for materials used, and yielding products valued at $5,546,448. In 1890 the corresponding figures were: Establishments, 805; capital, $11,110,304; wage-earners, 13,119; wages, $5,918,614; materials, $8,021,854; and products, $18,222,890. In 1900 these large figures were reached: Establishments, 2,056; capital, $33,107,477; wage-earners, 34,230; wages, $10,683,038; materials, $15,637,520; and products, $36,810,243. The principal manufactures in the order of value of production were: Tobacco, cigars, and cigarettes, 128 establishments, $5,349,907 capital, $10,891,286 products; lumber and timber products, 416 establishments, $14,937,693 capital, $10,848,403 products; turpentine and resin, 366 establishments, $5,526,618 capital, $6,469,605 products; cars and general shop construction by steam railroad companies, 13 establishments, $414,390 capital, $1,112,245 production; and wooden ships and boats, 15 establishments, $149,159 capital, and $254,991 products.

Mineral Productions.—A special report by the Bureau of the Census in 1904 on the production of mines, quarries, and oil and natural gas wells in the calendar year 1902, credits Florida with 71 plants, employing 3,146 persons, paying $1,082,030 for wages and $618,057 for supplies and materials, and yielding products valued at $2,943,806. The principal production was phosphate rock, of which Florida had been the chief producer since 1894. There were 61 plants, 2,866 wage-earners, and an output valued at $2,655,463. Limestones and dolomites yielded $63,571 in products, and all other minerals $224,772. In 1898 there was reported what was pronounced to be the most remarkable natural hydraulic cement rock known, the deposit extending for several miles along the left bank of the Appalachicola River from the vicinity of River Junction southly to Aspalaga. The deposit comprises over 2,000

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acres, has a thickness of 80 feet above the river, and contains sufficient raw material to produce over 2,000,000 barrels of cement.

Commerce.—In the fiscal year ending June 30, 1904, the imports of merchandise at the ports of Fernandina, St. Augustine, St. Johns, Appalachicola, Key West, Pensacola, St. Marks, and Tampa aggregated in value $4,118,722; and the exports (none from St. Augustine), $27,685,268. The heaviest imports were at Tampa, $2,541,502; Key West, $617,599; and Pensacola, $568,398; and the heaviest exports from Pensacola, $15,897,541; Fernandina, $7,361,135; Tampa, $1,930,569; St. Marks, $1,211,016; and Key West, $696,367. The tonnage movement for the same period was: Entrances, sailing vessels, 76,890; steam vessels, 121,062—total tonnage entered, 197,952; clearances, sailing vessels, 232,537; steam vessels, 973,542—total tonnage cleared, 1,206,079; aggregate tonnage movement, 1,404,031.

Banking.—On Sept. 9, 1903, there were 21 national banks in operation in the State, having a combined capital of $2,135,000; outstanding circulation, $948,100; surplus, $823,886; individual deposits, $9,401,924; and total resources, $15,164,180. The State banks numbered 28, and had combined capital, $1,004,000; deposits, $6,647,199; surplus, $505,536; and resources, $8,419,080. The exchanges at the United States clearing-house at Jacksonville in the year ending Sept. 30, 1903, aggregated $21,225,093, a gain of $2,032,192 over the total of the preceding year.

Education.—Statistics for the school year 1901–2 present the following summaries: Estimated number of children in the State of school age (6–21), 173,670; number enumerated (1900), 161,428; number enrolled in the public schools, 112,384; number in average daily attendance, 76,164; number of male teachers, 899; females, 1,900; in all, 2,799; average monthly salary of male teachers, $39.68, of female teachers, $33.67; number of school buildings, 2,336; and value of public school property, $1,066,904. The number of children enrolled in private schools was estimated at 2,000. During the year the income of the system was, from permanent public school funds, $30,813; from State taxation, $82,858; from local taxation, $674,273; from other sources, $14,547—total, $802,491. The total expenditures were $792,919, of which $602,108 was for salaries of teachers and superintendents. The permanent school fund aggregated $794,678. The following particulars relate to the educational facilities for the colored race: Estimated number of colored youths, 75,160; number enrolled in the public schools, 42,843; number in average daily attendance, 29,881; number of teachers, 670; public high schools, 2; high school teachers, 20; high school pupils enrolled, males, 295, females, 482, in all, 777; number of secondary and higher schools, excluding public high schools, 7; teachers, 52; students, males, 541, females, 639, in all, 1,180. The universities and colleges for white students were: John B. Stetson University (Baptist), at De Land, opened in 1887; Florida State Agricultural College (non-sectarian), at Lake City, opened in 1884; St. Leo Military College (Roman Catholic), at St. Leo, opened in 1890; Florida State College (non-sectarian), at Tallahassee, opened in 1857; and Rollins College (Congregational), at Winter Park, opened in 1885. The secondary and higher schools for colored students were: Cookman Institute (Methodist Episcopal), Edward Waters College (African Methodist Episcopal), and the Florida Baptist Academy, all at Jacksonville; Florida Institute, at Live Oak; Fessenden Academy, at Martin; Emerson Memorial Home (Methodist Episcopal), at Ocala; Normal and Training School (Congregational), at Orange Park; and the Florida State Normal and Industrial College, at Tallahassee. The State maintains an institution for the deaf, dumb, and blind at St. Augustine.

Illiteracy.—The United States census statistics on illiteracy show the following summaries for Florida in 1900: Total population, 10 years and over, 385,490; illiterates, 84,285. The white population of this limit was 216,510, of whom 19,184 were illiterates; and the colored population was 168,980, of whom 65,101 were illiterates.

Libraries.—The number of free, public, and semi-public libraries that reported in 1900 was 16, which together contained 67,739 bound volumes and 4,600 pamphlets, an increase in four years of 3 libraries and 24,233 bound volumes.

Religion.—The United States census of 1890 is the last giving statistics of the churches, that of 1900 not having embraced this line of inquiry. The figures of 1890 for Florida are: Total number of church organizations, 1,971; church edifices, 1,793; seating capacity, 309,132; hired halls, 245; value of all church property, $2,424,423; total number of communicants, 141,734. All Baptist bodies reported 41,647 communicants; all Methodist, 70,458; Roman Catholic, 16,867; all Presbyterian bodies, 4,574; and Protestant Episcopal, 4,225. The Methodist Episcopal Church, South, reported 25,362 members, and the Presbyterians, South, 3,444. At the triennial International Sunday School Convention, held in Denver, Colo., June 26–30, 1902, there were reported for Florida 2,400 evangelical Sunday schools, with 12,119 officers and teachers, and 94,870 scholars, a total enrollment of 107,449.

Post-offices.—On June 30, 1903, there were 1,181 post-offices in the State, of which 40 (one first-class, 11 second-class, and 28 third-class) were presidential, and 1,141 fourth-class. The gross receipts were $673,857

Transportation.—At the beginning of 1904 there were 3,574 miles of railroad in operation, of which 144 miles were constructed in 1902 and 116 miles in 1903. The only canal in the State was the Santa Fé, extending from Waldo to Melrose, a distance of 10 miles. The canal has a navigable depth of 5 feet, and cost for construction and improvements about $70,000.

Finances.—The State bonded debt on Jan. 1, 1904, amounted to $601,567, and was all held in various educational funds. The assessed valuations for 1903, were, real estate (including railroad

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and telegraph property), $90,397,127; personal property, $20,936,608 — total, $111,333,735; and the State tax was $5 per $1,000. Railroad property was assessed at $21,861,860.

Government.— Under the apportionment on the census of 1900 the State gained one representative in Congress, having three in 1904. The Senate consisted of 32 members and the House of 68. The office of lieutenant-governor had been abolished, and the State supreme court comprised a chief justice and five associate justices.

History.— The history of the State since 1879, as may be seen from the foregoing statements, is a continuous narrative of substantial development in all material activities, a development in some lines positively remarkable in character and strength. The period has been one of peaceful progress, interrupted only by the great assemblage and departure of troops for Cuba at the beginning of the war between the United States and Spain in 1898.

The following is a list of the governors of Florida since the admission of the State into the Union in 1845: Wm. D. Moseley, 1845–49; T. Brown, 1849–53; J. E. Broome, 1853–57; M. S. Perry, 1857–61; J. Milton, 1861–65; Wm. Marvin, 1865–66; D. S. Walker, 1866–68; H. Reed, 1868–72; O. B. Hart, 1872–74; M. L. Stearns, 1874–77; G. F. Drew, 1877–81; W. D. Bloxham, 1881–85; E. A. Perry, 1885–89; F. P. Fleming, 1889–93; H. L. Mitchell, 1893–97; W. D. Bloxham, 1897–1901; W. S. Jennings, 1901–05; Napoleon B. Broward, 1905 —— GEO. J. HAGAR.

Newark, N. J., Aug. 25, 1904.

FLORIDA, CAPE, the southern point of Biscayne Key, Florida, on the southern part of the Atlantic coast. It forms one side of the entrance into Biscayne Bay, and bears a lighthouse with a fixed white light. W.F.J.

FLORIDEÆ. See VEGETABLE KINGDOM, Vol. XXIV, p. 138.

FLORIDIA, a town of Sicily, in the province of Noto, 7 miles W.N.W. from Syracuse. It stands in a wide plain, surrounded by vineyards, olive groves and corn-fields. Population, 8,492.

FLORIN, the name of a gold coin first struck in Florence in the 13th century. It was the size of a ducat and had on one side a lily and on the other the head of John the Baptist. It is a matter of dispute whether the name is derived from the flower or from the name of the city. The coins were imitated by the various European states. The value of the English and Austrian florin is 48 cents, while those of other states equal 40 cents. The German gold guldens of the middle ages and the modern guldens are forms of the florin. The latter are still marked with the letters *Fl.* The Netherlands florin is the Dutch monetary unit. W.R.B.

FLORIO, CARYL, pseudonym WILLIAM JAMES ROBJOHN, an American musician and composer; born in Devonshire, England, November 2, 1843. He removed to New York in 1857 and became soloist at Trinity Church. He was organist in several churches and was conductor of opera in New York and Havana. He was musical director at Wells College from 1889 to 1891. His compositions include cantatas, overtures, operettas and sacred music. He wrote the operas *Gulda* (1879) and *Uncle Tom's Cabin* (1882). W.M.C.

FLOSS SILK. See SILK, Vol. XXII, pp. 66–68.

FLOTOW, FRIEDRICH, FREIHERR VON, a German composer; born at Teutendorf, in Mecklenburg, April 27, 1812; died at Wiesbaden, Jan. 24, 1883. At the age of fifteen he went to Paris and began to study under Reicha. His reputation was made by his earliest operas, *Le Naufrage de la Méduse* (1839); *Stradella* (1844); and *Martha* (1847) In 1856 he was appointed intendant of the theater at Schwerin. In 1863 he resigned this position and returned to Paris, but in 1868 removed to Vienna. Of his later operas three attained marked success: *Indra* (1853); *La Veuve Grapin* (1859); and *L'Ombre* (1870).

FLOUR. Prior to 1870 flat or low grinding was universally prevalent in the mills of the United States. The agencies employed were substantially identical with those found in English mills. In Europe the system known as "American" simply referred to the automatic character of American mills, without reference to results produced or processes employed. Oliver Evans (born 1755, died 1819) was the first to introduce automatic milling by his invention of the conveyor and elevator. These made all the operations of the mill continuous and automatic from the receiving of the wheat to the packing of the flour. This is still characteristic of American mills, and has been generally, though not universally, adopted in European countries.

Soon after 1870 the so-called "new process" came into extensive use, and was universally adopted in the larger American mills. In flat grinding the aim had been to make the largest possible production of flour by once grinding the wheat. The residue—bran, middlings and shorts—was either sold as feed, or if the middlings were ground again, the result of the second grinding was a flour of low grade. The introduction of the middlings purifier, which was a French idea, modified and improved by American inventors, enabled millers, by cleansing the middlings of impurities in the form of particles of bran, to make the flour of this second grinding much superior to that obtained by the first grinding of the wheat. This flour was called "patent," by a misnomer, which has, nevertheless, adhered to it. The flour made by the first grinding was known as "bakers'" or "clear" flour, and the residue as low grade.

The fact that middlings flour was superior to any that could possibly be obtained by flat or low grinding soon led millers to grind so as to produce as many middlings and as little flour as possible on the first grinding. This style of grinding, called "high grinding," soon produced a further revolution in American milling through the introduction of chilled-iron rolls. These rolls, used in Hungary since 1844, permitted a much more gradual reduction of the wheat to middlings and flour than millstones, and with their advent came a new name for the American sty e of milling,—"gradual reduction." Other a vantages over millstones were claimed for rolls, and after 1878 their adoption became very general in the larger mills. However, the mechanical features of the roller-mill were improved by American manufacturers, principally in the substitution of the belt-drive for the cumbrous gears of the European machines. American milling is not so

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elaborate as the Hungarian system, but follows its general plan of making many reductions and separations. Spring wheat, being harder than most winter wheats, was at first supposed to be better adapted for roller-milling; but the roller system has been quite generally adopted by all the larger mills, without reference to the character of the wheat. Other machines besides the roller-mill have also been introduced in the United States, based on European models. These refer especially to bolting or dressing the flour, and are various forms of centrifugal reels and flat-surface bolters.

