
CHRONICLES

Notable and Anniversary Dates in Biochemistry for 2002

N. P. Voskresenskaya and E. N. Bylinsky, Compilers

Department of History of Medicine and Public Health, Semashko Institute of Social Hygiene, Economics,
and Public Health Administration, ul. Obukha 12, Moscow, 103064 Russia

- 125th anniversary of the production of liquid gases (oxygen, etc.) (L. P. Cailletét, A. Pictet, 1877).
- 125th anniversary of the invention of the centrifuge (W. Lefeld, 1877).
- 125th anniversary of the first measurement of osmotic pressure, justification of existence of the cell membrane (W. Pfeffer, 1877).
- 125th anniversary of *Zeitschrift für physiologische Chemie* (Germany, 1877).
- 100th anniversary of the biological peroxidation theory (A. N. Bach, 1902).
- 100th anniversary of the theory of peptide structure of protein (E. Fischer, F. Hofmeister, 1902).
- 100th anniversary of construction of the first (slit) ultramicroscope (H. Siedentopf, R. Zsigmondy, 1902).
- 75th anniversary of the hypothesis of the chromosome molecular structure and reproduction (N. K. Koltsov, 1927-1928).
- 75th anniversary of the preparation of adrenocortical hormones (J. Rogolf, G. Stewart, 1927).
- 75th anniversary of the isolation of the adenohipophysis gonadotropic hormone from urine of pregnant women (B. Zondek, S. Aschheim, 1927).
- 50th anniversary of the establishment of the structural formula of triiodothyronine (1952).
- 50th anniversary of the isolation of an alkaloid reserpine from *Rauwolfia* (1952).
- 50th anniversary of the general theory of action of pyridoxal enzymes (A. E. Braunshtein, M. M. Shemyakin, 1952).
- 50th anniversary of *Procollagens, Their Chemical Structure, Properties, and Biological Role* (V. N. Orekhovich, 1952).
- 50th anniversary of the experimental confirmation of location of the genetic information of bacterial viruses in their DNA (A. Hershey, M. Chase, 1952).
- 50th anniversary of the discovery of ionic mechanisms of excitation and inhibition (A. Hodgkin, A. Huxley, 1952).

January 9 – 80th anniversary of the birth of H. Khorana (1922), American biochemist of Indian origin, member of the American National Academy of Sciences. Khorana synthesized acetyl-CoA from yeast (jointly with J. Moffat) in 1949, determined the nucleotide sequence in DNA triplets encoding each of 20 amino acids (with colleagues), synthesized the DNA and RNA chains consisting of 64 feasible triplets and detected those which serve as a signal for starting and terminating the biosynthesis of a specific protein; in 1967-1970 synthesized the gene encoding the alanine tRNA (with colleagues). In 1968 he won the Nobel Prize in Physiology and Medicine (jointly with R. Holley and M. Nirenberg) for determination of the genetic code and its role in protein synthesis. Bibliography: *Studies on Polynucleotides* (1967) *J. Mol. Biol.*, **25**, 275 (with others); *Total Synthesis of the Gene for an Alanine Transfer Ribonucleic Acid from Yeast* (1970) *Nature (Lond.)*, **227**, 27. Literature: *The Nobel Prize Winners*, in *The Encyclopedia: A-L* (1992) Progress, Moscow; *Science* (1968) October 26; Great Medical Encyclopedia, Third Edition.

January 28 – 80th anniversary of the birth of Robert Holley (1922), American biochemist, member of the American National Academy of Sciences. He isolated for the first time the complete chemical structure of a biologically active nucleic acid; determined the nucleotide sequence in the synthesis of tRNA (with colleagues); in addition to the primary structure, found the biologically active secondary structure in tRNA (with colleagues); determined (1965) the structure of alanine tRNA of yeast (with coworkers). In 1968 he shared the Nobel Prize in Physiology and Medicine with H. Khorana and M. Nirenberg for determination of the genetic code and its role in the protein synthesis. Bibliography: *Structure of Ribonucleic Acid* (1965) *Science*, **147**, 1462 (with other); *The Nucleotide Sequence of a Nucleic Acid* (1968) *The Molecular Basis of the Life* (R. Haynes and P. Hanowalt, eds.) Vol. 72, San Francisco-London. Literature: *The Nobel Prize Winners*, in *The Encyclopedia: M-Ya* (1992) Progress, Moscow; *Science* (1968) October 26; Great

Medical Encyclopedia and Great Soviet Encyclopedia, Third Edition.

