

In memory of Yurii Mikhailovich Romanovsky

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On August 23, 2022, at the age of 93, a famous physicist and biophysicist, one of the founders of modern mathematical biophysics, honored professor at Lomonosov Moscow State University, Yurii Mikhailovich Romanovsky, passed away.

Yurii Mikhailovich was born in Moscow on October 31, 1929 and lived in Moscow all his life, with the exception of evacuation to Tomsk with his parents in 1942 and a long business trip to Cuba to teach at the University of Havana in 1968. His father, Mikhail Alekseevich Romanovsky, was a front-line officer in the First World War, graduated from the Moscow Commercial Institute, and became one of the first organizers of Soviet science. Among his positions was scientific secretary of the Higher Attestation Commission of the USSR, employee of the Presidium of the USSR Academy of Sciences, and representative of the academy in the West Siberian Branch of the USSR Academy of Sciences. Mikhail Alekseevich met his future wife and mother of Yurii Mikhailovich, Sophiya Yul'evna Romanovskaya (Shternman), in 1916 on the Russian-Austrian front during the famous Brusilov breakthrough. S Yu Romanovskaya graduated from the University of Paris (Sorbonne) and fought as a doctor in the Russian Expeditionary Force in France in 1914–1915. Sophiya Yul'evna, a well-known doctor and pediatrician and candidate of medical sciences, worked until her retirement at the Institute of Pediatrics of the USSR Academy of Medical Sciences. The family also had an elder daughter Aleksandra Mikhailovna, a metallurgical engineer (1918–2008).

After finishing secondary school in 1947, Yu M Romanovsky entered the physical faculty of MSU and graduated in 1952 from the Department of Oscillations. He did his diploma work under the supervision of the well-known radio physicist Professor K F Teodorichik and was assigned to the Research Institute of Automotive Instruments. There, he worked until he entered the postgraduate course of the Physical Department of MSU and met his future wife Liya Mikhailovna Andrianova.

At MSU, Yurii Mikhailovich Romanovsky's postgraduate supervisor and actual teacher was the prominent Soviet mechanical scientist, Professor Sergei Pavlovich Strelkov, an outstanding teacher and the author of excellent textbooks on mechanics and the theory of vibrations. The book of problems by S P Strelkov in the general physics course has been the main textbook for students in many universities and technical institutes for many decades.

One could say that almost the whole life of Yu M Romanovsky was associated with the Physical Department of MSU. He taught at the Physical Department of the university for 55 years. In 1983, he became a professor in the Department of General Physics and Wave Processes.



Yurii Mikhailovich Romanovsky
(31.10.1929 – 23.08.2022)

Among the scientific results he obtained in his young days can be mentioned the conditions for the loss of stability of oscillatory systems with fluctuating parameters and formulation of a theory of synchronization of distributed systems in application to chemistry and biology. In his Ph D thesis, “Flight of an airplane with elastic wings in a turbulent atmosphere” (1961), the behavior of an aircraft's load-bearing planes at speeds close to critical was simulated. The unique submarine missile guidance system created by him and his colleagues became known only thanks to the book *Soviet military power from Stalin to Gorbachev* (editors A V Minaev, Yu M Romanovsky, and O V Rudenko (Moscow, 1999)), which removed the veil of secrecy from the scientific developments of those years. According to some experts, submarine missiles were then the only weapon capable of hitting (due to high speeds) strategic nuclear submarines of potential enemies, and thus prevented international conflicts. Yu M Romanovsky not only designed acoustic systems but also personally participated in sea launches of missiles.

From 1965, Yu M Romanovsky was engaged in mathematical simulation of biological processes. He formulated theories of distributed self-oscillating systems with diffusive bonds in application to autowave processes in chemical and biochemical reactions in living cells, in particular, a theory of autowave flows of protoplasm in cells with amoeboid mobility.

Yu M Romanovsky initiated the development and application of laser methods to investigate biological mobility at molecular and cell levels. He and his disciples and colleagues managed to experimentally investigate nonstationary oscillatory autowave processes in living cells. The results obtained became the basis for constructing a series of mathematical models of autowave intracellular mobility. Yu M Romanovsky created and visually studied mathematical models of living cell reactions to light and heat. He carried out a large series of studies of running biopotentials generated by a local effect of electromagnetic interaction on leaves of green plants. The effect of radiation on electric pulse generation in plants was analyzed in a wide range from ultraviolet to millimeter waves.