The flour-mills of the United States number over eighteen thousand. Minneapolis is the largest milling center, while Pennsylvania has the largest number of mills (nearly three thousand), but most of them are small. The entire milling capacity of the United States is largely in excess of the requirements, and if continuously operated, could, in three months, grind all the wheat produced in the United States in any one crop. The home market requires about seventy-five million barrels of flour per annum, while of late years the annual exports from the United States have reached about sixteen million barrels. The millers of the United States have a national association, several state organizations and a number of mutual fire insurance companies. See FLOUR, Vol. IX, pp. 300–304.

FLOWER. See BOTANY, Vol. IV, pp. 126–148; HORTICULTURE, Vol. XII, pp. 253–277.

FLOWER, BENJAMIN ORANGE, an American editor and author; born in Albion, Illinois, October 19, 1858. He was graduated from the University of Kentucky, and soon after founded *The American Sentinel* at Albion. In 1880 he established *The Arena* magazine in Boston which has since been removed to Trenton, New Jersey. Among his published works are *Civilization's Inferno; or Studies in the Social Cellar* (1893); *The New Time* (1894); *Persons, Places and Ideas; Gerald Massey; Poet, Prophet and Mystic* (1895); *The Century of Sir Thomas More* (1896); *Lessons Learned from Other Lives* (1899). He has also edited the *Coming Age* and *The New Time* and is an extensive contributor to leading magazines and periodicals, writing principally upon socialogical topics. W.M.C.

ROSWELL P. FLOWER

FLOWER, ROSWELL PETTIBONE, an American financier and politician; born in Theresa, Jefferson County, New York, August 7, 1835. He was educated in the public schools and became a teacher in his native town. In 1860 he removed to Watertown, where he engaged in business and entered politics, organizing the Jefferson County Democratic Club. His success in politics attracted the attention of Samuel J. Tilden, through whose influence he was appointed chairman of the Democratic State Committee in 1877. Four years later he was elected to Congress, succeeding Levi P. Morton, who had resigned upon being appointed minister to France. In 1881 he was a candidate for the Democratic nomination for governor and three years later declined the nomination for lieutenant-governor. In 1886 he was re-elected to Congress and in 1890 was again re-elected. In 1891 he was nominated by the Democratic party for governor of New York state and was elected by a large majority. Meanwhile he became well known as a banker and financier, his firm assuming great prominence in Wall street affairs. From the close of his term as governor he applied himself to the interests of his large banking house and to a systematic course of philanthropy. In 1893 the University of Lawrence conferred upon him the degree of LL.D. He died in Eastport, New York, May 12, 1899. W.M.C.

FLOWER, FRANK ABIAL, an American historian; born in Cottage, New York, May 11, 1854. He has written several state and county histories and *Old Abe: the Wisconsin War Eagle* (1880); *The Life of Matthew H. Carpenter* (1883), and *History of the Republican Party* (1884). W.M.C.

FLOWER, SIR WILLIAM HENRY, was born at Stratford-on-Avon, England, on November 30, 1831, and was educated at University College, London, and Middlesex Hospital. He was a surgeon in the Crimean War, and afterward became a surgeon in London, a professor in the Royal College of Surgeons, and in 1884 director of the natural history department of the British Museum. He has been president of the Zoölogical Society, and of the Anthropological Society, and has received numerous honorary degrees, gold medals, and tributes of respect from all parts of the world. He is the author of a number of learned treatises on topics pertaining to natural history. He retired from the service of the British Museum in 1898, and died in the following year. He wrote the articles on HORSE, KANGAROO and SEAL in this ENCYCLOPÆDIA. W.F.J.

FLOWER-DE-LUCE OR FLEUR-DE-LIS. See IRIS, Vol. XIII, p. 282.

FLOYD, JOHN BUCHANAN, an American soldier and statesman; born in Montgomery County, Virginia, June 1, 1807. He graduated at South Carolina College in 1826, and in 1836 he removed to Helena, Arkansas, and practiced law there; but in 1839 he returned to Virginia and settled in Washington County. He was elected to the Virginia legislature in 1847, 1849, and 1855, and from 1849 to 1853 he was governor of the state. In 1856 he was a Presidential elector and voted for Buchanan, who in March, 1857, appointed him Secretary of War. In this capacity he was accused of improperly distributing munitions of war so as to aid the South. He was a brigadier-gen-

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eral in the Confederate army, and was one of the defenders of Fort Donelson, from which he escaped with a portion of the garrison before its surrender. He died in Abingdon, Va., Aug. 26, 1863. E.E.T.

FLOYD, WILLIAM, an American soldier and statesman; born in Brookhaven, Suffolk County, N. Y., Dec. 17, 1734. During the Revolutionary troubles he was appointed to the command of Suffolk County, and was a delegate to the Continental Congress, 1774–77 and 1778–83, in which capacity he signed the Declaration of Independence. In 1777–78 and again in 1808 he was a State senator; in 1789–91 was a Representative in Congress; in 1794 removed to Westernville, Oneida County; and was a delegate to the State Constitutional Convention in 1801. He died in Westernville, Aug. 4, 1821. E.E.T.

FLUKEWORMS OR FLUKES. See TREMATODA, Vol. XXIII, pp. 568–570.

FLUOR. See FLUOR-SPAR, Vol. IX, p. 306.

FLUORESCEIN. See PHTHALIC ACID, Vol. XVIII, p. 869.

FLUORESCENCE. Certain substances, like fluor spar and sulphate of quinine, have the power of absorbing light of short wave-length, and simultaneously emitting light of longer wave-length. Sulphate of quinine shines when exposed to rays of wave-lengths too short to affect the eye directly. This property is probably allied to the power which platinum-barium, cyanide and calcium tungstate have of becoming luminous when exposed to the X rays, which are themselves invisible. See LIGHT, Vol. XIV, pp. 607, 608; and MINERALOGY, Vol. XVI, p. 390.

FLUORESCENT LAMP, an electric lamp invented by Thomas A. Edison in 1896. It has a bulb of glass, resembling that of the ordinary incandescent electric light, except that it is more circular, and that the wires enter at a greater distance apart. There is no platinum film to become incandescent, the light being obtained by coating the inside of the glass bulb with tungstate, against which the lines of force of the currents from the wires are directed, so that the molecules of air strike the tungstate, rebounding in all directions, and causing fluorescence. It is not necessary to maintain as perfect a vacuum as with the incandescent lamp, and the whole globe glows with a white light that bears a strong resemblance in appearance to sunlight. The tungstate is attached to the glass by fusion. Other fluorescent metals besides tungstate may be used. No perceptible heat is developed by the light, which is in marked contrast to the incandescent lamp, which develops 95 per cent of heat and only 5 per cent of light. Professor Edison states that the fluorescent lamp of 2-candle power will light a room as well as a 16-candle power incandescent lamp, though the photometer shows only about twice as great illuminating effect for lamps of the same candle-power. It is also claimed that the new lamps will last much longer than the incandescent, since there is no filament to burn out.

C. H. COCHRANE.

FLUORINE. See CHEMISTRY, in these Supplements.

FLUOROSCOPE. An instrument devised by Thomas A. Edison for transforming the X rays into light, so that an observer may see the bones in his hand, or discern articles through several inches of wood, etc. It has been manufactured in two forms, one for private use and one for exhibition purposes. The former instrument is a light pasteboard box about a foot long, with a handle below. One end is made to fit the eye, and is strapped to the head, to secure good adjustment. The box tapers outwardly toward the farther end, which is rectangular, and contains the fluorescent screen. Inside, the box is painted black, except the screen, which is made of simple pasteboard, first covered with white paper, and then coated with collodion. Fine crystals of calcium tungstate are then sifted on the collodion, followed by a sifting of coarser crystals, until there is an even coating of the crystals all over the screen. When the fluoroscope so made is held toward the light of a Crookes tube at the proper distance, the observer is able to see right through the pasteboard screen, whose fluorescence changes the X rays, and thus the various phenomena discovered by Roentgen may be observed visually. A current of four amperes is passed through the Crookes tube to enable the bones of the hand to be seen to advantage. In searching for a suitable material for making this fluorescent screen Mr. Edison tried over eighteen hundred different salts, and found 72 that would fluoresce, calcium tungstate being the most satisfactory. The form of the fluoroscope used for exhibition purposes is larger, having a screen of about twenty inches square, and arranged so that observers may pass in a line and place their hands within the screen. Still another form is being arranged for use by physicians in hospitals.

C. H. COCHRANE.

FLUSHING, a city of New York, on the north shore of Long Island (see Vol. IX, p. 307). The city is largely populated by New York business men, and has all city improvements, such as good schools, churches, street-railways, gas and electric lights, free postal delivery, banks, building and loan associations, excellent water-works, police force, fire department and a handsome public park. Population now embraced in Greater New York.

FLUSTRA, a genus of polyzoa, in which the colonies have the form of mat-like, branching structures, which greatly resemble some of the ribbon-like seaweeds. Microscopic examination shows that the broad, flat branches are thickly studded with numerous polypes. Each individual animal is contained in a cavity or cell. The colonies are commonly known as "sea-mats."

FLUX. See METALLURGY, Vol. XVI, p. 67.

FLY FUNGUS OR FLY-MOLD, a name given to species of the genus *Empusa*, which are parasitic on flies, grasshoppers, moths, etc. The best-known species is *E. muscæ*, which appears as an epidemic on the common house-fly toward

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autumn, the dead flies becoming attached to windows and walls. The body is swollen by the growth of the white, thread-like hyphæ, which forms spores by the abstriction of special branches. These white, dust-like spores may be found in a circle about the dead bodies.

FLYING. See FLIGHT, Vol. IX, p. 271; and AERONAUTICS, in these Supplements.

FLYING DRAGON OR FLYING LIZARD, the name given to the members of several species of arboreal lizards having the power to pass from branch to branch by means of a lateral extension of the ribs and skin. *Draco volans* is the most common form. The animals are further characterized by having very long tails, the skin of the throat in the form of a loose wattle, and very bright colors. R.W.C.

FLYING-LEMUR, a small carnivorous mammal (*Galeopithecus volans*) closely allied to the bat. By means of a membrane connecting its limbs with one another it can fly or leap long distances. It is found in the Indian Archipelago. See MAMMALIA, Vol. XV, p. 405. R.W.C.

FLYING-MACHINES. See AERONAUTICS, Vol. XXV, pp. 55–57.

FLYING-PHALANGER. See PHALANGER, Vol. XVIII, p. 741.

FLYING-SQUID, a name sometimes given to cephalopod mollusks of the genus *Ommastrephes*, because they often dash backward with such velocity that they shoot some distance above the surface of the water. They are abundant north of Cape Cod, and constitute the food-supply of many fishes, and are economically important because they furnish the principal bait used in the cod-fishery.

FLY-WHEEL. See MECHANICS, Vol. XV, 779.

FOCUS. See OPTICS, XVII, pp. 822–3, 827–8.

FŒTUS. See MAMMALIA, Vol. XV, p. 371.

FOG. See METEOROLOGY, Vol. XVI, p. 130.

FOGO, Newfoundland, a port of entry on Fogo Island, separated by Hamilton Sound, 15 miles wide, from the northeast coast of the mainland. It has considerable fisheries and an active transit trade. Population, 800. C.L.S.

FOG-SIGNALS. To avoid collisions at sea and on large lakes, and to prevent vessels from running upon dangerous shores during heavy fogs which prevail at intervals near all large bodies of water, systematic signals of warning were found necessary. The most powerful lights proved inefficient, and navigators have long been obliged to resort to sound. Before the invention of steam, the ringing of bells and gongs and the firing of cannon were the only signals made use of; but the roar of the sea on the shore often exceeded the noise of these instruments. On board ship these signals were more effective, and are still used on small craft. It was next attempted to make use of the horn, but to force a sufficiently powerful current of air through the horn to produce a strong blast was not practicable until the invention of the steam engine. The steam-whistle, more shrill than a blast-horn, is in constant use in lighthouses. But this whistle, powerful as it is, is not strong enough in some instances, and use is made of the siren invented by Cagnard de la Tour for experiments in acoustics and harmonics. The steam-siren can be heard from 20 to 30 miles from land. For a description of it, see ACOUSTICS, Vol. I, p. 102. For vessels at sea a system of signals is maintained by all nations with but slight alterations. See NAVIGATION, VOL. XVII, p. 285.

FOHR. See SCHLESWIG-HOLSTEIN, XXI, 432.

FOKTCHANY OR FOKCHANI. See FOKSHAN, Vol. IX, p. 310.