March 9 – 125th anniversary of the birth of Emil Abderhalden (1877-1950), German biochemist and physiologist, member of the German Academy of Sciences in Berlin, Foreign Corresponding Member of the USSR Academy of Sciences (from 1925). He studied the biological role and chemical structure of proteins; found tissue proteins vary in structure; proposed to classify proteins into separate groups; established biological activity of a number of proteins and amino acids; demonstrated that food proteins can be replaced by the mixture of amino acids and protein hydrolyzates. He discovered the so-called defensive enzymes produced in the body under certain conditions (pregnancy, tumor growth, etc.) and proposed a diagnostic reaction for their detection (Abderhalden's reaction). He synthesized (1916) optically active polypeptides, including a polypeptide of 19 amino acids; demonstrated (1916, jointly with E. Fischer) the likeness of artificial polypeptides and natural peptides; isolated a number of diketopiperazines and proposed a hypothesis on diketopiperazine structure of proteins (1922-1924). Bibliography and literature: see Great Medical Encyclopedia, Third Edition; *Biologists: Reference Book on Biographies* (1984) Naukova Dumka, Kiev.

March 21 – 70th anniversary of the birth of Walter Gilbert (1932), American biochemist, member of the American National Academy of Sciences. He isolated the repressor and determined the operator structure and location on the DNA helix that the repressor is bound to (jointly with G. Muller-Hill); in 1973 he determined the *lac*-operon sequence (jointly with A. Maxim); started studies on the *lac*-operon nucleotides; cleaved the DNA helix into fragments of a changeable but certain length; in 1977 determined the complete nucleotide sequence of the protein under study (jointly with A. Maxim). In 1980 won the Nobel Prize in Chemistry for contribution to the determination of base sequence of nucleic acids (jointly with F. Sanger and P. Berg). Bibliography: *Genetic Repressors* (1970) (with Mark Ptash); *Useful Proteins from Recombinant Bacteria* (1980) *Scientific American*, April. Literature: *The Nobel Prize Winners*, in *The Encyclopedia: A-L* (1992) Progress, Moscow; *Science* (1980) November 21.

April 10 – 75th anniversary of the birth of Marshall Nirenberg (1927), American biochemist, member of the American National Academy of Sciences. In the early 1960s he performed important experiments which helped in determination of the genetic code (with colleagues); he discovered codes of nitrogen bases for all 20 amino acids and succeeded in the synthesis of all possible triplet sequences (with colleagues). He showed that the genetic code controls not only the production of all proteins necessary for the organism's existence but also the transmission of hereditary characters. His approaches were used

for determination of chemical structure of nearly all proteins. In 1968 he won the Nobel Prize in Physiology and Medicine (jointly with R. Holley and H. Khorana) for determination of the genetic code and its role in protein synthesis. Bibliography: *The Genetic Code: II* (1963) *Scientific American*, March. Literature: *The Nobel Prize Winners*, in *The Encyclopedia: M-Ya* (1992) Progress, Moscow; *Science* (1968) October 26; Great Medical Encyclopedia, Third Edition.

May 5 – 125th anniversary of the death of Joseph Caventou (1795-1877), French pharmacologist. In 1818 he discovered alkaloids strychnine and brucine (jointly with P. Pelletier), in 1820 isolated pure quinine (with P. Pelletier); in 1817 he isolated from green leaves a mixture of plant residues into ethanol solution and named it chlorophyll (jointly with P. Pelletier). Literature: see Great Medical Encyclopedia, Third Edition, Vol. 1, p. 240; Vol. 3, p. 205; Great Soviet Encyclopedia, Third Edition, Vol. 28, p. 316.

