Professor Iya I. Kiknadze: 80th Birthday and 55 years in science and teaching

Professor Iya Ivanovna Kiknadze is a leading expert in cell biology, cytogenetics, karyosystematics, and comparative and evolutionary genomics of Chironomidae.

On February 9, 2010, this honoured worker of science of the Russian Federation celebrated her 80th anniversary. She is among the oldest researchers at the Institute of Cytology and Genetics (ICG), Novosibirsk, and Professors of the Novosibirsk State University (NSU). In addition, in 2010 it will be 55 years since the beginning of her research work, of them, three years at the Laboratory of Cytology, Zoological Institute, Leningrad, later transformed into the Institute of Cytology. She has been working at ICG, Novosibirsk, for 52 years, since January, 1958. For 32 years, from1962 till 1994, she headed a laboratory at the institute and from 1963 to 1986, at NSU.

Iya Kiknadze is the founder in Russia of the new research field: functional organization of chromosomes and differential gene activity in Diptera. She developed the notion of puffing as the basis for differential gene transcription and described the pattern and dynamics of puffs at major stages of chironomid development. With her supervision, the role of tissue-specific puffs was analyzed and an insight into the genetic control of tissue-specific secretory proteins was obtained. She pioneered in microdissection of the disk containing genes of the tissue-specific Balbiani ring, investigation of the molecular study of these genes, description of transposable elements in Chironomidae, and study of the cytogenetic control of the fine structure of chironomid salivary glands in the course of induced gene repression and expression. This study provided grounds for the original hypothesis of periodic genome reprogramming. Construction of high-resolution cytophotographic maps of chironomid polytene chromosomes allowed these species to be enrolled on the list of models for studies of evolutionary transformations in genomes and genetic impact of industrial factors on organisms. In particular, these results were extensively used in the assessment of radioactive pollution in the integrated projects: *Remote Consequences of the Radioactive Impact of Nuclear Tests at the Semipalatinsk Test Site on the Population of the Altai Territory* and *Study of the Genetic Consequences of Nuclear Tests at the Semipalatinsk Test Site on Plant and Animal Populations*. Iya Kiknadze supervised the development of inversion genomics of chironomids, based on global analysis of the disk (gene) sequence polymorphism on various continents: Eurasia, North and South America, Africa, and Australia. Putative ancestral disk sequences were recognized in each of the chromosome arms of the genome (primitive karyotype). Phylogenetic trees were constructed for the first time for the genus *Chironomus* on the basis of inversion polymorphism in cooperation with researchers of the Institute of Mathematics, Novosibirsk, and the cytogenetic history of the genus was reconstructed.

Iya I. Kiknadze at the Symposium of Cytogenetics of Invertebrates, August 2010. Photo W. Wülker.

Iya Kiknadze was the first to obtain experimental evidence against the involvement of endomitosis in somatic polyploidization. It allowed revision of the endomitosis concept. Functional organization of chromosomes and differential gene activity are also among the subjects of Kiknadze's seminal studies. Her monograph "Functional organization of polytene chromosomes" summarizes studies in this field. Iya Kiknadze applied the polytene chromosome model to the development of the essentials of the functional organization of interphase chromosomes and introduced the notion of chromomeres as functional units of these chromosomes.

When working at ICG, Iya Kiknadze commenced studies of interphase chromosomes, chromomeres, and nucleoli. In collaboration with Dr. E. S. Belyaeva, she proved that the nucleolus was a transcriptionally active region of an interphase chromosome.

One more field of research conducted under Kiknadze's supervision since 1980s is the molecular and cytological organization of specific regions in eukaryotic chromosomes, including the organization of multigenic loci and their transformation in the course of evolution.

Long-term monitoring of chromosome pools of natural chironomid populations is conducted in permafrost regions of Yakutia in cooperation with the Institute of Ecology, Yakutian Academy of Sciences.

Iya Ivanovna Kiknadze was born in the old merchant city of Tyumen on February 9, 1930. Her mother Antonina Reshetnikova and father Ivan Balakin were clerks.