FOLGER, CHARLES JAMES, statesman, was born at Nantucket, Mass., on April 16, 1818, and was graduated from Hobart College in 1836. In 1839 he was admitted to the bar, and thereafter rapidly rose in his profession. He was a county judge in New York State in 1844, was elected to the State senate in 1861, serving for eight years continuously, and was chairman of the judiciary committee of the constitutional convention of 1867. After an admirable career in State affairs, he was made assistant U. S. Treasurer in New York in 1869, judge of the State court of appeals in 1870, chief judge of that court in 1880, and Secretary of the U. S. Treasury in 1881. In 1882 he was nominated by the Republicans for governor of New York, but was overwhelmingly defeated, not because of the slightest objection to him, but in order to rebuke some of the methods of the party managers. He died on September 4, 1884. W.F.J.

FOLGER, PETER, pioneer and poet, was born in England in 1617, and came to America in 1635, living for six years at Watertown, Mass., and thereafter at Martha's Vineyard. He was a surveyor by profession, and was an occasional preacher in the Baptist Church. He wrote a notable poem, entitled *A Looking-Glass for the Times*, in which he eloquently pleaded for freedom of conscience and of worship, for Baptists, Quakers, and all others. It was published in 1675. He died at Nantucket in 1690. W.F.J.

FOLIATION. See GEOLOGY, Vol. X, pp. 279, 280.

FOLK, JOSEPH WINGATE, an American lawyer, born in Brownsville, Tenn., Oct. 28, 1869; was graduated at Vanderbilt University; admitted to the bar in 1890; practiced in Brownsville till 1892; then removed to St. Louis, Mo., where he became district attorney, and distinguished himself by a fearless and successful prosecution of bribery cases against public officials in 1902–03. He was the Democratic nominee for governor of Missouri in 1904. G.J.H.

FOLLY ISLAND is one of the smaller sea islands of Charleston County, South Carolina, lying south of Charleston and between James Island and the Atlantic Ocean. It is divided from James Island by Folly Island River. Stono Inlet is at its southwest end. W.F.J.

FOLSOM, JOSEPH L., soldier, was born in New Hampshire in 1817, and was appointed from that State a cadet at West Point, where he was graduated in 1840 and was commissioned a second lieutenant of infantry. He was afterward an instructor at West Point. In the Mexican War he was sent to California, and became a captain and acting quartermaster in 1846. He

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was made collector of the port of California during the military occupation and took part in the civil organization of the territory and State. He died on July 19, 1855. W.F.J.

FOLSOM, ABBY, reformer, was born in England and came to America in 1837. She was an earnest advocate of the emancipation of the colored race, and frequently spoke at anti-slavery meetings. Her intensity of feeling upon the subject made her appear at times fanatical. She wrote *A Letter from a Member of the Bar of Boston to an Avaricious Landlord*. She died in 1867. W.F.J.

FOLSOM, NATHANIEL, an American soldier; born in Exeter, N. H., Sept. 18, 1726. He served as captain in the Seven Years' war, and commanded the 4th New Hampshire militia at the beginning of the Revolutionary war. In 1775 he was appointed brigadier-general of the New Hampshire troops sent to Massachusetts, and served during the siege of Boston; was later appointed major-general, and sat in the Continental Congress, 1774–75 and 1777–80. He died in Exeter, May 26, 1790. E.E.T.

FOLTZ, CLARA SHORTRIDGE, lawyer, was born in Indiana but went to the Pacific Coast in early life. Left a widow with five children to support, she studied law and was the first woman admitted to the California bar. She has served as an orator in political campaigns. W.F.J.

FOLWELL, WILLIAM WATTS, educator, was born at Romulus, N. Y., on February 14, 1833, and was educated at Hobart College (1857). He was a teacher of languages at Ovid, N. Y., Seminary; an adjunct professor of mathematics at Hobart College; a student at the University of Berlin; an officer of engineers in the Civil War, rising to the rank of brevet colonel; a professor at Kenyon College in 1869; president of the University of Minnesota from 1869 to 1884, and afterward professor of political economy and librarian of that institution. He has held many civic offices in Minneapolis, including that of president of the Park Board since 1894. He has also been acting-president of the American Economic Association. W.F.J.

FOLZ OR FOLCZ, HANS, German meistersinger. See GERMANY, Vol. X, p. 471.

FONDA, a village and the county seat of Montgomery County, New York, in the east-central part of the state, in the Mohawk Valley, 40 miles northwest of Albany. It is reached by the New York Central and Hudson River and the Fonda, Johnstown and Gloversville railroads, while the Erie Canal and the West Shore railroad are near by. Its population in 1900 was 1,145. W.F.J.

FOND DU LAC, a city of southeastern Wisconsin, capital of Fond du Lac County (see Vol. IX, p. 316). It is an important business center, situated in the midst of a fine farming region. It has good water communications, excellent railroad connections and large manufactories of lumber, sashes, doors and blinds and agricultural implements. Its principal public buildings are a courthouse, opera-house and high school. It is noted for the number and excellence of its artesian wells, has extensive water-works, and is lighted by gas and electricity. Population 1890, 12,024; 1900, 15,110.

FONSECA, MANOEL DEODORO DA, the first President of the Brazilian Republic, was born in 1827. He was educated in Rio Janeiro, and on graduation entered the army. In the war between Brazil and Paraguay in 1865, he distinguished himself and rose to the rank of major. At the close of the war he was given a command in the province of Matto-Grasso. Subsequently, he was made a general and placed in charge of the cartridge factory and magazine at Rio Janeiro, where he organized a military club, in which he became very popular. The influence he gained here over his brother officers was used by him, it is said, to foment discontent in the army, and for the spread of republican ideas, with which he had become imbued, and the imperial authorities therefore transferred him to Matto-Grasso, of which he subsequently became governor. His removal from the Brazilian capital did not, however, stifle the military discontent, which culminated in November, 1889, in an uprising of the army, the expulsion of Emperor Dom Pedro and family, and the proclamation of a republic, of which Marshal Fonseca was elected the first President, Feb. 25, 1890. He proved to be a self-seeking and oppressive ruler, and in 1891 assumed the role of dictator and dissolved the Congress. He was, in turn, the victim of a revolution (Nov. 23, 1891), which placed Vice-President Peixotto in the presidential chair. He died Aug. 23, 1892.

FONSECA BAY. See HONDURAS, Vol. XII, p. 133.

FONTAINE, LAMAR, soldier and engineer, was born in Texas on October 10, 1829, and in boyhood was for four years a captive of the Comanches. He was in the navy under his kinsman, Matthew Fontaine Maury, and travelled in all parts of the world. He was with the Russian army at Sebastopol and won a decoration for his service. In the Civil War he was a Confederate soldier, and was in 27 battles and 57 skirmishes, and was wounded 67 times. He particularly distinguished himself during the siege of Vicksburg, when he passed through the lines with dispatches and supplies without detection. W.F.J.

FONTANELLE, a post hamlet of Washington County, central eastern Nebraska, on the Elkhorn River, 10 miles N. E. of Fremont. It is the seat of a Congregational college.

FONTANELS, the membranous spaces in the infant cranium between the frontal and parietal bones, and, also, between the parietal and occipital, at the two extremities of the sagittal suture. These spaces are gradually closed by the bone-growth, so that they rarely exist after two years. They are noticeable in a very young child by the perceptible palpitation. In surgery, a fontanel, or fonticulus, is a small ulcer, intentionally produced

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for the discharge of humors from the body. The insertion of a small, hard substance in a flesh-cut, causing slight suppuration, accomplishes this result. It is rarely employed in modern surgery.

FONTENOY, Belgium, a village in the province of Hainaut, 5 miles southeast of Tournay, where the French under Marshal Saxe defeated the allied forces commanded by the Duke of Cumberland May 11, 1745. C.L.S.

FONVIELLE, WILFRID DE, a French author; born July 21, 1828, in Paris, was teacher of mathematics, and published several popular scientific works, such as *The Wonders of the Invisible Moon* (1865); *Modern Astronomy* (1868). He became famous by his scientific aeronautic excursions. During the siege of Paris (1870) he left the city in his balloon, and landed in Belgium. Among his works on politics are to be mentioned *Le Souverain* (1853); *La République sans Phrase* (1872); *Le Siège de Paris a vol d' Oise au* (1895). G.A.S.

FOOCHOW, sometimes written FOO-CHOO, FUH-CHOW or FUCHAW. A city and treaty port in province of Fo-Kien, China. Pop. 1900, estimated at 500,000 to 1,000,000. See FUH-CHOW, IX, 712.

FOOD is whatever feeds the body, and hence

COMPOSITION OF ANIMAL FOODS.

FLESH, ETC., FREED FROM BONE, SHELL AND OTHER REFUSE.

KINDS OF FOOD MATERIALS. (*Italics* indicate European analysis; the rest are American.)	Water.	Total Nutrients.	NUTRIENTS.			
			Nitrogenous (albuminoids).	Fat.	Carbohydrates.	Ash.
Meats (Fresh).	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Beef, side, well fattened	54.6	45.4	17.2	27.2	---	1.0
Beef, lean, nearly free from fat	76.0	24.0	21.8	0.9	---	1.3
Beef, round, rather lean	66.7	33.3	23.0	9.0	---	1.3
Beef, sirloin, rather fat	60.0	40.0	20.0	19.0	---	1.0
Beef, neck, "second cut"	64.5	35.5	19.9	14.5	---	1.1
Beef, liver	69.5	30.5	20.1	5.4	3.5	1.5
Beef, tongue	63.5	36.5	17.4	18.0	---	1.1
Beef, heart	56.5	43.5	16.3	26.2	---	1.0
Veal, lean	78.8	21.2	19.9	0.8	---	0.5
Veal, rather fat	72.3	27.7	18.9	7.5	---	1.3
Mutton, side, well fattened	45.9	54.1	14.7	38.7	---	0.7
Mutton, leg	61.8	38.2	18.3	19.0	---	0.9
Mutton, shoulder	58.6	41.4	18.1	22.4	---	0.9
Mutton, loin (chop)	49.3	50.7	15.0	35.0	---	0.7
Meats (prepared).						
Dried beef	58.6	41.4	30.3	4.4	---	6.7
Corned beef, rather lean	58.1	41.9	13.3	26.6	---	2.0
Smoked ham	41.5	58.5	16.7	39.1	---	2.7
Pork, bacon, salted	10.0	90.0	3.0	80.5	---	6.5
Fowl.						
Chicken, rather lean	72.2	27.8	24.4	2.0	---	1.4
Turkey, medium fatness	66.2	33.8	23.8	8.7	---	1.3
Goose, fat	38.0	62.0	15.9	45.6	---	0.5
Dairy Products, Eggs, Etc.						
Cow's milk	87.4	12.6	3.4	3.8	4.8	0.7
Cow's milk, skimmed	90.7	9.3	3.1	0.7	4.8	0.7
Cow's milk, buttermilk	90.3	9.7	4.1	0.9	4.0	0.7
Cow's milk, whey	93.2	6.8	0.9	0.2	5.0	0.7
Cheese, whole milk	31.2	68.8	27.1	35.4	2.4	3.9
Cheese, skimmed milk	41.3	58.7	38.3	6.8	9.0	4.6
Butter	9.0	91.0	1.0	87.5	0.5	2.0
Hen's eggs	73.1	26.9	13.4	11.8	0.7	1.0
Fish, Etc.						
Flounder, whole	84.2	15.8	13.8	0.7	---	1.3
Haddock, dressed	81.4	18.6	17.1	0.3	---	1.2
Bluefish, dressed	78.5	21.5	19.0	1.2	---	.3
Cod, dressed	82.6	17.4	15.8	0.4	---	1.2
Whitefish, whole	69.8	30.2	22.1	6.5	---	1.6
Shad, whole	70.6	29.4	18.5	9.5	---	1.4
Mackerel, average, whole	71.6	28.4	18.8	8.2	---	1.4
Salmon, whole	63.6	36.4	21.6	13.4	---	1.4
						Salt.
Cod	53.8	26.1	21.7	0.3	---	20.1 | 4.1
Smoked herring	34.5	53.8	36.4	15.8	---	11.7 | 1.6
Salt mackerel	42.2	47.2	22.1	22.6	---	10.0 | 2.5
Oysters	87.2	12.8	6.0	1.2	3.6	2.0

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VEGETABLE FOODS.