May 11 – 75th anniversary of the birth of Mikhail Nikolaevich Kolosov (1927, born in Kursk), Russian organic chemist and biochemist, Academician of the Russian Academy of Sciences. From 1959 was working in the Institute of Natural Compound Chemistry (Institute of Bioorganic Chemistry). His main works are in the field of fine organic synthesis, chemistry of nucleic acids, antibiotics, and other natural compounds. He established the spatial structure of the most important antibiotics (tetracycline, aureomycin, etc.), synthesized natural tetracycline, detected structures responsible for the biological activity of these antibiotics and their mechanisms of protein biosynthesis inhibition. He is an author of works concerning the enzymatic synthesis of nucleic acids; he developed approaches for enzymatic synthesis of polydeoxynucleotides; dealt with synthesis of the structural gene of valine tRNA; isolated and established the structure of a new antitumor substance reumycin. Bibliography and literature: see Great Soviet Encyclopedia, Third Edition; *Biologists: Reference Book on Biographies* (1984) Naukova Dumka, Kiev.

May 26 – 100th anniversary of the birth of Alexander Evseevich Braunshtein (1902-1986, born in Kharkov), Russian biochemist, Academician of the USSR Academy of Sciences and of the USSR Academy of Medical Sciences. He was the leader of the Laboratory of Intermediate Nitrogen Metabolism in the All-Union Institute of Experimental Medicine (1936-1960) and of the Laboratory of Chemical Foundations of Biological Catalysis in the Institute of Molecular Biology, Academy of Sciences (from 1960). The winner of the 1941 USSR State Prize for the work *Generation of Amino Acids through Intermolecular Transfer of Amino Group* (jointly with M. G. Kritsman) and of the 1980 Lenin Prize for a series of works concerning *Biological Functions, Structure, and Action Mechanism of Enzymes of Amino Acid Metabolism*, published 1949-1978. He discovered a number of biolog-

ical conversions of amino acids, justified the cardinal importance of transamination in the nitrogen assimilation and dissimilation. Bibliography and literature: see Great Medical Encyclopedia and Great Soviet Encyclopedia, Third Edition; *Biographical Dictionary of Figures in Natural Science and Technique* (1958) Vol. 1, Moscow; Torchinskii, Yu. M. (1989) *In Memory of Academician A. E. Braunshtein, Biokhimiya*, No. 54, 707-708.

May 30 – 90th anniversary of the birth of Julius Axelrod (1912), American biochemist and pharmacologist. In the early 1950s he isolated epinephrine from a mixture of catecholamines (jointly with B. Brody); jointly with coworkers, he isolated catechol-O-methyltransferase which is one of two main enzymes responsible for catecholamine degradation in the body; adjusted the action mechanism of psychotropic substances (which were discovered in the 50s) used in the treatment of the main mental diseases: schizophrenia, mania and depressive states. He revealed the blood-brain barrier permeability for norepinephrine and sympatomimetics, studied the effect of drugs on catecholamine metabolism and distribution in the nervous system. He won the 1970 Nobel Prize in Physiology and Medicine for discoveries relating to humoral transmitters in nerve terminations and to mechanisms of their storage, release, and inactivation (jointly with B. Katz and U. Von Euler). Bibliography: *Biochemical Action of Hormones* (1970) (with G. Litwack); *Catecholamines and Hypertension* (1976) *Clinical Scientific Molecular Medicine*, **51**, Suppl. 3, 4158. Literature: *The Nobel Prize Winners*, in *The Encyclopedia: A-L* (1992) Progress, Moscow; Great Medical Encyclopedia, Third Edition, Vol. 10; *Science* (1970) October 23.

