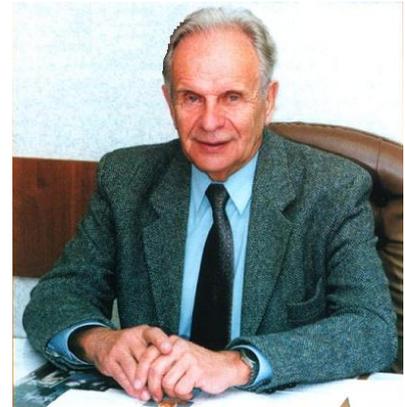


## PLATON G. KOSTYUK

**Director of the Bogomolets Institute of Physiology, advisor of the Presidium of the National Academy of Sciences and Academy of Medical Sciences of Ukraine, member of the Russian Academy of Sciences, member of the European Academy of Sciences, member of the German Academy of Natural History “Leopoldina”, member of the Academy of Sciences of Czechoslovakia and member of the Hungarian Academy of Sciences.**

Platon G. Kostyuk is a scientist whose contribution to neuroscience, molecular biology and cell biophysics is enormous. He was an outstanding investigator in neurophysiology (synaptic processes in the spinal cord) and in molecular biology and biophysics of the nervous cell (structure and function of ionic channels, membranous receptors). He founded the Ukrainian school of scientists in the field of neurophysiology, cell and molecular physiology and contributed significantly to its success.



Kostyuk was born in 1924 in Kyiv in the family of a well-known Ukrainian psychologist Grygoriy S. Kostyuk, a member of the Academy of Pedagogical Sciences in the USSR and the founder of the Institute of Psychology in Ukraine. It was his father who inspired Platon Kostyuk to start a scientific career. Because of his German nurse, Platon could speak German fluently when he was only five years old. When he arrived later in Germany, his fluent German with Prussian accent made people think that he stemmed from Germany. At the age of 6, he played the piano very well and at school he even considered to become a concert-pianist. Fortunately, he did not become a professional musician, in stead Science became his main ambition. However, love to music made him to follow a two-year course at the Kyiv conservatory in addition to higher biological and medical education. He graduated from Shevchenko National University (Kyiv) in 1946, and the Kyiv Medical Institute in 1949. At the age of 25, he became PhD, and 7 years later he received his Doctor of Sciences degree. Two years later he organized his own laboratory at the Bogomolets Institute of Physiology, which soon (1958) was transformed into the Department of General Physiology of the nervous system. At that time his successful reports at International Congresses of Physiological Sciences underpinned the impressive progress of Ukrainian physiological science. Kostyuk's scientific achievements were published in leading international scientific journals in English, German and French. His scientific potential as well as his personality resulted in accepting the leadership of the Bogomolets Institute of Physiology, which he headed since 1966.

It was the Institute of Physiology where the method of microelectrode investigations of excitable cells was widely used for the first time in the former USSR. The microelectrode technique developed by a young Ukrainian physiologist was absolutely a new approach to investigating neurons, generating a lot of important data about physico-chemical processes in nervous and smooth muscle cells, and about mechanisms of synaptic transmission and ionic mechanisms of excitation. The delicate experiments and new ideas needed novel equipment which resulted in Kostyuk's endeavor to start instrument building under Institute's guidance. His scientific priorities of that time were demonstrated in two books: *Microelectrode technique* and *Two- neuron reflex arc*.

An important aspect of his work was dealing with calcium channels. To study calcium homeostasis in nervous cells and metabolic disturbances in brain pathology, he introduced the recording of single ion channels into the practice of scientific research. These studies showed the presence of a whole family of potential-controlled membrane channels capable to forming the input flow of calcium ions in response to depolarization of the neuronal membrane in a highly selective manner. The channels could be divided into two functional groups on basis of their sensitivity to changes in membrane potential: low- and high-threshold ones. He found that a combination of ionic channels for each type of neurons determined the wide spectrum of excitability manifestations. These

features allow each neuron to respond, in a specific way, to the corresponding input signal at a certain time. He was also the first to use a method of intracellular soma dialysis in the nervous cell to study its membrane and molecular mechanisms.

Kostyuk's investigations of mechanisms of calcium permeability in membranes of the nervous cell (Investigations of Ion Mechanisms of the Nerve Cell Soma) were recognized as an highly important discovery and he was awarded with the State Prize of the USSR (Kostyuk et al. 1983) and later the Galvani International Prize, USA (1992).