Kinds of Foods. (*Italics* indicate European analysis; the rest are American.)	Water.	Nutrients.				
		Nitrogenous (albuminoids).	Fats.	Carbohydrates, etc.	Wood Fiber.	Mineral Matters.
Foods.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Wheat flour, average	11.6	11.1	1.1	75.4	0.2	0.6
Graham flour (wheat)	13.0	11.7	1.7	69.9	1.9	1.8
Rye flour	13.1	6.7	0.8	78.3	0.4	0.7
Pearled barley	11.8	8.4	0.7	77.8	0.3	1.0
Buckwheat flour	13.5	6.5	1.3	77.3	0.3	1.1
Oatmeal	7.7	15.1	7.1	67.2	0.9	2.0
Maize meal	14.5	9.1	3.8	69.2	0.8	1.6
Hominy	13.5	8.3	0.4	77.1	1.3	0.4
Rice	12.4	7.4	0.4	79.2	0.2	0.4
Beans	13.7	13.2	2.1	53.7	3.7	3.6
Peas	15.0	22.9	1.8	52.4	5.4	2.5
Potatoes	75.5	2.0	0.2	20.7	0.8	1.0
Sweet potatoes	75.8	1.5	0.4	20.0	1.1	1.2
Turnips	91.2	1.0	0.2	6.0	0.9	0.7
Carrots	87.9	1.0	0.2	8.9	1.2	0.8
Cabbage	90.0	1.9	0.2	4.9	1.8	1.2
Cauliflower	90.4	2.5	0.4	5.0	0.9	0.8
Melons	95.2	1.1	0.6	1.4	1.1	0.6
Pumpkins	90.0	0.7	0.1	7.3	1.3	0.6
Apples	84.8	0.4	0.0	12.8	1.5	0.5
Pears	83.0	0.4	0.0	12.0	4.3	0.3
Starch	15.1	1.2	0.0	83.3	0.0	0.4
Cane sugar	2.2	0.3	0.0	96.7	0.0	0.8
Wheat bread	32.7	8.9	1.9	53.5		1.0
Graham bread	34.2	9.5	1.4	53.3		1.6
Rye bread	30.0	8.4	0.5	59.7		1.4
Soda crackers	8.0	10.3	9.4	70.5		1.8
Oatmeal crackers	4.9	10.4	13.7	69.6		1.4
Pilot (bread) crackers	7.9	12.4	4.4	74.2		1.1
Macaroni	13.1	9.0	0.3	76.8		0.8

includes air and water, but as generally understood, the term is used as referring to such food as requires digestion in the body. Food ought to embrace all the elements found in the body. These, as given by chemists, number 15. According to Professor Atwater's table, the following are the chemical constituents of the body of a man weighing 148 pounds·

		Pounds.
5 Gases	Oxygen	92.4
	Hydrogen	14.6
	Nitrogen	4.6
	Chlorine	0.12
	Fluorine	0.02
3 Metalloids	Carbon	33.30
	Phosphorus	1.40
	Sulphur	0.24
7 Metals	Calcium	2.80
	Potassium	0.34
	Sodium	0.12
	Magnesium	0.04
	Iron	0.02
	Manganese	Traces.
	Copper	

While the body is composed of the 15 elements named above, and in the proportions there stated, it would be impossible to nourish it with them in their elementary condition.

The amount of food required daily, Huxley estimated thus: Lean beefsteak, 5,000 grains; milk, 7,000 grains; bread, 6,000 grains; potatoes, 3,000 grains; butter, 600 grains; water, about 6 pounds—taken as both food and drink, to supply the daily loss to the system. The water required for the system comes largely from the food, as is shown by Professor Atwater, in the preceding tables:

Digesting Food. For an account of the process of digestion, see Nutrition, Vol. XVII, pp. 695,–697. The various juices of the alimentary canal which act upon the food are given in the following table, showing not only their names, but their uses, as taken from Roberts:

Name.	Function.
1. *Ptyalin*, or salivary diastase, contained in the saliva.	1. Changes starch into dextrine and glucose.
2. *Pepsin*, contained in gastric juice.	2. In acid fluids, changes albuminoids into peptones.
3. *Curdling ferment*, contained in gastric juice.	3. Coagulates casein.
4. *Trypsin*, contained in pancreatic juice.	4. In alkaline solutions transforms proteids into peptones.
5. *Curdling ferment*, found in pancreatic juice.	5. Coagulates milk casein.
6. *Pancreatic diastase*, found in pancreatic juice.	6. Changes starch into dextrine and glucose.
7. *Emulsive ferment*, found in pancreatic juice.	7. Emulsifies fats.
8. *Bile*, poured into duodenum.	8. Assists in emulsifying fats.
9. *Invertin*, found in intestinal juice.	9. Converts cane sugar into inverted sugar.
10. *Curdling ferment*, found in intestinal juice.	10. Coagulates casein.

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Relative Value of Vegetable and Animal Food. In practice, there are no distinctive flesh-eaters among us—none who avail themselves of the higher proportion of albuminoids and fat. All practically admit, in eating their ordinary dinner, that an excess of nitrogenous matter and fat is bad. They do so by mixing the meat with potatoes, the latter containing an excess of starch (carbohydrate) and a small amount of albuminoids and fat. The slice of meat mixed with the lump of potato brings the whole down to the average composition of a fairly arranged vegetarian meal. By a vegetarian repast is not meant mere cabbage and potatoes, but properly selected, well-cooked, nutritious vegetable food. As an example, take equal weights of beef and potatoes composing the meal, without bread, and we have the following analysis, according to the table given by Pavy:

Mixed Dinner.	Water.	Albumen.	Starch.	Sugar.	Fat.	Salts.
Lean beef	72.00	19.30	------	------	3.60	5.10
Potatoes	75.00	2.10	18.80	3.20	0.20	0.70
	147.00	21.40	18.80	3.20	3.80	5 80
Mean composition	73.50	10.70	9.40	1.60	1.90	2.90

Compare with the above the meal furnished to the poor in Munich by Count Rumford's soup (without bread—afterward added) No. 1, composed of equal measures and weights of peas and pearl-barley or barley meal. Their percentage of composition was as follows:

Rumford's Soup.	Water.	Albumen.	Starch.	Sugar.	Fat.	Salts.
Peas	15.00	23.00	55.40	2.00	2.10	2.50
Barley meal	15.00	6.30	69.40	4.90	2.40	2.00
	30.00	29.30	124.80	6.90	4.50	4.50
Mean composition of mixture	15.00	14.65	62.40	3.45	2.25	2.25

Here, then, in one hundred parts of the material of Rumford's halfpenny dinner, as compared with the "mixed diet," we have forty per cent more of nitrogenous food, more than six and a half times as much carbohydrate in the form of starch, more than double the quantity of sugar, about seventeen per cent more of fat, and only a little less of salts (supplied by the salt which Rumford added).

The great German scientific philanthropist states that he found that less than five ounces of solids was sufficient for each man's dinner. He was supplying far more nutritious material than beef and potatoes, and therefore his five ounces were more satisfactory than a pound of beef and potatoes, three fourths of which is water, for which water the buyer pays a good round price per pound when he buys his prime steak. Count Rumford added the water at pump cost, and, by long boiling, claimed to have caused some of it to unite with the solid materials (by the hydration), and then served the combination in the form of porridge, raising each portion to 19¾ ounces.

Cheap Dinners for School Children. During the last few years experiments have been made on an extensive scale, in different countries in Europe, in order to test the cost, healthfulness and popular approval of a system of cheap dinners for the benefit of the national and board schools. The editor of these supplementary volumes is indebted to George Herbert Sargent of Birmingham, England, one of the founders and chief promoters of the system, for numerous documents setting forth the results of such experiments in various parts of Great Britain and on the Continent. The limits prescribed for this article permit the insertion of only a few of the many tables reported. In the Kendal district, cheap dinners were started for the supply of two country schools about one mile apart. The managers provided the following plant: One hundred soup-plates, 100 small spoons, one eight-gallon iron pan, one five-gallon can, 20 basins, one pair of scales, two ladles, and one bucket. The dinners were served in a vacant cottage, free of rent in each case, near the school, by a woman who was paid 25 cents per day. Fuel cost 35 cents per week. The *menu* was the following:

On Mondays, Tuesdays and Thursdays, soup and hash—

Soup.	Hash.
5 lbs. peas,	70 lbs. potatoes,
3 lbs. barley,	1½ lbs. onions,
2 lbs. bones,	8 oz. salt,
¼ lb. beef dripping,	¾ oz. pepper,
½ lb. onions,	3 lbs. meat.
6 oz. salt,	
½ oz. pepper.	

On Wednesdays and Fridays, hash and pudding—

Hash.	Pudding.
49 lbs. potatoes,	17½ lbs. flour,
1½ lbs. meat,	1 lb. lard,
1 lb. onions,	2 baking-powders,
6 oz. salt,	4 lbs. treacle or preserve,
½ oz. pepper.	Salt.

The quantities given were sufficient for 80 children; the average number present, 72. The pupils who were able to pay were charged one English penny for a single dinner, or four-pence per week, the dinner being served on the five school days. In case of deficiency caused by free dinners the lack was supplied from private sources.

The nutritive value of the cereals and pulses (wheat, barley, oats, beans, peas and lentils) is as 3 to 1 when compared with meat; its economy, as 18 to 1.

G. H. Sargent had reported from the city of Birmingham, in a period of five months, a total of about 300,000 school dinners, of which the following were from the kitchen under his own charge:

		Costing.
9,833½	at a halfpenny (paid for), costing about	$102
4,709½	at a halfpenny (free)	49
30,381	at a farthing (paid for)	155
104,097	at a farthing (free)	540
17,210	at 30 for 1s. (free)	120
166,231		$906

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His experience is thus summarized:

It has been found that two or three of our dinners a week, given throughout the winter to half-starved children, in addition to what they could get before, change them from a pinched to a fairly well-fed condition, fill them with life and spirits instead of dullness and misery. The popularity of the soups is tested in the simplest way; no compulsion whatever is laid on the children to finish what is given them. They are not pressed—or even encouraged—to eat more than they feel an inclination for; yet we rarely find, as we often did when the dinners were far more costly, that any is left. The very cheapest dinners are by far the most popular. Peas and lentils meet another distinct want. It has been noticed that the children prefer something moderately solid. This legumes just supply; they retain enough hardness when cooked to want biting, but not enough to make them indigestible. They have, further, these enormous advantages: when one has once learned where to buy and how to cook them, they are very cheap and give very little trouble."

USE OF SALT IN FOOD. Common salt is of immense importance in the processes ministering to the nutrition of the body, for not only is it the chief salt in the gastric juice, and essential for the formation of bile, and may hence be reasonably regarded as of high value in digestion, but it is an important agent in promoting the processes of diffusion, and therefore of absorption. Says the London *Lancet:*

"Direct experiment has shown that salt promotes the decomposition of albumen in the body, acting, probably, by increasing the activity of the transmission of fluids from cell to cell. Nothing can demonstrate its value better than the fact, that if albumen without salt is introduced into the intestine of an animal, no portion of it is absorbed, while it all quickly disappears if salt be added. If any further evidence were required, it would be found in the powerful instinct which impels animals to obtain salt. Buffalos will travel for miles to reach a 'salt-lick'; and the value of salt in improving the nutrition and the aspect of horses and cattle is well known to every farmer. The popular notion that the use of salt prevents the development of worms in the intestine has a foundation in fact, for salt is fatal to the small thread-worms, and prevents their reproduction by improving the general tone and the character of the secretions of the alimentary canal. The conclusion, therefore, is obvious, that salt, being wholesome, and indeed necessary, should be taken in moderate quantities, and that abstention from it is likely to be injurious."

FOOLS, FESTIVAL OF (*Festa stultorum, futuorum, follorum*), a feast celebrated during the middle ages in several Christian countries in the month of December, and participated in by clergymen and laymen. It probably has its origin from the old Italian Saturnalia, and is first mentioned toward the end of the 12th century in a writing by Johann Beleth. The chief festivities fell on the day of Innocent Children or New Year's Day, but lasted generally from Christmas till the last Sunday after Epiphany. In its observance children were chosen to act the part of abbots, bishops and popes in the sacred rites of the Church and in the processions. Later on this parody developed into burlesque mummery, in which deacons and sub-deacons took part. The church became the place where not only the greatest fooleries and harlequinades were acted out but where the most vulgar songs were rendered. The chief seat of these festivals was France and the German cities situated on the Rhine. They became such a nuisance that they were repeatedly forbidden by popes, bishops and councils, and finally abolished by a decree of the Parliament of Dijon in 1552. G.A.S.

FOOL'S PARSLEY, the common name of *Æthusa Cynapium*, an umbelliferous plant, a common poisonous weed in gardens and fields in most parts of Europe. It resembles parsley in its foliage and general appearance, so that serious accidents have occurred from its being mistaken for that herb.

FOOLS' SHIP, a work of the German humanist Sebastian Brant (1458–1521) of Strassburg, written in German in 1494, and treating in a masterly manner on contemporaneous vice and foolery, in 113 chapters, which are illustrated by splendid wood-cuts. It had an immense success and was translated in nearly all European languages; into English by Barclay. G.A.S.

FOOT. See ANATOMY, Vol. I, pp. 729, 738, 739; MAMMALIA, Vol. XV, p. 363; ANTHROPOLOGY, Vol. II, p. 96; APE, Vol. II, pp. 143, 144.

FOOT, in music, apart from the dance, is the group of beats or main rhythms which are contained between two bar lines. This is the measure of time and defines the number of pulsations in each group which contains a separate ictus or stress. It is the determinate standard, or radical unit, by which the multifarious complications of rhythms in an extended piece of music are to be ultimately regulated. As the rhythm of poetry is measured by syllables and feet so is that of music by beats and bars. Foot is also used in speaking of the pitch of sounds. W.R.B.