June 4 – 125th anniversary of the birth of Heinrich Wieland (1877-1957), German biochemist, member of the American National Academy of Sciences, member of the London Royal Society. Wieland studied chemistry of organic nitrogen compounds. His analysis of the hydrazine color reaction constituted the basis for discovery of free nitrogen radicals; he developed a dehydration theory in combustion reactions based on hydrogen activation; combined organic chemistry and biochemistry subjects by demonstrating the dehydration in living cells; discovered cholenic acid. Won the 1927 Nobel Prize in Chemistry for studies on bile acids and on structure of many similar substances. Bibliography: *On the Mechanism of Oxidation* (1932); *Über den Verlauf der Oxydationsvorgänge* (1933) Stuttgart. Literature: *The Nobel Prize Winners*, in *The Encyclopedia: A-L* (1992) Progress, Moscow; Great Medical Encyclopedia, Third Edition; Farber, E. (ed.) (1961) *Great Chemists*.

June 16 – 100th anniversary of the birth of Barbara McClintock (1902-?), American geneticist, member of the American National Academy of Sciences. She found that maize chromosomes exchange the genetic material and information during the chromosome crossing-over

on the early stages of meiosis (jointly with H. Crayton), showed the ring chromosome is associated with appearance of variegated coloration of maize seeds. She also found nucleolar chromosomes involved in the biosynthesis of cell ribosomes which are centers of cell protein biosynthesis; performed fundamental studies on chromosomal rearrangements during mitosis and meiosis (1929-1938). Won the 1983 Nobel Prize in Physiology and Medicine for the discovery of transposing genetic systems. Bibliography: *The Control of Gene Action in Moire* (1965) Brookhaven: *Symposia in Biology*. Literature: *The Nobel Prize Winners*, in *The Encyclopedia: M-Ya* (1992) Progress, Moscow; Great Soviet Encyclopedia, Third Edition; *Science* (1983) October 28.

June 23 – 70th anniversary of the birth of Nikolai Grigor'evich Khrushchov (1932, born in Leningrad), Russian histologist and cytologist, Academician of the Russian Academy of Sciences. He has been working in the Institute of Developmental Biology, Russian Academy of Sciences, from 1963. His works are mainly in cytology and histology of the hemopoietic and connective tissues; he studied nucleic, protein, and carbohydrate metabolism of cells; elucidated the regularities of cell reproduction and renewal and of mechanisms of amitosis and generation of polyploid forms; formulated a concept on the involvement of the combined system of blood and connective tissue cell division during physiological and reparative regeneration; directed the works in transplantation of hemopoietic tissue and its culture outside the body. Bibliography: *Functional Biochemistry of Loose Connective Tissue* (1969) Nauka, Moscow; *Histogenesis of Connective Tissue: Experimental Study on Fibroblast Origin* (1976) Nauka, Moscow. Literature: *Biologists: Reference Book on Biographies* (1984) Naukova Dumka, Kiev.

August 10 – 100th anniversary of the birth of A. Tiselius (1902-1971), Swedish biochemist, member of the American National Academy of Sciences, Vice-President (1947-1960) and President (1960-1964) of the Nobel Foundation, Chairman of the Swedish State Committee for Research in Natural Sciences. Tiselius developed an electrophoretic method for separation of substances similar in chemical structure; designed a device for optical assessment of substance separation; elaborated technology of chromatography. Won the 1948 Nobel Prize in Chemistry for studies in electrophoresis and adsorption analysis, especially for the discovery concerning the complexity of serum proteins. Bibliography: *Colloid Chemistry* (1928) (with T. Svodberg); *Purity and Purification of Chemical Substances* (1958). Literature: *The Nobel Prize Winners*, in *The Encyclopedia: M-Ya* (1992) Progress, Moscow; Great Medical Encyclopedia, Third Edition; *Nature* (1948) November 13.

