

Editorial

In memory of Vadim Aleksandrovich Ratner



Vadim Aleksandrovich Ratner, born 1932 in Khabarovsk, was head of the laboratory at the Institute of Cytology and Genetics, Siberian Branch of the Russian Academy of Sciences (Novosibirsk) from 1979–2002; Doctor of Biology since 1976; professor since 1978. He was one of the leading Russian experts in the field of mathematical molecular genetics who established a background on the theory of molecular genetic control systems and the unified theory of molecular evolution. He was author and co-author of about 400 scientific publications, including 14 monographs. His scientific teachers were A.A. Lyapunov, N.V. Timofeeff-Ressovsky, and D.K. Belyaev. His scientific endeavours have resulted in the formation of one of the most active research schools whose works are well known and recognized both in Russia and abroad. In 1997, he was elected as an academician

of the Russian Academy of Natural Sciences and since 1996 he was a Soros Professor. In 2002, he received the V.S. Kirpichnikov Award, together with L.A. Vasil'eva as co-author, for a collection of work on the genetics and evolution of patterns of mobile genetic elements (MGE).

V.A. Ratner initiated a number of organizational and technical activities. For instance, he founded the Theoretical Department and several laboratories at the Institute of Cytology and Genetics, Siberian Branch of the Russian Academy of Sciences; he launched work on the creation of databanks and computer-assisted tools; he edited 14 thematic collections of scientific works on mathematical genetics; he organized numerous domestic and international scientific schools and conferences; he arranged collaboration with various laboratories in the USA, Germany, Italy, and other countries; and he was leading several research projects funded by domestic and foreign grants. For several years, he was a member of the editorial boards of three international journals and a number of scientific councils within the Russian Academy of Sciences and its Siberian Branch.

The main areas of V.A. Ratner's scientific interest and work were (i) the theory of molecular genetic control systems, including problems of genetic language; genetic code; simulation of phage development, gene networks, and dynamics of self-reproducing systems; and the concept of limiting factors and principle of blockmodular organization; (ii) the theory of molecular evolution, including scenarios of the emergence of molecular genetic organization foundations; problems of synonymous evolution of macromolecules, phylogenetic analysis, molecular coevolution, evolution of genomes, and evolution of viruses and retrotransposons; and (iii) experimental and theoretical study of the *Drosophila* MGE genetic system, in-

Electronic publication can be found in *In Silico Biol.* **2**, 0047 <<http://www.bioinfo.de/isb/2002/02/0047/>>, 5 September 2002.

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cluding induction of MGE transposition by stress factors; response of MGE patterns to selection; and simulation of interactions between MGE, adjacent genes, and polygenes.

It is difficult to overestimate the impact of his work on the emergence and development of mathematical biology that now gives rise to a growing number of new fields of biology, such as molecular evolution, structural biology, computational biology and bioinformatics. 40 years ago, after the discovery of the double helix, several prominent scientists and physicists became interested in biology. Vadim Ratner was among them. However, in contrast to many others, his way was not to apply pure and sometimes abstract physical principles to biological problems, but rather to delve into the biology, to become biologist and to solve biological problems using the rich and powerful tools of physics and mathematics. One example of this way of thinking was his work on deciphering the genetic code. In the late 1950's, the genetic code was the most intriguing puzzle for many theoreticians in the world such as the great physicist George Gamow, coding-theory professional Solomon W. Golomb and many others. They came up with many intellectually elegant hypotheses that mostly failed when real experimental data appeared. The real genetic code destroyed the abstract concepts; it was much simpler and more "natural". But for Vadim Ratner this was not the end but the beginning of his theoretical work on the genetic code. He compiled all available experimental data and applied theoretical analysis to try and understand the logic of nature. He proposed an almost correct variant of the genetic code way before it was finally done by extensive efforts of many experimental groups around the world. He discovered many of the amazing properties and symmetries of the genetic code showing that it was not just a simple and strange "frozen case", but a product of natural evolution of billions of years. He stated that we should patiently try to understand its great logic rather than try to squeeze facts into a limited space of artificial principles.

In order to understand the role of Vadim A. Ratner in the growing and flourishing area of bioinformatics, it is necessary to mention his teaching activities. He was actively involved in the training of young scientists; for 35 years he was lecturing at the Novosibirsk State University. Since 1978 he was Professor of the Chair of Cytology and Genetics, where he presented a number of specialized key courses. He was the founder and, for over 30 years, tutor in the unique speciality of mathematical biology, launching over 100 specialists in the field, including 8 doctors and more than 30 candidates of science. At that time in the early 70's, it was a globally unique school. Students from the faculties of biology, physics, and mathematics came together to work on the theoretical analyses of problems in the fast growing field of molecular biology and molecular evolution, ranging from the origin of life to the prediction of 3D protein structures. V.A. Ratner was always saying: "Don't be surprised by the biological facts that do not fit into existing hypotheses. Nature follows its own logic and always finds its own way". His students will always have these words in their minds when approaching new puzzles that nature presents for solving.

Vadim Aleksandrovich Ratner passed away on August 15, 2002 after a long and serious illness. The scientific world has lost a brilliant scientist, a great man and very nice person, and for many of us, a good friend.

September 5, 2002