FOOT. See WEIGHTS AND MEASURES, Vol. XXIV, pp. 510, 511, 517, 518.

FOOT, SOLOMON, an American statesman; born in Cornwall, Vt., Nov. 19, 1802. He graduated at Middlebury College in 1826; studied law; was admitted to the bar; and began the practice of law in Rutland. He was a Representative in Congress from Vermont, 1843–47, and sat in the United States Senate as a Republican from Dec. 1, 1857, to March 28, 1866. He was several times president of the Senate *pro tem.* He died in Washington, D. C., March 28, 1866. E.E.T.

*FOOTBALL, a game highly popular in colleges and universities in the United States. To the account of it given in Vol. IX, p. 321, of this ENCYCLOPÆDIA, there may be advantageously added a later statement of its expansion into new forms and its principal recent modifications. Football is one of the oldest, if not the oldest, of athletic sports. The Greeks are said to have had a type of this sport, which they called ἐφεδρόν, and there was a game indulged in by the Romans, played, however, rather more with the hand than with the foot, but which partook of some of the traits of the latter-day football. This was called the Follis. In the very earliest accounts of English national sport we find a record of this rough but sturdy game. In these primitive times whole townships contended one against the other, and the contest often lasted all day. In it much

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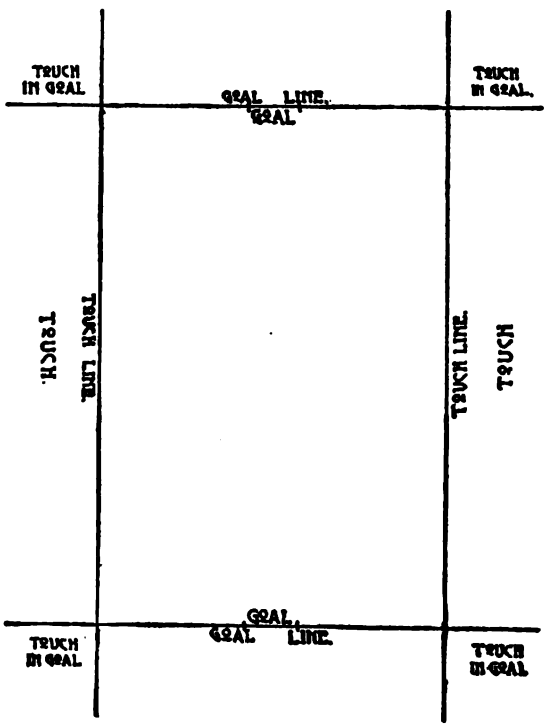
roughness occurred, and it partook of a lawlessness which caused it to come into considerable disfavor with the property classes.

There is a legend that the first football was the head of a Dane that was kicked about on the Roodee, at Chester, on Shrove Tuesday. At any rate, from as early as the twelfth century (see Fitz Stephen's *History of London*) the game was the great Shrove Tuesday sport. Edward II, Henry IV, Edward III, Richard II and James III all issued decrees against the sport, but it has kept its vitality in spite of edicts, and it is played wherever the British colonist has gone. Its history, when translated, is a repetition of the story of opposition, but, in the end, the game takes root and is, apparently, more tenacious of life than any other sport.

The game is played upon any level field by teams of from eleven to twenty players. The object of each side is to send the ball in the direction of

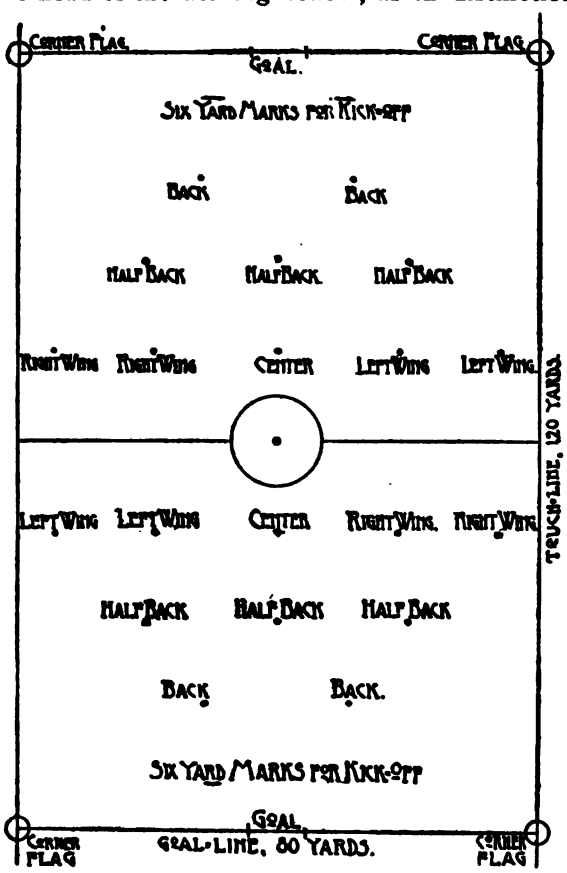


RUGBY

the opponents' end of the field, where scoring is possible, either by getting the ball past a certain line, or through or over a goal there set up. There are at present two general divisions of the sport, one characterized as the running, and the other as the kicking or dribbling game. Not but that the ball is kicked in both schools, but in the running game it can be carried in the hands or arms, while in the kicking game it must be advanced in other ways.

The principal varieties of the sport are known as the Rugby and the Association. But besides these, and coming from as well as very directly influenced by them, are the American-Intercollegiate, the Gaelic, the Australian and some special varieties of football played in parts of Canada. The two chief divisions of Rugby and Association may be traced still farther back, into the schools where they were played before being taken up by the universities or the general public. The Rugby or running game was played, not alone at Rugby, but at Cheltenham, Marlborough and other schools, while the Association or kicking game came from Eton, Harrow, Westminster, Charterhouse and other less-noted schools. Winchester had a game by itself, which it still preserves.

Association football is in reality an offshoot of the running or Rugby game, although it is now the head of the kicking school, as in distinction



ASSOCIATION.

from Rugby, the parent of the running game. No carrying or batting the ball is allowed, and to score a goal the ball must be kicked between the goal-posts and under the goal-bar. The Association game is the most generally played sport in England, and it has been taken up by professionals, so that it stands in that respect to university football in England much as the American professional baseball does to the college game.

In one sense, there are no "Canadian" rules, for British Columbia, Manitoba and the maritime provinces play the English Rugby. Ontario and Quebec have an organization known as the Canadian Rugby Union, and the game played under their rules is the one most generally known to

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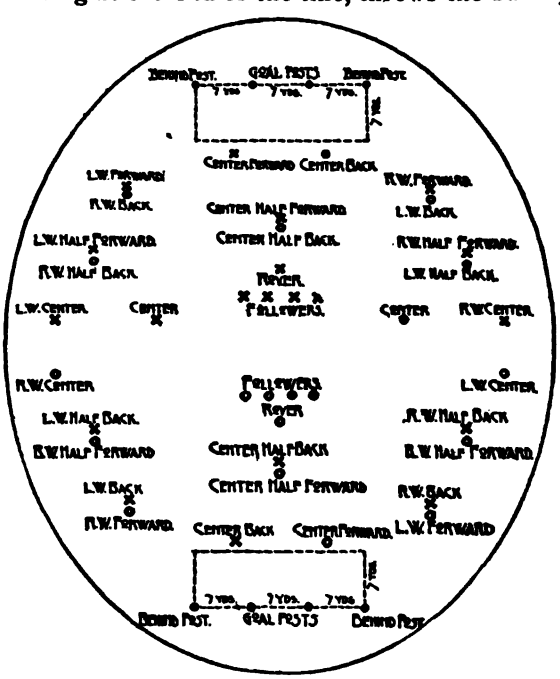
football players as the Canadian game. The Canadian game differs from the English Rugby Union in several features, but is more closely allied to that branch than to the American Intercollegiate. Its principal points of difference from the latter are in greater strictness on the off-side rule, and the more immediate putting of the ball in play after a "down," thus not admitting of the men taking up special positions, as they do, under signal, in the American Intercollegiate.

Gaelic football is one of the oldest of Irish pastimes, and one lately revived both there and in America, principally on the Pacific Coast. The game is played by teams of fifteen men, whose positions are as follows: One goal-keeper, two full-backs, two half-backs, three centers, two forwards, two wing-forwards, one full-forward. The point-posts are a distinguishing feature; a ball passing between these, but missing the goal, counts a point. Another distinctive feature is that of putting the ball in play. The players of both sides are drawn up in two parallel lines at the center of the field, each man holding the hand of a player on the opposite side. The referee, standing at the end of the line, throws the ball up

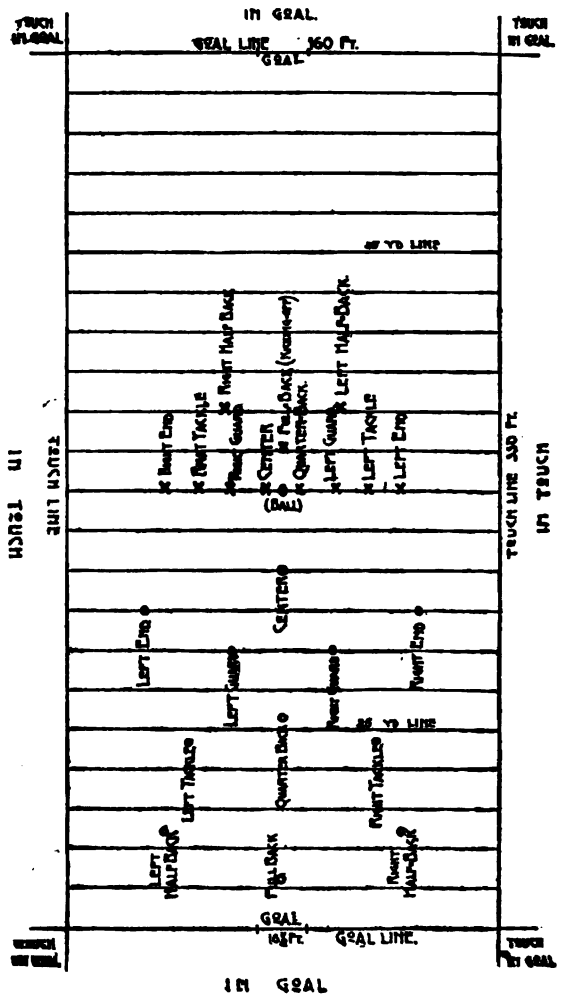


AUSTRALIAN.

into the air so that it will fall about the center of the line. Thereupon the players let go hands and the play begins. The ball may be propelled only by kicking with the foot or striking with the hand, but cannot be thrown or carried. A favorite method of progress with the ball is what is called "hopping"; that is, bounding the ball on the ground by successive pats with the hand.

The Australian game is the product of the inventive genius of the British player, when far enough from home to be free from conservatism. Its arrangement of players, as will be seen from the diagram, is decidedly intricate, and its chief features lie in the radical alteration of the positions.

But of all these games the youngest and the one that offers the greatest incentive for original development is the American Intercollegiate. This is due to the expansion of its laws, which are framed and annually revised with the intent of leaving as great a field for independent and original plays as possible. Free from the bonds of a tradition which might forbid a certain play as unlawful, merely because it had never been used,



AMERICAN INTERCOLLEGIATE.

the American captain and coach plan out and adapt all new arrangements of attack and defense that they can devise, and the contests, therefore, are of extreme interest, drawing often as many as forty thousand people.

The play is after the Rugby order, as the American Intercollegiate rules were originally adopted from that game, but the principal difference now lies in the outlet of the scrimmage and in the allowance of interference to aid the runner. Instead of the indeterminate methods of the Rugby scrimmage, the ball is snapped out to a quarter-

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back, who has in his charge, practically, the direction of the entire play, and who is able to pass the ball from his position to a player at any point in the field behind him. The interference is a method of off-side play, and for that reason not so generally accepted as an improvement upon the English style, as is the outlet for the scrimmage. The American Intercollegiate is played with 11 men on a side, and the detail of each position is highly developed. WALTER CAMP.

FOOTE, ANDREW HULL, an American naval officer; born in New Haven, Connecticut, September 12, 1806. He entered the navy as acting midshipman and made his first cruise in the schooner *Grampus*. In 1830 he was commissioned a lieutenant and in 1833 he was flag lieutenant of the Mediterranean squadron. In 1838 he circumnavigated the globe with Commodore Read as first lieutenant of the sloop of war *John Adams*. At the commencement of the Civil War he was executive officer at the Brooklyn navy yard. In July, 1861, he was commissioned a captain, and in the following year commander, and after his capture of Forts Henry and Donelson, was promoted rear-admiral. Disabled by a wound received at Fort Donelson he retired from active service and was placed in charge of the Bureau of Equipment and Recruiting. He died in New York city, June 26, 1863. W.M.C.