The personality of Platon Kostyuk, together with his scientific reputation, his authority as a scientist and his wisdom, attracted numerous scientists all over the world. The Institute collaborated with the Nensky Institute of Experimental Biology of the Polish Academy of Sciences, the St. George Hospital of the London University, universities in Paris and Lille in France, the Max Delbruck Centre in Berlin, and the German Max Plank Institutes. Moreover close collaborations were established with universities in California, New Jersey, Miami, Minnesota, Columbia, Missouri, and Florida in the USA, with the Institute of Brain Research in Tokyo, the Institute of Pharmacology of the Milan University in Italy and the National University of Halve in Sweden. The list of Kostyuk's scientific contacts can serve as an illustration of the history of physiological science. He liked to visit the laboratory of Alan Hodgkin and Andrew Huxley in Cambridge and discussed his own ideas with them. In fact, Kostyuk started his explorations using the microelectrode method at the time that these scientists developed their mathematic model of nervous impulse and formulated the membranous theory of bioelectrical events in excitable tissues (1952). It was the time that Huxley discovered the so-called sodium pump. Together with J. Eccles, these British scientists received the Nobel Prize for discovering ionic mechanisms in membrane of a neuron in 1963. The scientific activity of these scientists was very close to Kostyuk's own scientific interests, and their opinion on his scientific achievements was very important to him. In 1961, Kostyuk accepted an invitation of Prof. J. Eccles to visit his laboratory in Canberra. A very productive collaboration started. Prof. Bernard Katz, a scientist who showed the role of ions of calcium in the process of transmitter release was another person whose laboratory in London Kostyuk liked to visit. He also kept in touch with Prof. Alfred Fessar in the Institute of Physiology in Gif-sur-Yvette, a suburb of Paris: one day he presented a report at a conference held in Paris in the French language. He had intensive professional contacts with German scientists, such as J. Dudel (University in Munich), M. Kleyer (Frankfurt am Maine), and Prof. Robert Schmidt (Wurzburg), who he met in Canberra (1961). A textbook of Human Physiology by Prof. Schmidt was published twice in Russian, edited by Kostyuk.

The academician Kostyuk was engaged in training of highly qualified scientific staff in molecular physiology and biophysics. He organized the Department of Molecular Physiology and Biophysics of the Physico-Technical Centre of the National Academy of Sciences of Ukraine. In June 2000 the UNESCO Department of Molecular and Cell Physiology was opened at the Bogomolets Institute of Physiology, evidencing the high level and significance of fundamental and applied investigations in the field of molecular physiology and neurophysiology carried out at the Institute. Kostyuk shares the headship of the department with Prof. Ervin Neher (Germany), the Nobel Prize Laureate.

In 1969 Platon G. Kostyuk founded the Journal of Neurophysiology (Kyiv) which was later published in english by Plenum Publishing Corporation (USA, UK) and, at the moment, by Springer Verlag. Together with Prof. D. Smith and Prof. M. Ito, he founded the International Journal of Neuroscience (Oxford, UK), which he served as co-editor during 1976 - 1999.

Kostyuk has contributed much to development of the Ukrainian science as a member of the National Academy of Sciences of Ukraine: he was vice-president of the National Academy of Sciences of Ukraine for 6 years (1993-1998); since 2005 he acted as advisor of the Presidium of the National Academy of Sciences of Ukraine. Platon Kostyuk's influence is extending far beyond the realm of physiological science: he played a fundamental role in the scientific and cultural life of Ukraine as member of the Ukrainian Parliament (Supreme Council of Ukraine) and head of the Supreme Council of Ukraine between 1975 -1990. There he revealed his hopes for the future and the task he had set for himself to help the scientific and cultural revival of Ukraine in the years to follow.

Kostyuk was member of the councils of numerous international scientific societies: member of the council of the Physiological Society of the USSR (1965-1991), president of the Ukrainian Physiological Society (since 1992), vice-president of the International Brain Research Organization (IBRO, 1974-1979), head of the Soviet Committee in IBRO (1974-1990), vice-president of the International Union of Theoretical and Applied Biophysics (1975-1981), member of Council and vice-president of the International Union of Physiological Sciences (IUPS, 1980-1994), and vice-president of the Federation of European Physiological Societies (FEPS, 1991-1995).

For the development of Ukrainian science and professional school, for training future professionals, his sensing of the importance neurological research, and maintenance of the high level of physiological and biophysical sciences in Ukraine, Platon Kostyuk received a lot of awards, among them: the Order of Labour Red Banner (1967, 1974), the Lenin Order (1981, 1984), the State Prizes of Ukraine (1976, 1992, 2003), the Vernadsky Gold medal N2 of the National Academy of Sciences of Ukraine (2005). He was also nominated for Hero of Socialist Labour in the former USSR (1984) and became Hero of Ukraine (2007). For his contribution to the international scientific community he was awarded with the World Medal of Liberty, USA (2006) and the Gold Medal for Ukraine (2007).

Kostyuk has published more than 650 scientific articles and 16 books, among others:

1. Kostyuk P.G. Two neuron reflector arc. M. 1959 (in Russian)
2. Kostyuk P.G. et al. Microelectrode technique.- 1960 (in Russian)
3. Kostyuk P.G. Role of calcium ions in nerve cell function. 1992. – Oxford University Press – 220 p.
4. Kostyuk P.G., Verkhatsky A.N. Calcium signaling in the nervous system.- 1995.- John Wiley & Sons, Chichester.- 206 p.
5. Kostyuk P.G. Plasticity in nerve cell function. - 1998- Claredon Press, Oxford.- 135 p.
6. Kostyuk P.G. et al. Biophysics, A manual.-2001, Kyiv. - 544 p.
7. Veselovskiy N.S., Fedulova, Kostyuk P.G. Biophysics of single synapse. 2004.- Kyiv, Naukova dumka, 118 p.
8. Kostyuk P.G., Kostyuk O.P., Lukyanets O.O. Ions of calcium in brain function. From physiology to pathology. – 2005.-Kyiv, Naukova dumka.-198 p.

Lyudmila Shapoval, Doctor of Science (biology)  
Leading scientist of the Bogomolets Institute of Physiology,  
Secretary of the Ukrainian Physiological Society