August 18 – 70th anniversary of the birth of Yurii Andreevich Vladimirov (1932, born in Moscow), Russian biophysicist, Academician of the Russian Academy of Medical Sciences, winner of the 1983 State Prize. In

1962-1965 Vladimirov directed a laboratory in the Institute of Biological Physics, Russian Academy of Sciences, from 1967 chief of the Chair of Biological Physics, Russian Medical University. He studied fluorescence and phosphorescence of proteins, the primary photochemical reactions in proteins; formulated the hypothesis on the leading role of disorders in the barrier function of cell membranes in cellular pathology; contributed to elaboration of a number of approaches used in biology and medicine for diagnosis of inflammatory, immune, cardiovascular diseases. Bibliography: see Great Medical Encyclopedia, Third Edition; *Physicochemical Foundations of Photobiological Processes* (1989) Moscow (jointly with others).

October 2 – 75th anniversary of the death of S. Arrhenius (1859-1927), Swedish naturalist and physicochemist, member of the Swedish Royal Academy, member of the London Royal Society, Foreign Member of the USSR Academy of Sciences (1926). His main works in biology are connected with the use of physical chemistry methods for studies in biology and biochemistry. Won the 1903 Nobel Prize in Chemistry for creation of the theory of electrolytic dissociation (1887) and its use in biochemistry, physiology, and geochemistry. Arrhenius established some quantitative laws for reactions between toxins and antitoxins, bacteria agglutination, digestion, and absorption. In 1907 he performed the mathematical analysis of I. P. Pavlov's findings on secretion. He mathematically expressed reaction rate dependence on temperature (the Arrhenius equation). Bibliography: *Immunochemistry* (1907); *Quantitative Laws in Biological Chemistry* (1915); *Chemistry in Modern Life* (1925). Literature: *The Nobel Prize Winners*, in *The Encyclopedia: A-L* (1992) Progress, Moscow; Great Medical Encyclopedia, Third Edition; Great Soviet Encyclopedia, Third Edition; *Swedish Men in Science* (1952).

October 8 – 75th anniversary of the birth of C. Milstein (born 1927 in Argentina), English biochemist, member of the American National Academy of Sciences and of the London Royal Society. In 1975 he showed that individual clones of antibody-producing cells can be converted into immortal cells by fusion with myeloma cells: this resulted in the line of malignant cells (hybridoma) capable for infinite growth in culture and in the body and to produce certain specific antibodies (jointly with G. Köhler); made valuable general conclusions about the structure of antibodies and of their genes; developed a method for preparation of monoclonal antibodies (jointly with G. Köhler). In 1984 shared the Nobel Prize in Physiology and Medicine with G. Köhler and M. Erne for the development of immunochemistry problems, in particular, for production of specific antibodies. Bibliography: *Continuous Culture of Fused Cells Secreting Antibody of Predefined Specificity* (1975) *Nature (London)*, **256**, 495 (with G. Köhler). Literature: *The Nobel Prize Winners in 1984* (1985) *Priroda*, No. 1, 99-100.

October 30 – 75th anniversary of the birth of Dmitrii Aleksandrovich Kharkevich (1927 born in Leningrad), Russian pharmacologist, Academician of the Russian Academy of Medical Sciences. From 1964 Chief of the Chair of Pharmacology in the Sechenov Moscow Medical Academy. His works mainly concern neuropharmacology problems, especially connected with the region of autonomic ganglia and neuromuscular synapses. He studied pharmacology of afferent systems, contributed to understanding of dependence between the structure and physiological activity of various chemical compounds. He elaborated and introduced into clinical practice new ganglioblockers, curare-like agents, antihistamine drugs (hygronium, diazolon, etc.). For the monograph *Pharmacology of Curare-Like Agents* won the 1971 Kravkov Prize of the Russian Academy of Medical Sciences; for studies in neuropharmacology won the 1992 Zakusov Prize of the Russian Academy of Medical Sciences. President of the Russian Society of Pharmacologists. Editor-in-Chief of the *Eksperimentalnaya i Klinicheskaya Farmakologiya (Experimental and Clinical Pharmacology)* journal. Bibliography: *Pharmacology of Myorelaxants* (1989) Meditsina, Moscow (with others). Literature: see Great Medical Encyclopedia, Third Edition; D. A. Kharkevich (1987) *Farmakologiya i Toksikologiya*, No. 6, 117-119.