FOOTE, HENRY STUART, an American public man; born in Fauquier County, Va., Sept. 20, 1800. He graduated at Washington College, Va., in 1819; studied law; and was admitted to the bar in 1822. He commenced practice at Tuscumbia, Ala., in 1824, but removed to Jackson, Miss., in 1826. He was elected United States senator from Mississippi as a Unionist, and served from 1847 to 1852, when he resigned; and was governor of the State, 1852–54, in which latter year he removed to California. He returned to Vicksburg, Miss., in 1858, and as a member of the Southern convention at Knoxville, Tenn., in 1859, spoke against disunion, though subsequently he represented Tennessee in the first and second Confederate Congresses. After the war he settled in Washington, where he practised law. He published *Texas and the Texans* (1841), a *History of the Southern Struggle*, and a volume of *Personal Reminiscences*. He died in Nashville, Tenn., May 20, 1880. E.E.T.

MARY HALLOCK FOOTE.

FOOTE, MARY HALLOCK, an American authoress and illustrator; born in Milton, New York, Nov. 19, 1847. She studied illustration at the Cooper Union, New York, and engaged in book-illustrating until 1876, when she married Andrew De Wolf Foote, a mining engineer. She accompanied her husband to Colorado, where she was afforded ample opportunity to study nature and Western life. She published a number of stories of camp-life, all of which are illustrated with original drawings by herself. Her tales include *The Led Horse Claim* (1883); *John Bodewin's Testimony* (1886); *The Last Assembly Ball* (1888); *Cœur d'Alene* (1894); and *The Cup of Trembling, and other Stories* (1895). Her best-known illustrations are those for Osgood and Company's *Hanging of the Crane; Scarlet Letter;* and *Skeleton in Armor*.

FOOTE, SAMUEL AUGUSTUS, an American statesman; born in Cheshire, Conn., Nov. 8, 1780. He graduated at Yale in 1797, and engaged in mercantile pursuits in New Haven. For several years he was a member of the State House of Representatives, and twice its Speaker. He was Representative in Congress from Connecticut from 1819 to 1821, from 1823 to 1825, and from Dec. 2, 1833, to May 9, 1834. He sat in the United States Senate from Dec. 3, 1827, to March 2, 1833, and was governor of the State from 1834 to 1835. In 1844 he was a Presidential elector on the Clay and Frelinghuysen ticket. He died in Cheshire, Conn., Sept. 15, 1846. E.E.T.

FOOT-ROT, a hoof-disease among sheep. The disease exists in two varieties. The common form consists of a superfluous growth of hoof, causing it to turn down, crack, etc., at the toe, and, when neglected, to separate from the sensitive parts beneath, and cause ulcers, proud flesh and general soreness. It is caused by a sudden change of the sheep from a rocky, scanty pasturage to a rich, soft one. The remedies to be used depend upon the advancement and severity of the case. In the earliest stage a careful paring of the hoof will prevent serious results; later stages require a treatment of tar; and still later a caustic or active astringent application is necessary. For such an astringent butter of antimony diluted with an equal quantity of myrrh is a good remedy when carefully administered. The safest remedy is a fluid caustic of equal weights of flowers of sulphur and finely powdered sulphate of copper mixed with lard or oil. The second form of the disease is termed "foul in the foot." This is more troublesome, and begins in the interdigital space. The foot is hot, tender and swollen around the coronet. A separation of the toes results from the ulcerations. Poultices should be applied in the severer cases, and in the milder forms the parts should be washed with a solution of chloride of zinc and the foot protected with a leather boot.

FORAGE, hay, straw and oats supplied to horses of officers and soldiers in the army. Where troops are together, the provisions of forage devolves on the commissariat. Officers of the staff, etc., who are entitled to horses, but whose duties are at stations where bodies of horses are not collected, receive a money allowance, in lieu of forage in kind, varying according to the place and price of provender. According to the regulations of the United States army, an allowance is made for each horse of 14 pounds of hay and 12 pounds

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of grain, generally oats, daily. A mule is given but 9 pounds of grain, with 14 pounds of hay.

FORAGE PLANTS OF THE UNITED STATES. See GRASSES, Vol. XI, pp. 48–53 for description of the true grasses (*Gramineæ*). The majority of important forage plants are members of this great family, which is of more economic importance to man than all others of the plant kingdom. Popularly, the term *grass* is applied to all those plants which are used for pastures and meadows—a classification founded upon use alone, disregarding the distinctive features. A true grass has simple leaves, a stem generally jointed and tubular, the husks or glumes in pairs, and the seed single. This definition includes wheat, rye, oats, etc., and excludes clover, and some other plants commonly called grasses. In this article, however, there are also described important forage plants, which, though not true grasses, find much use in agriculture. Of the special adaptation of different forage plants to different sections of the United States, little is known. There are many climates, many kinds of soil and many degrees of aridity and moisture, and no one species of grass is equally adapted to all parts of this extensive territory; yet not more than a dozen species have been successfully introduced. This number answers, with a tolerable degree of satisfaction, the wants of quite an extensive portion of the country, chiefly the northern and cooler regions; but in other localities the same kinds of grasses do not succeed equally well. This is particularly the case in the Southern and Southwestern states, the arid districts of the West, and in California. To discover successful varieties for such regions is largely a matter of experiment and observation.

The grasses most generally cultivated in the United States are: 1. Red clover (*Trifolium pratense*); 2. White or Dutch clover (*T. repens*); 3. Timothy (*Phleum pratense*); 4. Blue-grass (*Poa pratensis*); 5. Wire-grass (*Poa compressa*); 6. Red-top (*Agrostis vulgaris*); 7. Orchard-grass (*Dactylis glomerata*); 8. Fowl meadow-grass (*Poa serotina*); 9. Meadow-fescue (*Festuca pratensis*) and 10. Alfalfa, or lucerne (*Medicago sativa*). For feeding during droughts, Indian corn, sown at the rate of two bushels per acre, in drills two feet apart, cultivated thoroughly once or twice, and cut when in blossom, will make a good reliance, as also will German millet (*Panicum Germanicum*) and common millet (*P. miliaceum*). Above are designated ten species of forage plants that do well under ordinary conditions; 1, 2, 3, 4, 5 and 6 constitute the bulk cultivated for pasture, and 1 and 3 for hay; 7 is one of the most valuable in the whole list, and is always worth trial, unless the land to be grown over is exceptionally low and wet; 8 and 9 are well worthy of trial; 10 is the most successful forage plant of the irrigated and moist portions of the Southwest. Fowl meadow-grass, especially, has been found to take the place of blue-grass in those sections of the Northwest where blue-grass does not succeed. The hay is especially valuable for horses, it having all the advantages of wild hay, being free from the dust that infests timothy and clover, while it possesses all the nutriment of the best cultivated hay, and dairymen pronounce it valuable hay for milch cows. Meadows of timothy alone are, when well managed, very satisfactory and profitable. It is also common to combine red clover with timothy in various proportions. In low, wet meadows, red-top is considerably employed, and it is a common constituent of pastures in all the Northern states. Some species of grass are best adapted to clay-lands, some to sandy soils, some to loam, some to dry upland, and some to lowland; and, under such special conditions, the grass most suitable should be used alone. Generally, however, a mixture of five or six suitable varieties will yield a larger crop than one alone. The mixture of several kinds, perhaps, is most valuable in land that is intended for pasturage, as then they reach maturity at different times and furnish a succession of good feed, and also cover the ground more uniformly and completely. For a permanent pasturage, under most circumstances, the following kinds, in proper proportions, make a good mixture: June grass (blue-grass), foxtail (*Alopecurus pratensis*), red-top (bent-grass), timothy, tall fescue and perennial rye-grass. For an immediate pasture the following mixture is generally satisfactory: Blue-grass, 8 pounds; orchard-grass, 4 pounds; timothy, 4 pounds; red clover, 6 pounds.

In all new countries the dependence must, of course, be first upon the wild grasses. As a rule, these have not been sufficiently appreciated. Many of them are of exceeding value, but, unfortunately, are, as a rule, sparse seeders, and hence are apt to be neglected. The trouble is, that farmers, as a class, do not investigate and experiment enough for themselves. Thus they are content with the most meager list of grasses, and, as a result, for a good part of the season their stock finds insufficient food of proper succulence, and, oftentimes, is really distressed for subsistence.

Chemical Composition of American Grasses. Of late years considerable attention has been given to the chemical composition of grasses, and much information has been gained concerning their nutritive value. The determinations of the grasses given in the above list of those commonly cultivated in the United States will be found in the table on the following page.

The specimens used were from various parts of the country, and grown under several conditions of soil and environment. The stage at which analyses were made was, in nearly every case, full bloom or slightly later, that being the period at which grasses are usually cut for hay. The analyses have been calculated for "dry substance," and also for fresh grass where the amount of water in the fresh grass had previously been determined, otherwise for the amount of water in hay. The great variation in composition of grasses becomes apparent on examining a table of 136 analyses, given in the special bulletin of the United States Department of Agriculture on the

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agricultural grasses and forage plants of the United States for 1889. The highest and lowest determinations, selected from this table, are shown in the following list of extremes:

Dry Substance.	Highest.	Lowest.
Ash	19.24	3.57
Fat	5.77	1.48
Nitrogen—free extract	66.01	34.01
Crude fiber	37.72	17.68
Albuminoids	23.13	2.80
Nitrogen	3.70	.45
Non-albuminoid nitrogen	1.64	-- --
Per cent of nitrogen, non-albuminoid	60.70	-- --
Water in fresh grass	76.50	60.00

The highest ash is undoubtedly owing to the presence of adherents oil, and the lowest carbohydrates are dependent, relatively, on the same cause. The wide variations in fiber and albuminoids must be regarded, however, as being entirely due to physiological causes, which are difficult to explain. Species are not, in themselves, at all fixed in their composition, there being as large variations among specimens of the same as between specimens of different species.

Grass and Forage Crops. Of the native grasses of the United States, the timothy, or cattail, (*Phleum pratense*) is of first importance. It attains to perfection on rich clays and loams in the middle states, and yields, under favorable circumstances, a ton and a half to two tons of hay per acre. It is a hardy grass, of luxuriant growth, and its nutritive qualities are universally recognized. It is, also, a valuable crop for seed, an acre of prime grass yielding from fifteen to twenty-five bushels of clean seed, which is usually worth, in the market, from two to four dollars per bushel, and the stalks and chaff that remain make a useful fodder for most kinds of stock. It may be sown on wheat or rye in August or September, or in the spring. When sown alone or with other grasses, early in the season, on a rich soil, it will produce a good crop the same year.

The blue-grass of Kentucky, otherwise known as June grass, is an early grass, very common in the soils of New England and the West, in pastures and fields, constituting a considerable portion of the turf. It varies very much in size and appearance, according to the soil on which it grows. In Kentucky it is universally known as blue-grass, and is considered the most valuable of all the pasture-grasses. It comes into the soil in some parts of the country when left to itself, and grows luxuriantly and is relished by cattle.

Meadow foxtail is a valuable pasture-grass, on account of its early and rapid growth, and of its being greatly relished by stock of all kinds. It thrives best on a rich, moist, strong soil, and shoots up its flowering stalks so much earlier than timothy, that it need not be mistaken for that grass, though it closely resembles it. It is superior to timothy as a permanent pasture-grass.

Orchard-grass is one of the most valuable and widely known of all the pasture-grasses. It is common to every country in Europe, to the north of Africa and to Asia, as well as to America. Its culture was introduced into England from Virginia, where it had been cultivated some years previously, in 1764. Its rapidity of growth, the luxuriance of its aftermath, and its power of enduring the cropping of cattle, commend it highly to the farmer's care, especially as a pasture-grass.

Meadow spear-grass, nerved manna-grass (*Glyceria nervata*), is the fowl meadow of many farmers, while the grass commonly called fowl meadow by others (*Poa serotina*) often goes with them under the name of bastard fowl meadow. It is a native American grass, the nutritive value of which is equal at the time of flowering and when the seed is ripe, while the nutritive matter of the lattermath is said to be greater than that of most other grasses.

Hungarian grass, Hungarian millet (*Panicum Germanicum*), is an annual forage plant introduced into France in 1815, where its cultivation has become considerably extended. It germinates readily, withstands the drouth remarkably, remaining green even when other vegetation is parched up, and if its development is arrested by dry weather, the least rain will restore it to vigor. It has numerous succulent leaves, which furnish an abundance of green fodder, very much relished by all kinds of stock.

Broom-corn (*Sorghum saccharatum*) is considered, by some botanists, as a variety of *Sorghum vulgare;* by others, as a distinct species. Its leaves are linear; ligules short and hairy; panicle with long, loose, expanding branches. It is an annual, and flowers in August, growing from six to nine feet high. It is a native of India.

The panicles are used for brooms, and the seeds for poultry, hogs, etc. It is extensively cultivated in many parts of the country, along the Connecticut River, in Massachusetts; the Mohawk, in New York; and at the West. It is said to have been first cultivated in this country by Dr. Franklin.

Red clover (*Trifolium pratense*) is one of the most valuable and economical forage plants. It belongs to the pulse family, or *Leguminosæ*, which includes the larger portion of forage plants called artificial grasses, in distinction from the *Gramineæ*, the only true, and often called the natural, grasses.

