

Il'ya Artem'evich Zakharov (Zakharov-Gezekhus): On the 70th Anniversary of His Birth



Il'ya Artem'evich Zakharov (Zakharov-Gezekhus), Doctor of Biology (1972), Professor (1976), Corresponding Member of the Russian Academy of Sciences (2000) is a leading Russian geneticist. Zakharov discovered (1969, 1977) cytoduction, a new genetic phenomenon consisting in the transmission of mitochondrial genetic factors without the transmission of nuclear ones. He made a considerable contribution to the development of various fields of general genetics, as well as to the restoration of Russian genetics smashed in the Lysenko period.

Zakharov's works are well known both in Russia and abroad. He published many books and monographs and more than 200 articles on various branches of genetics and the history of science. Zakharov founded genetic scientific schools in St. Petersburg and Moscow and supervised 30 candidate and 3 doctoral dissertations. Zakharov won Zabolotnyi Prize of the National Academy of Sciences of Ukraine, Kirpichnikov Prize (2000), the Governmental Grant for Outstanding Scientists (1994–1996), and the Governmental Science Grant (1997–1999). Zakharov is also Honored Scientist of the Russian Federation (1999).

Zakharov was born in Leningrad on June 18, 1934 in a family with old cultural traditions. Many of his ancestors in the paternal line were civil and military engineers and scientists, including the shipbuilder who

designed the first Russian battleships and the renowned physicist Nikolai Aleksandrovich Gezekhus, who was the first rector of Tomsk State University (1888). As a homage to his eminent ancestors, Zakharov assumed the double name Zakharov-Gezekhus in 2003. As a child, Zakharov-Gezekhus had hard times: during World War II, their family lived in blockaded Leningrad for a year; in summer 1942, they were evacuated by warship across Lake Ladoga and lived in a village near the city of Vologda for two years. In 1944, the Zakharovs returned to Leningrad. Zakharov finished high school and Leningrad State University (Department of Microbiology). After graduation, Zakharov worked at the Department of Genetics and Breeding of Leningrad State University; in that period, the renowned geneticist M.E. Lobashev was the head of the department. At this department, Zakharov rose from a laboratory technician to a research assistant. In 1959, Zakharov started to deliver a course in the genetics of microorganisms that he developed himself; later, this course became the basis of a university textbook, first published in 1967 and reprinted several times. In the late 1964, Zakharov was asked to organize the Laboratory of Radiation Genetics in Physical Technological Institute of the Academy of Sciences of the Soviet Union (in 1971, the institute was renamed the Leningrad Institute of Nuclear Physics; now it is called the St. Petersburg Institute of Nuclear Physics of the Russian Academy of Sciences and is located in the town of Gatchina near St. Petersburg). Zakharov was the head of this laboratory from 1965 to 1987. In 1987, Zakharov moved to Moscow to become the head of the Laboratory of Comparative Animal Genetics of the Vavilov Institute of General Genetics of the Russian Academy of Sciences. In 1992, he was appointed a deputy director of the institute.

Zakharov's scientific interests are diverse. His research work mainly lies in three fields:

- (1) the genetic control of genome repair and mutations,
- (2) crossing over, genetic mapping, and comparative analysis of genetic maps, and
- (3) cytoplasmic (mitochondrial) heredity.

In all these fields, Zakharov performed pioneering studies whose results had an impact on genetic research not only in Russia, but also in many other countries all over the world. Studies in the first field began on yeast and *Drosophila* in Leningrad State University and were

successfully continued in the Leningrad Institute of Nuclear Physics. Cytoinduction was discovered in that period. Studies on cytoinduction are still carried out in the laboratory founded by Zakharov and currently headed by one of his disciples.

One of Zakharov's first published studies (performed together with S.G. Inge-Vechtomov, who was then a student) dealt with crossing over in *Drosophila*. Afterwards, an original method of yeast gene mapping was developed and the results of genetic mapping in various organisms were collected and summarized to become the basis of two monographs. The first of these monographs became the first such summary in the world literature. Zakharov was the first to propose the mathematical methods for comparison of genetic maps, which allowed the gene orders in mammalian genomes to be compared. Studies on genetic mapping were continued in the Vavilov Institute of General Genetics. The radiation mapping method, a modern method of fine genetic mapping of mammalian genomes, was developed and successfully used in the laboratory headed by Zakharov. This method was used to construct the map of human chromosome 3 in the framework of the Human Genome project. Note that this is the only large-scale study on human chromosome mapping performed by the genetic method in Russia thus far.

Zakharov supervises large-scale studies on the genetic resources of farm animals in Russia. Studies on the mechanisms of cytoplasmic (mitochondrial) inheritance are being rapidly developed. Zakharov and his coworkers began the studies on the mutation process in mitochondrial DNA back in the 1960s. They demonstrated that the DNA repair system eliminated UV-induced lesions not only in chromosomes, but also in

mitochondrial DNA (1970). During the past decade, Zakharov and his colleagues have been studying cytoplasmic heredity in insects. The results of joint studies performed in collaboration with the Department of Genetics of Cambridge University (United Kingdom) demonstrated that the cytoplasm-determined androcyte (the death of males and development of unisexual offspring in Coccinellidae) was caused by various symbiotic bacteria living in the cytoplasm and transmitted to the next generation transovarially ("via the egg"). Studies on the polymorphism of the mitochondrial DNAs of the Russian breeds of dogs and horses and of the reindeer have been started and are successfully continued in the laboratory headed by Zakharov. Of special interest are the studies on human mitochondrial DNA polymorphism that are performed in human populations of the central Asian regions (Tyva, the Altai, Khakassia, etc.). The data obtained were used to formulate and substantiate the hypothesis that the migration of human populations that resulted in populating America began from the Altai-Sayan Upland.

Zakharov-Gezekhus is a brilliant organizer and popularizer of science. He won the prize of MAIK Nauka/Interperiodica Publishing and two competitions of popular science articles of the Russian Foundation for Basic Research. His interesting studies on the history of genetics, which reminded the scientific community the names of outstanding Russian researchers that had been wrongly forgotten, are generally known.

Geneticists from Russia and many countries throughout the world congratulate Il'ya A. Zakharov-Gezekhus on his 70th birthday and wish him health, every success in his research, and many more years of happiness and creative work.