November 17 – 80th anniversary of the birth of Stanley Cohen (1922), American biochemist, member of the American National Academy of Sciences. Cohen prepared a growth-stimulating concentrated extract from mouse tumor (with colleagues); found snake venom to activate the growth of nervous tissue; determined the epidermal growth factor (EGF) in extracts of salivary glands of adult mice and elaborated the technique for isolation and purification of reasonable amounts of the mouse EGF which is now used for studies of biochemical signals regulating cell division and differentiation. He obtained antibodies to EGF; prepared functionally active molecules of hybrid DNA (with colleagues); in 1956 found in the blood Ii antigens (jointly with L. Unger and J. Feldman). Shared the 1986 Nobel Prize in Physiology and Medicine with R. Levi-Montalcini for discoveries important for elucidation of regulatory mechanisms in cell and organ growth. Literature: *The Nobel Prize Winners*, in *The Encyclopedia: A-L* (1992) Progress, Moscow; *Science* (1986) October 31; Great Medical Encyclopedia, Third Edition, Vol. 5, p. 260.

November 19 – 90th anniversary of the birthday of George Palade (1912), American biochemist and cytologist of Rumanian origin, member of the American National Academy of Sciences. Palade found (1955) in liver and pancreas cells electron-dense granules of 8-30 nm in size attached to the external side of the cytoplasmic membrane and to other places; he isolated the granules and established their involvement in the protein

synthesis. Afterwards, such granules were found in all animal cells except erythrocytes and were called Palade granules and then ribosomes. Palade described protein synthesis, studied the synthesis of cellular and intracellular membranes, of capsules enclosing the cell and its organelles; proposed a vesicular theory of substance transfer through the cellular membranes (ions and large molecules from the extracellular space are absorbed by vesicles released from time to time by the cell membrane). Shared the 1974 Nobel Prize in Physiology and Medicine with A. Claude and C. De Duve for discoveries concerning the structural and functional organization of the cell. Bibliography: *The Endoplasmic Reticulum* (1956) *J. Biophys. Biochem. Cytol.*, **2**, No. 4, Suppl., 85; *Release of Enzymes and Ribonucleic Acid from Ribonucleoprotein Particles* (1960) *ibid.*, **7**, 631 (with P. Siekevitz). Literature: *The Nobel Prize Winners*, in *The Encyclopedia: M-Ya* (1992) Progress, Moscow; *Science* (1974) November 8; Great Medical Encyclopedia, Third Edition.

December 15 – 150th anniversary of the birth of Henri Becquerel (1852-1908), French physicist, member of the Paris Academy of Sciences and of the London Royal Society. He discovered that some minerals (con-

taining uranium salts) could spontaneously emit invisible rays similar to X-rays in physical properties; developed approaches for therapeutic use of radioactive substances. Shared the 1903 Nobel Prize in Physics with M. and P. Curie for the discovery of spontaneous radioactivity. Bibliography: see Great Soviet Encyclopedia, Third Edition; Great Medical Encyclopedia, Third Edition; *On the Radioactivity of Matter* (1902). Literature: see Great Soviet Encyclopedia, Third Edition; Great Medical Encyclopedia, Third Edition; *The Nobel Prize Winners*, in *The Encyclopedia: A-L* (1992) Progress, Moscow; Ranc A. Henri (1946) *Becquerel et la découverte de la radioactivité*, Paris.

150th anniversary of the birth of R. Altmann (1852-1900), German anatomist and histologist. Altmann discovered and studied the cytoplasmic organelles mitochondria; invented methods for fixation and staining of cells and tissues which are now used in histology mainly for detection of mitochondria (the Altmann's fixer); proposed to differentiate nucleic acid as it is and its complex with proteins, nucleoproteins (1889). Suggested existence of smaller elementary units in the cells, bioblasts. Literature: see Great Medical Encyclopedia, Third Edition.