White clover is widely diffused over this country and all the countries of Europe. It is indigenous, probably, both to England and America. Its chief value is as a pasture-grass, and it is as valuable for that purpose as the red clover is for hay or for soiling.

The yellow clover, hop-trefoil, or shamrock (*Trifolium procumbens*), like the white, is of spontaneous growth, very hardy and prolific. It bears a yellow flower and black seeds.

Alfalfa, or lucerne (*Medicago sativa*), is one of the most productive plants for forage ever cultivated. It was extensively cultivated by the Greeks and other nations of antiquity for many centu

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ries, and it has been a prominent object of attention in Italy, Spain, France, Holland and Flanders. Its relative value, as compared with clover (*T. pratense*), is decidedly inferior, while its absolute value per acre is much greater. It was early introduced into this country. It bears from three to five crops per annum, producing from three to eight tons of hay. Our climate in the Northern and middle states is too cold for it, but it grows luxuriantly in California, Arizona, New Mexico, Utah and Colorado. It must have a deep, loamy soil, free from weeds, and well filled with manure.

East India giant clover (*Polygonum Sachalinense*), introduced into the United States from Europe, being a native of Russia, is regarded of great value for forage in the arid regions of the Western and Southwestern states. It grows with luxuriance in territory formerly regarded unfit for grazing purposes, and attains a height of from 8 to 12 feet. It is a thick-growing, bushy plant, with large succulent leaves, and will produce from 80 to 120 tons per acre of green forage. Since it requires a minimum amount of moisture, and is such a rank grower, it is regarded of great value in the breeding of cattle on a large scale.

In addition to the article to which reference is given at beginning, see also bulletins of the Department of Agriculture on the grasses and forage plants of the United States, and AGRICULTURE, in these Supplements.

JOHN G. COULTER.

FORAKER, JOSEPH BENSON, an American statesman; born in Highland County, Ohio, July 5, 1846. From 1862 till the close of the war he served in the 89th Ohio Volunteers, rising from private to brevet captain. He graduated at Cornell University in 1869, and in the same year began to practise law at Cincinnati. From 1879 to 1882 he was judge of the superior court of Cincinnati; was elected governor of the State in 1885 and again in 1887; was chairman of the Republican State conventions in 1886, 1890, 1896, and 1900, and a delegate at large from Ohio to the national Republican conventions of 1884, 1888, 1892, 1896, and 1900. He was elected United States senator, June 15, 1896, and was re-elected Jan. 15, 1902.

E.E.T.

ARCHIBALD FORBES.

FORBES, ARCHIBALD, a British war correspondent; born in Morayshire, Scotland, in 1838, and died at London, Mar. 29, 1900. He served some years in the Royal Dragoons. He was correspondent of the *Daily News* through the Franco-Prussian war, during the Commune in Paris, during the Prince of Wales's Indian tour, and in the Russo-Turkish and South African campaigns. In 1879 he rode 110 miles in 15 hours to report the victory of Ulundi. He published several books detailing his experiences, and has lectured in Great Britain, America, and Australia. His works include a novel, *Drawn from Life; Glimpses through the Cannon Smoke* (1880); *Barracks, Bivouacs, and Battles* (1891); *The Afghan Wars* (1892); *Colin Campbell, Lord Clyde* (1895); *Studies of War and Peace* (1895); *The Black Watch* (1896); and *Life of Napoleon III* (1898).

FORBES, JOHN COLIN, artist, was born at Toronto, Canada, on January 23, 1846, and at an early age adopted the career of a painter. He studied in London, at the Royal Academy, and returned to Canada, where he made portraits of Lord Dufferin, Sir John A. Macdonald, the Hon. Alexander Mackenzie, Sir Charles Tupper, and other prominent men. He has also painted many portraits in the United States, including one of President Benjamin Harrison. W.F.J.

FORBES-ROBERTSON, JOHN, a British art critic and journalist; born in Aberdeen, Scotland, Jan. 30, 1822. Even before his graduation from Aberdeen University, he contributed articles in dramatic criticism to local papers. He engaged in business for several years, but, later, spent much of his time in art criticism. He was, for a time, editor of *Pictorial World* and was a constant contributor to various art periodicals. He published *The Great Painters of Christendom* (1877), *Life of George Jameson, the Scottish Painter*, and other works, all of which have been favorably received. He died February 25, 1903.

FORCE. See DYNAMICS, Vol. VII, pp. 502, 503; MECHANICS, Vol. XV, pp. 755–756; and ENERGY, Vol. VIII, pp. 187–192.

FORCE, PETER, an American historian; born at Passaic Falls, N. J., Nov. 26, 1790. He learned the printing trade in New York, and resided there until 1815, when he removed to Washington, D. C. From 1820 to 1836 he published the *National Calendar*, an annual volume of statistics; and from 1823 to 1830 he issued the *National Journal*, the official paper of John Quincy Adams's administration. From 1836 to 1840 he was mayor of Washington, and was afterward president of the National Institution for the Promotion of Science. In 1833 he began the publication of *American Archives*, of which nine volumes were issued; but the scheme, originally fathered by the government, was held to be *ultra vires*, and it was discontinued by order of Secretary of State William L. Marcy. The mass of historical material collected by Mr. Force for this and other publications is considered very valuable. He was the author of many scientific papers, including contributions on the subject of Arctic discovery. He died in Washington, D. C., Jan. 23, 1868.

E.E.T.

FORCE, TUBES OF. See ELECTRICITY, § 9a, in these Supplements.

FORCE BILL, otherwise known as the FEDERAL ELECTIONS BILL, a measure introduced in the Lower House of Congress, March 15, 1890; considered from June 25th to July 2d; passed the House the

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last-named date and went to the Senate. It was reported in the Senate August 7th, but not taken up until December 2d. It was debated until January 5th, when it was laid aside indefinitely by a vote to take up the Silver Bill. The Force Bill provided for Federal regulation of elections in any county, in any state in the Union, upon petition of at least fifty citizens. It was a Republican measure, excited intense opposition, and was made an issue in the national campaign of 1892.

FORCIBLE ENTRY AND DETAINER, a legal phrase used to describe an unlawful entry upon real estate, such as lands and tenements, accomplished by means of force—*vi et armis*, as the old indictments ran. Feudalism, until the passing of the Statute of Forcible Entry (5 Rich. II, c. 8), was the golden age of forcible entry. Then each petty feudal lord took and retook lands as the fancy seized him, or the forces were numerically in his favor. The exercise of this right was found to be so prejudicial to the public peace that the statute forbade the exercise of a right of entry except where it was given by law, and then only in a peaceable manner, "not with strong hand, nor with multitude of people." Following this statute, the laws of many of the separate states prescribe punishments for the offense of forcible entry. In every case a civil remedy also exists, and a person detaining lands and tenements belonging to another can be dispossessed by due process of law.

FORCING, in gardening, the artificial application of heat to accelerate vegetation. Many of the fruits and vegetables which grow well in the open air are very commonly forced, in order that they may be procured at seasons when they could not be without artificial means. See HORTICULTURE, Vol. XII, pp. 219, 220.

FORD, EDWARD ONSLOW, a British sculptor; born in London, July 27, 1852. He studied painting in Antwerp and Munich. In 1871 he turned his attention to sculpture, and returned to England in 1874. His best-known statues are *Sir Rowland Hill; W. E. Gladstone;* and *Henry Irving as Hamlet.* He died in London, Dec. 23, 1901.

FORD, SIR FRANCIS CLARE, a British diplomatist; born in 1830; was in the army from 1846 to 1851, and then entered the diplomatic service. He was British fisheries commissioner at Paris (1883); minister at Madrid (1884); ambassador to Spain (1887); ambassador to Constantinople (1892), and to Rome (1893–98). He was made a privy councilor in 1888, and knighted in 1889. Died at Paris, France, Jan. 31, 1899.

FORD, PAUL LEICESTER, American author, born at Brooklyn, N. Y., in 1865, died May 8, 1902. He was an able writer, his best-known works being *The True Story of George Washington*, and the novels *The Hon'able Peter Stirling*, and *Janice Meredith.*

FORD, WORTHINGTON CHAUNCEY, statistician, was born in Brooklyn, N. Y., on February 16, 1858, brother of Paul Leicester Ford (q. v.). He was chief of the Bureau of Statistics of the U. S. government in 1885–89, and again in 1893–98, was connected with the Boston Public Library in 1897–1902, and since 1902 has been chief of the division of manuscripts in the Library of Congress. In 1901 he was a lecturer on statistics at the University of Chicago. He has edited *Wells's Natural Philosophy*, and has written *The American Citizen's Manual*, *The Standard Silver Dollar*, *George Washington*, *Letters of William Lee*, *Correspondence and Journals of Samuel B. Webb*, and various other publications and official reports. W.F.J.

FORDHAM, New York city, a former village of Westchester County, now included in the Bronx borough, 12½ miles north of New York City Hall, on the heights above the east bank of the Harlem River. Among educational institutions at Fordham and Fordham Heights, is the University of the City of New York. C.L.S.

FORECASTS, WEATHER. See METEOROLOGY, in these Supplements.

FORECLOSURE. See MORTGAGE, Vol. XVI, p. 875.

FOREFATHERS' DAY, in American history, the anniversary of the landing of the Pilgrim Fathers from the ship *Mayflower* at Plymouth, Massachusetts, December 22, 1620. The day is generally observed by patriotic societies especially in the New England states. The first organization to celebrate the anniversary was the Old Colony Club, formed at Plymouth in 1769. It held annual banquets until it was disbanded in 1773. Until 1819 the various churches at Plymouth commemorated the day. The anniversary is especially remembered by the Society of Mayflower Descendants founded in New York city, December 22, 1894. Its membership is confined to lineal descendants of any passengers on the *Mayflower.* In 1904 there were over 3,000 members of the society. There are also numerous state societies of a similar character. In New York city the New England Society commemorate the day by a banquet at which addresses and speeches are made by prominent men. Properly Forefathers' Day should be observed on December 21, instead of the 22nd. The date of the landing of the *Mayflower* was December 11, according to the old style of reckoning. In 1752 when the Gregorian calendar was adopted in England, it became necessary to add ten days to the old calendar. Those who first commemorated Forefathers' Day inadvertently added 11 days instead of 10 days, thus fixing by custom the date on December 22. W.M.C.

FOREIGN ATTACHMENT, a proceeding whereby the property of a debtor, who does not reside in the state, may be seized under legal process and held for the payment of the plaintiff's demand. Laws exist in almost every state of the United States, permitting this form of attachment. The purpose of such enactments is that a citizen of the state may have the most complete remedy which the law can afford him against a non-resident debtor who is not under the jurisdiction of the laws of such state, and thereby frequent injustice and vexatious delay are prevented.

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FOREIGN ATTITUDES. Well informed writers of magazine and press, in 1903, claimed that the relations of the great powers of Europe with the United States were never before so cordial as during that year. Not only did a high average of general good feeling in diplomatic negotiations prevail, but other opportunities were taken advantage of to exchange courtesies. One incident of this kind was the hearty reception Germany extended the American squadron, under Admiral Cotton, during the days of the regatta at Kiel, in June. The frank and genial hospitality of the Kaiser and his people at that time and the gratitude with which their expressions of friendliness and regard were received and commented upon, in the United States, were unmistakable evidences of mutual good will between the two countries. After leaving the German seaport, Admiral Cotton's squadron spent a week at Portsmouth where the officers and men received marked attention and courtesy from King Edward and the English people, showing that here, too, there was no restraint in the cordial relations of the countries represented. In the earlier history of the country, the possibility was that the reopening of a question long ago considered settled, like that of the Alaskan boundary between the possessions of the United States and England, would have led to serious trouble, but under existing attitudes, aside from the annoyance of re-establishing the old boundary line by the joint commission appointed by the two governments, no apprehension of difficulty was entertained.

For a short time a little anxiety was felt that difficulties might arise between the United States and Russia, in the former's efforts to restore trading rights in the Chinese tributary province of Manchuria, then under Russian occupation, but the information officially announced that China would order the opening of the two ports of Mukden and Ta Tung Kao to the commerce of the world, and that Russia would in no way oppose such action, removed all fears of trouble. About the same time the massacre of Jews in Kishinef, Russia, called forth an expression of mild reproof or regret from the United States for the inadequate governmental protection afforded that race in Russia, but that no ill feeling was engendered thereby between the two countries, was shown by Russia's subsequent attitude, and the request of the United States Government and Venezuela that the Czar should name the members of the Hague tribunal to decide the preferred order of payment to the blockading powers.

The act passed by the United States Congress to construct an Isthmian canal led to protracted negotiations with the Republic of Colombia for the perpetual control of the canal strip of territory. The treaty to this effect was drawn up and submitted to the Colombian Congress for ratification, but after several months of deliberation it was rejected by the senate, August 12, 1903. This act of the Colombian Congress and the subsequent delay of that country to conclude arrangements with the United States for building the canal led the state known as the Isthmus of Panama to declare its independence of Colombia, November 3, 1903, and after its formation into a distinct self-governing republic, negotiations between it and the United States were concluded for the construction of the canal.

