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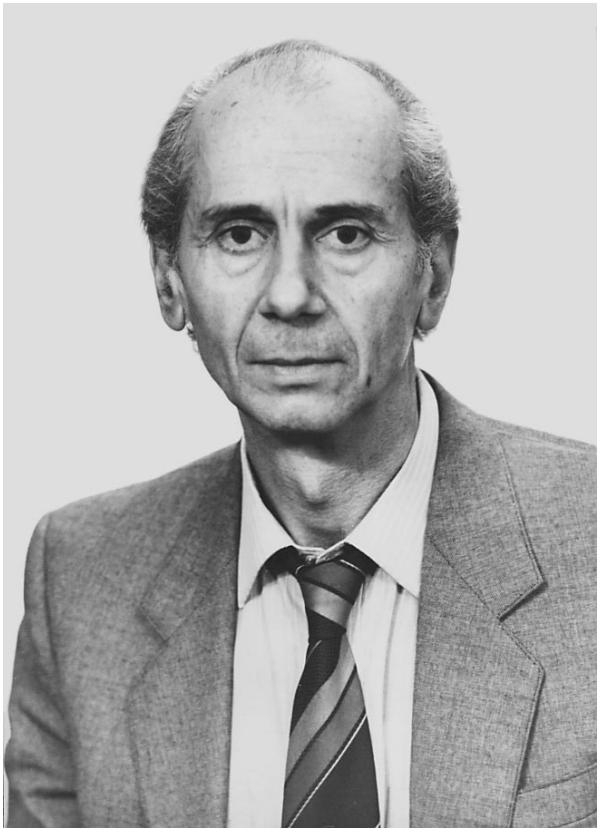
CHRONICLE

Yurii Aleksandrovich Chizmadzhev



An outstanding Russian scientist, the corresponding member of the Russian Academy of Sciences Yurii Aleksandrovich Chizmadzhev marked his 70th birthday on December 15, 2001. In 1956, upon graduating from the Moscow Institute of Engineering Physics, Yurii Chizmadzhev came to the Electrochemistry Department of the Institute of Physical Chemistry of the Russian Academy of Sciences, which was later reorganized into the Institute of Electrochemistry. This was the time when, under supervision of V.G. Levich, young theoretical physicists were organized into a group famous for its unforgettable creative atmosphere. First works by Yurii Chizmadzhev were devoted to various problems of electrochemistry, including the diffusion kinetics. His studies on the theory of the elementary act of electrode reactions, carried out under supervision of R.R. Dogonadze, pertain to that period. Later, the interests of Chizmadzhev focused on the macrokinetics of processes in porous media. He was led to this problem, which was of prime significance due to the development of fuel cells, by A.N. Frumkin. These studies formed the basis for his doctorate dissertation (1967) and were included into the book "Macrokinetics of Processes in Porous Media" (1971), the interest to which is not lost even now.

By the end of this period, Chizmadzhev turned his attention to biophysical problems. His first step in this direction involved studies on the stimulus propagation in axons and nerve systems. Essentially, he dealt with properties of systems with specific voltammetric characteristics. Yet another important direction involved studies of the ionic transport through bimolecular lipid layers, the latter being the necessary component of all biological membranes. This transport can be induced by both mobile carriers and molecules that form channels. The progress in these ionic-transport studies was made possible owing to original methods developed in his laboratory for measuring the potential distribution in bilayered lipid membranes. The results of these studies were very important for elucidating the mechanism of action of some antibiotics. Extensive development of biophysical studies resulted in the organization of a bioelectrochemistry laboratory in 1977. For a cycle of

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studies in these directions, which were generalized in two books, Chizmadzhev and co-workers were awarded a State Prize.

In the Chizmadzhev laboratory, prime attention was devoted to an electroporation phenomenon, i.e. to the origination and development of micropores under the action of electric field. It was shown that the decisive role in this effect is played by the electrostatic drawing of water into a pore nucleus formed due to thermal fluctuations (similar to the drawing of the dielectric into a capacitor). The electroporation phenomenon turned to be essential during the penetration of DNA into cells under the external field action. It helped scientists to transfer the hereditary information into some bacterial and animal cells. The phenomenon plays a significant role in a novel medical technology, namely, an electric-field-induced transfer of drugs through skin.

Yet another important direction of works by Chizmadzhev deals with the fusion of lipid membranes. It is a necessary stage of such important biological processes as the fusion of cells, the endocytosis, the penetration of virus into a cell, etc. Experimental and theoretical studies elucidated the mechanism of this phenomenon for model lipid membranes. These works formed the basis for studying the fusion phenomenon in more complex biological systems. The theory of the fusion induced by a virus protein developed recently allows one to get a deeper insight into this phenomenon.

The huge volume and high level of his experimental and theoretical studies mentioned above became possible not only owing to the talent of Yurii Chizmadzhev and his great activity, but was also due to his ability to recruit talented coworkers to the laboratory and direct their studies. These coworkers also deserve credit for the above achievements. Although many coworkers of Chizmadzhev had left for the USA and Europe in the 1990s, they keep scientific and personal contacts with their teacher. These contacts are most beneficial for the Bioelectrochemistry Laboratory in the international cooperation and for the high level of research carried out by a new generation of scientists.

The pedagogical activity of Chizmadzhev, who has been reading a course on the biophysics of membrane processes at Moscow State University and Moscow Institute of Engineering Physics for more than 20 years, are most beneficial for recruiting young scientists. Under his supervision, 20 candidate dissertation were defended, and eight scientists who worked at his laboratory became doctors of sciences.

Works by Chizmadzhev have gained wide recognition. In 1987, he was elected a corresponding member of the Academy of Sciences of the USSR. Since 1988, he has headed the Editorial Board of the journal *Biological Membranes.* His works were published in most authoritative international scientific journals. He has presented reports at dozens of domestic and international conferences and is an invited professor at universities of Geneva, Toulouse, Rome, Bari, and Florence. His talent as a lecturer is generally recognized. For example, we are sure that participants of the 50th ISE Meeting in Pavia will remember for long his bright plenary lecture devoted to the development of bioelectrochemistry since Galvani till recent time.

Yurii Chizmadzhev belongs with *intellegentsia* of the 1960s not only by his birthday but also by his heart. He is known for his wide outlook on the problems of culture, active interest in the future of our country, and naturally in the development of science. He meets his 70th birthday on the peak of his creative genius, and there is no doubt that he will achieve new success.

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