Iya spent all her childhood and school years in Tyumen, never going further than ten miles from it. She entered first School No. 1 and graduated from girl's school No. 25. In wartime, Tyumen gave home not to only evacuated industrial enterprises but also many higher educational institutions from Moscow and other Russian cities. They included the staff of the Moscow Medical Institute. As it later turned out, the embalmed body of Vladimir Lenin was kept there during the Second World War. The cultural standard of the provincial town was notably improved by performances of companies of the Moscow Academic Art Theatre and other theatres. The metropolitan culture influenced the artistic taste of Tyumen inhabitants, in particular, teenagers. In 1947, Iya graduated school with a School Gold Medal and went to the "northern capital" to enter the Leningrad State University.

In 1952, Iya Kiknadze graduated from the Faculty of Biology and Soil Science cum laude and became specialist in a field rare at that time: Darwinist–Geneticist. She started her research activity when learning at the University. From 1952 to 1955, she took a postgraduate course at the Leningrad State University and defended a candidate's dissertation entitled *Dynamics of DNA and RNA in oogenesis and early cleavage in invertebrates*. Then she obtained her first position of Junior Researcher at the Laboratory of Cytology, Zoological Institute (In 1956, the laboratory was transformed into the Institute of Cytology). Her research advisor at the University and Zoological Institute was Ivan I. Sokolov, a prominent cytologist. For years, he remained her tutor and standard of dedication and ethics. In 1957 Iya was advised by A. A. Prokof'eva–Bel'govskaya to move to the just established Akademgorodok in Novosibirsk and obtain a job at ICG. She was promised she would have an apartment and interesting work. Iya was a daughter of Siberia, and she did not resist it. In 1957 Iya Kiknadze, her husband the botanist Georgii Sergeevich Kiknadze, and their small daughter Irene left for Novosibirsk.

At ICG, Iya Kiknadze became Junior Researcher at the Department of Physical, Chemical, and Cytological Basics of Heredity. It was headed by Prof. Ivan Dmitrievich Romanov till 1961. It was a remarkable time with a remarkable scientist. Even now, his portrait is on the wall in Iya Kiknadze's study. During her first decade in Novosibirsk, Kiknadze made friends with older colleagues, Vera V. Khvostova and Raisa P. Martynova, and colleagues of her age, Ninel B. Khristolyubova and Klavdia K. Sidorova.

In 1961–1962, Kiknadze worked as a Senior Researcher. Since October, 1962, she has headed the Laboratory of General Cytology. She defended her doctoral dissertation *Functional Organization of Chromosomes* in 1967, at a session of the Joint Dissertation Council in Biological Sciences, Siberian Branch of the USSR Academy of Sciences. She was awarded Professor's rank at the Chair of Cytology and Genetics on December 10, 1970.

On January 21, 1988, the Department of Cell Biology was founded on the base of the Laboratory of General Cytology. It included the Laboratory of Evolutionary Cytogenetics and several sectors: Genetics of Tissue-Specific Traits, Molecular Neurogenetics, and Genomics.

Since 1994, Prof. Kiknadze has held the position of Chief Researcher at the Laboratory of Evolutionary Biology, ICG.

Professor Iya Kiknadze convened several All-Union and international conferences: the 2nd All-Union Symposium *Chromosome Structure and Function* (Novosibirsk, 1970) and the All-Union Symposium *Chironomidae Evolution, Speciation, and Systematics* (Novosibirsk, 1985). In 1982, the international symposium *Organization and Expression of Tissue-Specific Genes* was held in Akademgorodok in 1982. It marked the beginning of regular workshops on chironomid Balbiani rings. At present, I. Kiknadze is participating in the preparation of the conference *Invertebrate Karyosystematics* (Novosibirsk) as Chairlady of the Organizing Committee.

Professor Iya Kiknadze is the founder of the Novosibirsk school of dipterologists, experts in Chironomidae and Drosophilidae. Twenty-nine candidate's dissertations were defended with her scientific supervision. She generously presents her ideas to her students. She has dozens of followers and disciples who have chosen their own research

ways in many countries. Many of Kiknadze's students have raised their own students.

Professor Iya Kiknadze applied much effort to teaching of cytology at the Chair of Cytology and Genetics, Biological Department, Faculty of Sciences, NSU. From the foundation of the Chair of Cytology and Genetics in 1962 to 1986, she performed the offices of Vice-Chairholder. She was the first not only at NSU but in the USSR to develop and deliver the course *Cytology/Cell Biology* after decades of the stranglehold of Michurin's biology. She also held and supervised seminars and laboratory courses on branches of cytology and genetics.