Yu M Romanovsky made a considerable contribution to the elaboration of the ‘protein-machine’ conception proposed by a group of Russian scientists, which has become generally accepted by the world scientific community in recent years.

Using the methods of quantum mechanics and molecular dynamics, Yurii Mikhailovich managed to describe the effect of motion along dedicated degrees of freedom of protein molecules on the corresponding functional activity and thereby contributed greatly to revealing the structure–function relationship in biological macromolecules.

In recent years, Yu M Romanovsky’s research work was associated with mathematical simulation of molecular nanomachine (enzyme molecule) functioning. He proposed original approaches that made it possible to calculate their efficiency, and the new mathematical models allowed investigating elementary stages of catalytic reactions with the participation of enzyme molecules.

Yu M Romanovsky was one of the founders and long-time leaders of the all-Moscow seminar, Synergetics. Self-Organization and Nonequilibrium Processes in Physics, Chemistry, and Biology, which became very well known in our country and abroad. He conducted active pedagogical work delivering the lecture courses Autowave Processes and Laser Spectroscopy and Mathematical Models of Biomolecules. The innovative course Econophysics, created by him, consistently extends the principles of oscillatory processes to the world of economics. Over a hundred graduates of the Departments of Physics, Mechanics and Mathematics, and the Department of Computational Mathematics and Cybernetics successfully defended their degree work under his supervision. Twenty-eight of his disciples became candidates of sciences, five, doctors of sciences, and one, a full member of the Russian Academy of Sciences.

Yu M Romanovsky was a member of the MSU Dissertation Council, of the RAS Council of Biophysics, of the editorial boards of the journals *Prikladnaya nelineinaya dinamika* (*Applied nonlinear dynamics*) (series “Izvestiya vuzov”), *Kompyuternye issledovaniya i modelirovanie* (*Computer studies and simulations*), of the yearbook “Modern problems of statistical physics,” and of the editorial board of the series “Biophysics. Mathematical Biology” published by the Izhevsk Institute of Computer Science.

Yu M Romanovsky took an active part in the work of the program and organizing committees of the largest Russian and international conferences, including congresses of Russian biophysicists, congresses on biomedical optics (BIOS), and the international conferences Mathematics, Computers, Education. He actively participated in international scientific cooperation with MSU as head of scientific topics in the framework of interuniversity cooperation of MSU with Humboldt University of Berlin and the University of Palermo and lectured at the University of Havana.

Yu M Romanovsky published (as a co-author) over 350 scientific papers, including eleven monographs and five reviews published in the journal *Uspekhi Fizicheskikh Nauk* (*UFN*). Yurii Mikhailovich was not just an author, but a great friend of *UFN*. Bringing to the editorial office of *UFN* in January 1995 the review (in co-authorship with V A Teplov) “Physical bases of cell motion. Mechanisms of self-organization of amoeboid mobility” (published in *UFN* 165 555–578 (1995)), Yurii Mikhailovich simply amazed the editorial staff with his attitude towards *UFN*: “That is all, I brought my last review for *UFN*.” “Why, Yurii Mikhailovich? Why is it the last?” “Because according to our official statistics the average lifespan in Russia is now about 65 years and even less for men. I am already 65, and it is simply impossible to write a good review worthy of *UFN* in less than five years. So, according to the statistics, I simply won’t have enough time to write another review for *UFN*!” Fortunately, Yurii Mikhailovich lived for almost three decades after that and wrote three more wonderful reviews for *UFN*, but his strictness and exactingness in writing reviews for *UFN* will be remembered forever. It is a good example for all authors of *UFN*.

Yu M Romanovsky devoted great effort to perpetuating the memory of outstanding scientists, many of whom were his colleagues and friends, namely R L Stratonovich, Yu L Klimontovich, O V Bogdankevich, and V D Krivchenkov. Yurii Mikhailovich acted as a compiler, editor, and author of books of reminiscences of them. However, the greatest and, perhaps, one of the most important works of his last years was the book about his fellow students, 1952 graduates from the Physics Department of MSU. He had collected material about his fellow students for many years.

Let this short memoir preserve at least some episodes about the life and research work of this outstanding scientist, distinguished teacher, and bright person for those who did not have an opportunity to communicate with Yu M Romanovsky. And those who knew Yurii Mikhailovich will keep in their hearts the grateful memories of him for a long time.

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V A Makarov, A A Polezhaev, A V Priezzhev,
G Yu Riznichenko, V I Ritus, M Yu Romanovsky,
O V Rudenko, N N Sysoev, V V Tuchin*