

# MIKHAIL MIKHAILOVICH SHEMYAKIN

1908–1970

During the VIIth International Symposium on the Chemistry of Natural Products in Riga its Honorary President, Professor M. M. Shemyakin died suddenly on 26 June 1970.

Born in Moscow on 26 July 1908, he graduated in 1930 from the Moscow State University where he majored in chemistry. He received his Ph.D. in 1938, and his D.Sc. in 1941. Appointed Professor in 1942, he headed a laboratory in the All-Union Institute of Experimental Medicine and later in the Institute for Biological and Medical Chemistry of the USSR Academy of Medical Sciences. From 1959 onwards he was Director of the Institute for Chemistry of Natural Products, USSR Academy of Sciences.

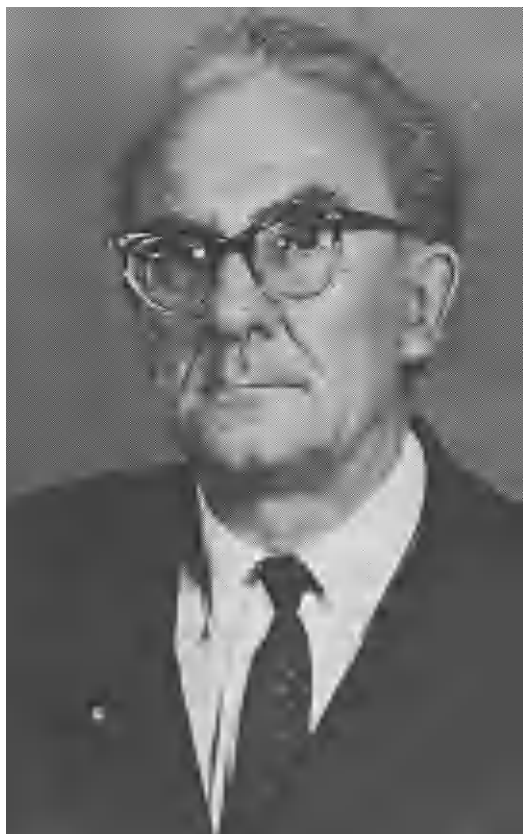
In the 40 years of his scientific career Shemyakin with his collaborators published over 450 papers and books on various problems of organic and bioorganic chemistry.

The first period of Shemyakin's research work was in the field of theoretical organic chemistry. Special mention should be made here of a large series of studies devoted to the hydrolytic and oxidative-hydrolytic cleavage of the carbon-carbon bond. The result of this work was a general theory of the oxidative-hydrolytic reactions of organic compounds (1956) and the development, together with A. E. Braunstein (1952), of a theory of amino acid metabolism catalysed by phosphopyridoxal enzymes. This theory made it possible to explain from a single viewpoint such transformations of the amino acids as transamination, racemization,  $\alpha$ - and  $\beta$ - decarboxylation, exchange of  $\beta$ - and  $\gamma$ -substituents, etc. Furthermore, in this and succeeding periods Shemyakin carried out several important studies which elucidated the mechanism of a number of organic reactions: pyrolysis of the salts of carboxylic acids, tautomerism of aldehyde and keto acids, osazone formation, the formation and rearrangements of azoxy compounds and nitrones, the substitution and tautomerism of triad prototropic systems, stereoselective carbonyl olefination, etc.

In the 'fifties Shemyakin's main field of activity was the chemistry of natural products. Here he displayed the same versatility, his interests embracing the chemistry, physicochemistry and biochemistry of amino acids, peptides, proteins, antibiotics, and also fatty acids and lipids.

Among Shemyakin's chief contributions to antibiotic chemistry are: the development of simple methods for the synthesis of chloramphenicol and its analogues, and the elucidation of the structure/activity relation of this antibiotic; the determination of the absolute configuration of the tetracycline antibiotics, and the first total synthesis of tetracycline itself; the elucidation of the structure and stereochemistry of the aureolic acid group of antitumour antibiotics; the establishment of the structure and the total synthesis of a number of depsipeptide antibiotics (the enniatins, valinomycin, serratamolide etc.).

## IN MEMORIAM



The last mentioned achievements were component parts of the largest and most important work of Shemyakin, an outstanding series of researches into peptides and proteins. It began in 1955 with a study of a peculiar group of  $\alpha$ -substituted  $\alpha$ -amino acids and their peptides (constituents of ergot alkaloids), and was then extended to general methods for the synthesis of peptides and depsipeptides. Investigation of the intramolecular interaction of hydroxy and amino groups with activated amide groupings led to discovery of the reactions of hydroxyacyl and aminoacyl incorporation into linear and cyclic peptides, and to the elucidation of their mechanism involving the corresponding oxa- and aza-cyclols as intermediates. Establishment of the laws for the fragmentation of acylpeptide esters under mass spectrometric conditions served as the basis for a new method of amino acid sequence determination. As the result of biological activity studies of a large number of naturally occurring peptides, depsipeptides and their synthetic analogues, Shemyakin developed a new area of research—the topochemical approach to structure/activity relations—and arrived at original views on substrate/receptor interactions in protein and peptide systems.

## M. M. SHEMYAKIN 1908-1970

In the last years of his life Shemyakin was actively engaged in attacking the molecular mechanisms underlying the functioning of biological membranes. He made a number of fundamental discoveries which shed considerable light on the ability of certain peptides and depsiptides to induce selective membrane permeability, among them the mechanism of the selective binding of alkali metal ions by peptide and depsiptide systems. This latter made it possible to lay the foundations of a theory for the specificity of membranes.

Particular mention must be made of the many-sided social activity of Shemyakin, and of his gigantic work in the organization of scientific endeavour. One of his great contributions was the creation of the Institute for the Chemistry of Natural Products within whose walls he trained numerous pupils who now constitute one of the largest schools of chemical thought in the USSR. As a member of the Presidium of the USSR Academy of Sciences, and head of its Division of Biochemistry, Biophysics and the Chemistry of Physiologically Active Substances, he did much for the development of these branches of science in the USSR.

Shemyakin considered international scientific collaboration to be a necessary condition for social progress and did much for the strengthening and widening of contacts between scientists of various countries. Besides being a member of the USSR Academy of Sciences he was also a member of the German Academy of Naturalists 'Leopoldina', a member of the European Peptide Committee, and of the Organic Chemistry Division of the IUPAC. He was also an honorary member of the Czechoslovak Chemical Society and of the French Chemical Society. It was typical of Shemyakin's self-sacrificing devotion to science that up to the very last, gravely ill, he did not for one minute interrupt his activity as head of the VIIth International Symposium on the Chemistry of Natural Products.

All who knew Professor Shemyakin, and particularly those upon whom befell the good fortune of working with him, will always cherish in their hearts fond memories of this great scientist, outstanding leader in social affairs, and simple, kind and sympathetic man, full of a deep personal charm.

YU. A. OVCHINNIKOV  
Chairman, Executive Committee