Iya Kiknadze introduced her experience acquired from the Leningrad biological research school to ICG and NSU. She started with the system of biologist tutorship. Major and minor laboratory courses on cytology and genetics and summer practicals in the field were conducted in the image and likeness of corresponding activities at the Chair of Biology of the Leningrad University. This was how the famous Leningrad school of cytology and genetics, created by the famous scientists Yu. A. Filipchenko, M. E. Lobashov, D. N. Nasonov, and M. S. Navashin, sprouted in Siberia.

Since 1965, Iya Kiknadze has been a member of the Joint Academic Board in Biology, Siberian Branch of the USSR Academy of Sciences. She was a permanent member of the Academic Board of ICG since its establishment, a member of the Academic Board of the Faculty of Sciences, NSU, and a member of the Dissertation Council at the Novosibirsk State Medical University. Now Prof. Kiknadze is also a member of the Dissertation Council at the Institute of Systematics and Ecology of Animals.

For 28 years, from 1974 to 2001, Iya Kiknadze was a member of the Editorial Board of the journal *Tsitologiya* (*Cytology*), and for 5 years, from 1984 to 1989, of the Editorial Board of *Ontogenez* (*Development*). Since 2003, she has been a member of the Editorial Board of *Evroaziatskii Entomologicheskii Zhurnal* (*Eurasian Entomological Journal*), and since 2008, of the Editorial Board of *Comparative Cytogenetics*.

The Honoured Worker of Science of the Russian Federation (since 1998), Professor Kiknadze was awarded the Order of the Badge of Honour in 1967 for participation in the development of the Novosibirsk Research Centre and scientific contribution; in 1970, the Medal for Valorous Labour. She has the titles of Honoured Veteran of the Siberian Branch of the USSR Academy of Sciences and Honoured Veteran of Labour. Certificates of Merit: from SB RAS on the occasion of the 275th Anniversary of the Academy of Sciences in 1999, from the Ministry of Education and Science on the occasion of the 50th Anniversary of the Siberian Branch of the RAS in 2007, and from the Novosibirsk Governor V. A. Tolokonsky in 2010.

Iya Kiknadze is an earnest and fruitful worker. It is apparent from her numerous publications in the recent decade and enormous work on reviewing and editing of research papers. Her desk is always covered by fans of photographs of her favourite polytene chromosomes. Their banding patterns serve as barcodes. They allow the features and evolutional history of each species to be understood. With the help of her students, A. G. Istomina, L. I. Gunderina, V. V. Golygina, and A. D. Broshkov, as well as with numerous Russian and foreign colleagues, Iya Kiknadze works in the enormous field of chromosome pools, chromosome polymorphism, and speciation in Holarctic Chironomidae species. These studies contribute to cytogenetics of natural chironomid populations in the context of the role of chromosome rearrangements in population adaptation and chromosome set divergence during speciation. They have revealed profound cytogenetic divergence between Palearctic and Nearctic populations of Holarctic species.

Iya Kiknadze is among authors of over 350 publications, including 10 monographs.

During all scientific activity Prof. I. Kiknadze had fruitful contacts with many specialists from different countries. She took part in many international symposia and other scientific meetings. While studying the structure and function of chironomid polytene chromosomes she had associated with Prof. B. Daneholt, Prof. E.R. Schmidt, Prof. M. Lezzi, Prof. J.E. Edström, Prof. U. Grossbach, Prof. R. Panitz, Prof. S. Case, H. Bäumlein, U. Wobus. Joint work with Prof. W. Wülker, Prof. J. Martin, Prof. M. Butler, Prof. X. Wang, Prof. R. Contreras-Lichtenberg, H. Vallenduuk, H. Moller-Pilot result in the description of new species, their karyotypes and chromosomal polymorphism. Iya Kiknadze collected chironomid larvae with M. Butler in North America. The fruitful interactions with Prof. W. Wülker and Prof. J. Martin resulted in revision and making cytomaps of polytene chromosomes of many *Chironomus* species more precise. In joint work with Prof. W. Wülker, Prof. J. Martin, Prof M. Butler and Dr. L. Gunderina it has been shown that the banding sequence pools of populations of the same species on different continents differed much in the sets and frequencies of

gene inversion orders. Banding sequence pools of populations on each continent were found to contain continent-specific banding sequences in addition to sequences occurring on several continents.

We wish Iya Kiknadze many more interesting years full with new ideas and successes.

I.K. Zakharov, A.G. Istomina, W. Wülker

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