The attitudes maintained by Russia and Japan towards each other during the summer of 1903 were somewhat unfriendly, owing to disagreements over Korean and Manchurian questions. There was a good deal of talk relative to this trouble, to the effect, that in the event of active hostilities an alliance of England and France with Japan and Russia, respectively, was quite probable. But, while rumors of these complications were being circulated, there was nothing in the actions of France and England towards each other to indicate a desire for such an alliance. On the other hand, there were many obvious reasons why they should perpetuate their friendly relations. These relations were maintained, as was afterwards demonstrated, when Japan and Russia engaged in an armed conflict without involving any other nations.

Commotion in the nest of governments in the Balkan Peninsula is not an unusual occurrence. The mixture of race, language and religion, which prejudice and dissension keep in a constant turmoil leads to many factional disturbances. The revolution in Macedonia, an uprising of the Christian population to secure independence from Moslem domination, was one of the main causes of trouble in the summer of 1903. During this turbulence the Russian consul, M. Rostovski, was murdered at Monastir, which caused Russia to dispatch a squadron into Turkish waters to emphasize her demands on the Sultan growing out of the assassination. International trouble was averted by the demands being promptly met, and the Russian fleet withdrew. Bulgaria, under the suzerainty of Turkey, was at the same time in a condition of insurrection that portended serious trouble.

A measure materially affecting the relative positions of England and Ireland was enacted in 1903 in the passage of the Irish Land Bill by the British Parliament. It was a great step forward towards the relief and hopes of that people. The measure provided, in effect, for the abolition of landlordism throughout the island and the turning over of the soil to the individual ownership of the men who live upon it and till it. Further arrangements were made, within its provisions, for political reform to consist of some form of home rule, within the empire, by which purely Irish legislation was to be placed wholly in the hands of the elected representatives of the Irish people, thus making concessions to Irish aspirations towards national independence. The plan set forth in the bill for the acquisition of tenant ownership provided that landlords were to receive from the government twenty-three years' purchase of their second term rents, or $115,000 for an estate renting at $5,000 a year, one-half in cash and one-half in land stock bearing about 4% interest. Tenant purchasers were to pay eighteen years' rent in terms of fifty and sixty years, making their annual payment considerably less than their rent charges had been, and with the stimulus of ownership to look forward

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to at the end of the period. The difference of five years' purchase in the price paid the landlord and charged the tenants, represents the amount the government considered it policy to "pay for contentment, prosperity and, in the end, for loyalty in Ireland." Walter Wellman, in writing on this subject from Ireland for the Review of Reviews, said: "It is computed that the annual cost of carrying and amortization of this bonus will be under a million pounds sterling,—the best investment for the unity and strength of the empire England ever made, even if every penny of it must come out of the treasury. But the treasury will not have to bear it. With the land question settled, members of the cabinet believe the cost of Irish administration can easily be reduced £1,000,000 a year. For instance, the royal constabulary, a standing army of 13,000 men, maintained almost entirely because the landlords think they need it, costs £1,350,000 a year. With landlordism abolished, this standing army may be largely dispensed with,—be reduced to one-quarter or one-third its present numbers and cost. With the land question settled, most of the objections to home rule will disappear; and that home rule in some form will logically and naturally follow disposal of the land question, is the belief of English and Irish public men of all parties." England's changed policy with Ireland, reconciliation by concession rather than submission by coercion, was an art of statesmenship suggested by conditions—a course that has the merit of being altruistic in application although clearly indicated by the dictates of self-interest. The tenets of good government and the growth of international comity are based on the same imperishable principle—a principle ever present but whose recognition depends upon mental conditions. An idea is lost to him whose mind cannot grasp it. Like a cable hidden in the depths of the ocean, the intelligence it bears can be utilized only where there are facilities for receiving it. Thought being the source of action, the need and wisdom of correct conceptions are apparent. The first requisites to absolute justice are measures to remove the causes of wrong and thus avoid ill effects to amend. In like manner, better results are attained by the uses of reason than by the weapons of war; and more virtue is found in genius than in armament.

The tendency to settle international difficulties through courts of arbitration rather than by the arbitrament of arms has grown with the progress and development of nations. Wars have decreased proportionately with the advance of intelligence and individual liberty. Up to the eighteenth and nineteenth centuries, a history of wars constituted for the most part the history of the world. It was the decisive battle, the conquering army, that fixed the boundaries of countries and determined their governments. It followed that a nation's military strength was a criterion of its greatness. The moral force that gradually wrought a change in this conception and application of greatness and power can be traced back to the earliest days of history. It is recorded that in ancient Greece the equipments of war were sometimes laid aside while disputes between states and cities were referred to chosen arbiters. The Amphictyonic Council was not infrequently called upon to settle differences between one town and another. When the possession of Salamis was in contention between Athens and Megara, Sparta was asked to arbitrate the question. Thucydides claimed that any one who was willing to refer his case to a tribunal for adjustment could not be reproached for wrong action. In Rome, private disputes were frequently settled by arbitration but her claim as mistress of the world precluded anything like international arbitration. Her way of settling outside disputations was to conquer and possess the countries in antagonism. The almost incessant conflict that existed during the Middle Ages, between lords and vassals, Protestants and Catholics, absolutism and democracy, made the bitterness of feeling so intense that calm deliberation on controversial points was very difficult to secure, yet, in the midst of the clash, popes and sovereigns were sometimes appealed to and instances are on record of certain ones having acted as arbiters or mediators to good purpose. Sully, the minister of Henry IV, conceived a plan for a general council to which the fifteen states into which Europe was to be divided, should submit all their differences. The plan was projected in an unpropitious time and yielded no visible results. A century afterwards, a still more elaborate scheme by the Abbey St. Pierre was formulated for settling all international disputes through a General League of Christendom. This idea was so far in advance of the ignorance and superstition of the age that it failed to effect any immediate action, but was evidently instrumental in suggesting later schemes in the same line. In 1789, Jeremy Bentham advocated the organization of a General Diet, consisting of two representatives from each of the powers, for settling international questions. This propostion was followed by that of Immanuel Kant, in 1795, to base all international right on a Federation of Free States, and each of them to have a republican constitution. But the French Revolution had thrown all Europe into such a turmoil, at this time, that the conciliatory measures of Bentham and Kant were like words spoken in the fury of a tempest. After the tumult had subsided, the first notable efforts to secure action on peace proposals were made in the United States. In 1816, the Society of Friends of New York took up the doctrine and advocated it with great earnestness. The American Peace Association was formed to aid the cause and, in 1835, made a strong plea to the senate of Massachusetts to take the initiative in establishing a permanent "Court of Nations." This movement in the Old Bay State was followed by petitions in Maine and Vermont to the same effect. The same association urged the Senate of the United States to act on the subject in 1837 and again in 1839, but the Committee of Foreign Affairs in both instances reported such action to be premature. In 1853, however, the United States Senate voted in favor of inserting arbitration clauses in treaties.

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The proposition to make provision for arbitration in treaties was strongly advocated by Richard Cobden in the House of Commons in 1849, but he failed to secure action on it. Twenty-four years afterwards, in 1873, Henry Richards re-introduced the subject in a modified form, by urging an invitation to foreign powers to concur in a general and permanent system, and this time it received a majority vote in the Assembly. The Italian Chamber passed a measure similar to Mr. Cobden's proposition in 1873, and the Dutch and Belgian Chambers did the same in 1874 and in 1875, respectively. These provisions practically remained dead letters, there being no effective steps taken for carrying them into execution; but they materially aided the current of thought running in this direction. Other factors contributing to the growth and influence of this sentiment were found in the associations formed for the study of international law. Such a body composed of men of different nationalities held a meeting at Ghent, September 18, 1873, and appointed a committee to study the question and present its various phases. On this committee Mr. Dudley Field represented the United States; Herr Goldschmidt, Germany; Sir William Vernon Harcourt, Great Britain; M. de Laveleye, Belgium; Signor Pierantoni, Italy. About the same time an association having for its object the reform and codification of the law of nations was organized in London, making international arbitration its chief subject for consideration. Its first meeting was held at Geneva in 1874; and in 1895 it was named "The International Law Association." Another association known as "The International Parliamentary Union" having for its object arbitration and peace, came into existence in 1888, and held a meeting in Paris in June, 1889. A report of the meeting shows that the United States and England were represented by 129 members. It was presided over by the distinguished French philosopher and statesman, M. Jules Simon. The Union established a permanent office at Berne. In 1890 it met in London, Lord Herschell presiding, when a committee was appointed to carry on the work of organization and propaganda on the Continent and in America. The persistent agitation of the question of arbitration aided in the efficiency and popularity of the theory as it became more widely utilized in settling boundary disputes, complaints for seizure and arrests and other questions arising out of international complications. About forty controversial points, between the different nations of the earth, were disposed of by arbitration tribunals during the latter half of the nineteenth century. Among the most important of these was the one known as the "Alabama Claims." It was a question involving a breach of neutrality by Great Britain during the Civil War in the United States. The question was settled in 1872. For fuller information on the subject see ALABAMA CLAIMS, Vol. XXV, p. 110. Another question that arose between Great Britain and the United States and was referred to a tribunal for settlement was known as the "Fishery Question," concerning the fur seals in Bering Strait. The point in controversy related to the respective rights of the United States and Great Britain in capturing seals in those waters. Arrangements were made between the two governments for arbitration in February, 1892, and a decision to which both governments assented was rendered in August, 1893. A question that had been in controversy for fifty-eight years — the territorial dispute between Great Britain and Venezuela, with regard to British Guiana, was amicably adjusted by arbitration in 1899.

While progress was being made in arbitration by a diversity of practical tests on minor questions, some nations were planning specific compacts with others for the purpose of referring any and all mooted questions, that might arise between them, to such tribunals. President Arthur, in his annual message in December, 1882, announced his willingness to assist any measure which might tend to secure peace. This was met with an immediate response by the Swiss government offering to enter into a general arbitration treaty with the United States. The Pan-American Congress which met in Washington, 1889–90, representing the United States and seventeen republics of Central and South America, made an effort to further the same line of action and instructed its delegates to recommend to their respective governments that they "adopt arbitration as a principle of American International Law for the settlement of the differences, disputes or controversies that might arise between two or more of them." An effort was made in 1896, by representatives of the United States and Great Britain, to provide for submitting all questions and differences not adjusting themselves by diplomatic negotiations to arbitration. A treaty in consonance with this proposition was drafted and signed January 11, 1897, by the British Ambassador, Sir Julian Pauncefote, and Secretary of State Olney. By reason of different contingencies or adverse delays, none of these schemes crystallized into definite and permanent organizations for carrying their ideas into universal application.

All of these efforts, however barren of results they may appear to have been, were, as could be seen by the light reflected from the dawn of the twentieth century, evolutionary steps to the most perfect and effective peace organization thus far formed, which had its first meeting at The Hague in 1899. See HAGUE PEACE CONFERENCE, Vol. XXVII, p. 211. This Peace Conference was not considered the final culmination of the evolution in this direction, but a crowning achievement in the progressive stages of a humane principle,— a significant epoch in the transition period of nations from the arena of the battle-field to the court of arbitration. Notwithstanding the desperate conflict that was being waged between Japan and Russia, 1904 was pre-eminently the banner year of arbitration treaties in the history of the movement. The war that was being prosecuted with such vigor evidently had an impelling influence on the advocates of peace measures for the settlement of disputes.

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The United Kingdom made permanent arbitration treaties with France, Germany, Italy, Spain and Sweden and Norway.

Two nations, Denmark and Norway, went to the unprecedented length of sweeping away all restrictions and declaring that all disputes between them, no matter of what character or what they might involve, should be submitted to arbitration.

In conformity with a request made to President Roosevelt, of the United States, by a deputation from the Interparliamentary Union then assembled at St. Louis, during the Louisiana Purchase Exposition, he announced that he would at an early day invite the other nations, parties to The Hague conventions, to reassemble, with a view to pushing forward toward completion the work already begun at The Hague, by considering the questions which the first conference had left unsettled, with the express provision that there should be a second conference. Secretary of State Hay, accordingly, October 30, 1904, under the instructions of the President, sent a note to the representatives of the United States, accredited to the various governments, with the request that each confer with the Minister for Foreign Affairs of that government to ascertain the extent to which it would be disposed to act in the call for a second peace conference.

Responses of a favorable nature were received from Germany, France, Japan, and other Powers. The Russian reply was cordial, but suggested the conference be postponed until after conclusion of the war with Japan.

On November 1, 1904, Secretary of State Hay and the French Ambassador signed a treaty, providing for settlement by arbitration of disputes between the United States and France. The treaty with France was followed by similar treaties with Germany, Switzerland and Portugal, and on December 12 by Great Britain. It was announced by the Department of State that assurances had been received from Italy, Mexico and other Powers that they were ready to negotiate like treaties

A.R.R.

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