PERSONALIA

Genrikh Romanovich Ivanitskiĭ (on his sixtieth birthday)

On November 8, 1996, Genrikh Romanovich Ivanitskiĭ celebrated his sixtieth birthday. A outstanding scientist, a Corresponding Member of the Russian Academy of Sciences, an honorary member of several foreign academies and scientific societies, and a winner of State and Lenin Prizes, he has contributed heavily to advances in theoretical and experimental biophysics. His professional record looks unlike that of many famed physicists and biophysicists. His drive, multifaceted interests, unabated energy and out-of-ordinary abilities as an organizer have made him the leader of biophysicists in this country.

Ivanitskiĭ was born in Moscow in 1936. On leaving school as a gold medal winner, he entered the Radio Engineering Faculty at the then prestigious Moscow Aviation Institute. His encounter with N Wiener's *Cybernetics or Control and Communication in Animal and Machine* sharply changed his destiny. As a fourth-year student, he went deeply into biophysics and sought ways and means of evading his assignment to the defence industry, as was then practiced with graduates from the Radio Engineering Faculty. He made it with support from Academicians G M Frank and A I Berg, and in 1959 he was sent first to do his pre-diploma project and then to take up a job with the USSR Academy of Sciences' Institute of Biological Physics based in Moscow at the time.

His early research project had to do with the identification and counting of brain cells. Together with G N Orlovskiĭ, he designed the country's first scanning optical microscope and associated image-processing computer systems. In 1964, he received his Candidate of Technical Sciences' degree for his dissertation, Development of Methods for Automatic Counting and Measurement of Brain Cells. The results reported there were later included in The Human Brain in Figures and Tables, a reference book by S M Blinkov and I I Glezer, which saw the light of day in Russian (1964), German (1965), and English (1966). In 1965, Ivanitskiĭ summed up his work (in the monograph Automatic Analysis of Microobjects by G R Ivanitskiĭ, L L Litinskaya, and V A Shikhmatov, Moscow: Energiya, 1967), and left Moscow. For the 29 years that followed he headed a laboratory at the USSR Academy of Sciences' just re-created Institute of Biological Physics at Pushchino. He and his laboratory carried on optical-microscopic studies.

Ivanitskiĭ set up a computer center to analyze various microobjects of animate and inanimate nature (cells, chromosomes, aerosols, pores, abrasive powders, dislocations, and microscopic bubbles). The laboratory developed new analysis algorithms which ultimately led up to a vision-simulating system. This ingenious system was later covered by patents in

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many countries (notably, Britain, Germany, the United States, and France) and served as the basis for Morphoquant, an instrument quantity-produced by Karl Zeiss Iena, which has found many applications in cellular biology and medical genetics.

Through Ivanitskii's and his coworkers' effort, the optical resolution was brought up to its theoretical limit for the first time ever in qualitative studies of microstructure. The findings received world recognition and were included as a section in its own right in a handbook of microscopy (*Handbuch der Microscopie*, Berlin: Herasugeler, 1973).

In 1970, Ivanitskiĭ received a Doctor of Physics and Mathematics' degree for his dissertation, *Methods and Techniques of Computer Analysis of the Morphology of Cells and Tissue Sections*. In 1978 this package of research won him, G M Frank and the team they together headed a State Prize.

In the late 1970s, Ivanitskiĭ set out on a new series of electron-microscopic studies into the three-dimensional reconstruction of protein macromolecules and the structure

Appointed in 1969 Head of the Department of Applied Mathematics and Electronics, Ivanitskiĭ consolidated at the Institute the then disconnected research programs on autooscillatory and autowave processes in excitable media. Turning to various objects in physics, chemistry, and biology, an inquiry was undertaken into the mechanisms whereby excitable systems tend to lose stability as autowave processes evolve in them, and new classes of dynamic autowave structures were discovered. In 1980, B P Belousov, A M Zhabotinskiĭ, A N Zaikin, G R Ivanitskiĭ, and V I Krinskiĭ were awarded a Lenin Prize for their work, Detection of a New Class of Autowave Processes and Study of Their Role in Distributed Excitable Systems. This work met with vivid response worldwide, and the research itself on autowave processes in various systems, including those dealt with in physics, is being actively pursued even today.

In 1974, Ivanitskiĭ was appointed Director of the Biological Research Center at Pushchino. In 1976, he was elected a corresponding member of the USSR Academy of Sciences and, following the death of Academician G M Frank, he was appointed Director of the Institute of Biological Physics. In cooperation with B N Veprintsev and A M Khokhlov, he organized a research program in cellular engineering, which spurred the development of fundamentally new microscopic techniques and procedures.

In 1978, Ivanitskiĭ initiated at the Institute a research project concerned with the nonlinear properties of modified chemical reactions of the Belousov–Zhabotinskiĭ type and materials of biological origin with a view to using them as sensors and biochips (logical devices for technical applications). The results were summed up in *Biotechnics* — *a Novel Strategy Computerization*, a known monograph edited by Ivanitskiĭ (Moscow: Nauka, 1990). This direction is now evolving in big strides in many countries.

In 1980, jointly with F F Beloyartsev and I L Knunyants, he started a comprehensive research program, Perfluorocarbons in Biology and Medicine. Under this program, a perfluorocarbon blood substitute with a gas-transport function, named Perftoran (more known, after newspapermen, as the blue blood), was created in just three years, a recordbreaking slice of time by all standards. When Perftoran was going through clinical tests at the country's leading medical centers and used to advantage by military field surgeons in Afghanistan, the KGB and the Communist Party bodies put up, quite unexpectedly for the researchers, an unprecedented opposition. The ensuing smear campaign led to the tragic death of F F Beloyartsev, the breakup of the team that was working on the blood substitute, the removal of Ivanitskii from office as the Institute's Director, and attempts to discredit him in the Party press. The true motives of the campaign remain unclear even today, but Ivanitskii endured the test and showed integrity, honesty, and courage.

When in 1990 the campaign ceased, Ivanitskii had to reanimate the broken-up program. In 1994, the Pharmacology Committee and in 1995 the Pharmacopoeia Committee of the Russian Federation Health Ministry cleared *Perftoran* for use at clinics. However, the five-year delay in implementing the program had cost this country the commercial lead. Although superior to Japan's *Fluosol* in many respects, the Russian gas-transport blood substitute appeared on the market five years later.

In addition to his activities as a scientist, Ivanitskiĭ has always been attentive to dissemination of scientific knowledge, education of the younger generation, and promotion of contacts among specialists and stronger ties between science and the arts. It was on his initiative that the First All-Union Congress of Biophysicists was held in Moscow in August 1982, and also many symposia, including the First International Symposium, well known to physicists, on autowaves in self-organization of evolving systems in biology, chemistry, and physics (Pushchino, July 1983).

In 1985, Ivanitskiĭ published *The World Through the Eyes* of the Biophysicist intended for senior school grades but now popular among the adults as well. The Znanie Publishers have turned out, as part of their *Physics*, *Mathematics and Cybernetics*, and *Under the Query Sign* series, about a dozen of his booklets on various topics in physics and biophysics in the past years.

His friends, disciples, and colleagues know quite well his joy of living, sense of humor, and ironic stand toward himself

— traits that have always helped him to rally around him people who share his views and to put through the most daring projects. Ivanitskiĭ celebrated his sixtieth birthday in the prime of the talent endowed upon him and full of ideas. We wish him good health and further successes in his multifaceted activity.

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