

The Birthday of Leonid Petrovich Tatarinov

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November 12, 2006 was the 80th birthday of the outstanding paleontologist and evolutionary biologist Academician Leonid Petrovich Tatarinov, Director of the Paleontological Institute of the Russian Academy of Sciences from 1975 to 1992 and editor-in-chief of *Paleontologicheskii Zhurnal* from 1975 to 1992. His name is connected with one of the most important landmarks in Russian evolutionary morphology and vertebrate paleontology. Leonid Petrovich has an unusually broad scientific outlook, a unique memory, and an

encyclopedic knowledge, and has played a very important role in the progress of fundamental biology in Russia. All his life he has been a dynamic and active researcher, and remains so now despite his age and serious illness. He has showed remarkable determination and deep attachment to his research while overcoming these problems. These efforts have resulted in a series of excellent works by Leonid Petrovich completed in recent years. The largest of these, on the evolution of reptiles, is still unpublished.

Leonid Petrovich has a deep interest in biology that has been instrumental in his professional choice, from his school years. The war interfered with his plans, and in 1943, at 17 years old, he was conscripted into the army. This recent schoolboy turned soldier was discharged from the army in 1944, following a severe infection, and was admitted to the Biological Faculty of Moscow State University. We can never know what might have happened otherwise; his illness may have saved his life. In his memoirs of that time, Leonid Petrovich names the people who made the most significant impact on his development. Among these is the founder of the Darwinian Museum A.F. Kots, and Academician I.I. Schmalhausen, who was head of the Chair of Darwinism, and the senior researcher Raisa L'vovna Berg. Under her supervision Leonid Petrovich was studying population genetics, but soon discovered that his interest was in organismal evolution, and he continued his education at the Chair of Vertebrate Zoology. Among the vertebrates, he was originally mostly interested in birds, possibly because of the irresistible charm of the excellent ornithologist G.P. Dement'ev. Gradually he switched to the morphological evolution of Anura, which he studied under the supervision of A.N. Druzhinin and, later, B.S. Matveev. However, his doubts continued even when he received a research scholarship at the Chair of Vertebrate Zoology in 1949 after he had graduated from university. Leonid Petrovich studied birds for some time in the collection of the Zoological Museum of Moscow University under the supervision of another legendary ornithologist, E.P. Spangenberg. As a fifth-year student he witnessed dramatic events in Soviet biology that followed the August 1948 Conference of All-Union Academy of Agricultural Sciences (VASKhNIL), and directly affected the Biological Faculty of Moscow University. These events are described in his vibrant memoirs, which, as an eye-witness's account, will certainly be interesting for future historians of science.

In May 1953, Leonid Petrovich received his PhD degree for his thesis "On the Role of Living Conditions in the Phylogeny of Amphibians." At that time he was working in the Inostrannaya literature Publishing House, where he worked until he received a job in the Paleontological Institute of the Academy of Sciences of the USSR, at the Laboratory of Lower Tetrapods, in 1954. He gladly welcomed this opportunity of scientific research, and the study of the evolution of land vertebrates became his life's work.

The career of Leonid Petrovich in the Academy of Sciences can be described relatively briefly. In 1961 he became the head of the Laboratory, in 1969 he received a Doctor of Science degree for the thesis "Problems of the Evolution of Theriodonts," and in 1975 he became the director of the institute. In 1974, Leonid Petrovich was elected a Corresponding Member of the Academy of Sciences, and in 1981, an Academician.

It is much more difficult to describe the variety of scientific achievements of Leonid Petrovich in these years. As a biologist with an excellent anatomical training, he, from the very beginning, considered morphology of extant and fossil vertebrates as a uniform basis for understanding the pathways and patterns of their historical differentiation. In this he restored the approach in evolutionary morphological studies founded in Russia in the 1920s by Academician P.P. Sushkin.

Paleontologists best know the this approach in Leonid Petrovich's work from his analysis of the morphological evolution of theriodonts. However, it was best expressed in his series of "intermediate" yet not quite paleontological papers at the end of the 1950s—beginning of the 1960s. Based on this approach, these papers convincingly supported the Goodrich–Watson concept of the early divergence of sauropsid and therapsid lineages of reptiles, and showed the similarity in the auditory system of extinct temnospondyls and extant anuran amphibians. All these conclusions directly and indirectly suggest deep parallelisms in vertebrate evolution. Today, when the traditional approach to phylogenetics based on structural continuity is gradually replaced in western scientific schools by determination of the simplest (most parsimonious) arrangement of shared derived characters, which minimizes parallelisms causing homoplasies, less place remains for such patterns in evolutionary processes. However, their existence cannot be denied, as is convincingly shown in Tatarinov's studies.

Therapsid reptiles have always been the main object of Leonid Petrovich's paleontological research. However, many of his works beginning with the 1950s were on other fossil groups, such as early archosaurs, seymouriamorphs, early turtles, lizards, snakes, and mammals. Among the studies completed by L.P. Tatarinov in the early period of his work at the Paleontological Institute, his outstanding input in the preparation of the volume *Amphibii, Reptilii, Ptitsy* (Amphibians, Reptilians, and Birds) in the series *Fundamentals of Paleontology* (1964) (Editor-in-Chief Academician Yu.A. Orlov) should be emphasized. Although over 40 years have passed from the publication of the volume, it has retained its importance as a reference book for paleontologists.

Leonid Petrovich has published over 200 scientific works, of which the most well-known are the monographs *Theriodonts of the USSR* (1974), *Morphological Evolution of Theriodonts and General Problems of Phylogenetics* (1976), *Paleontology and Theory of Evolution* (1985), and *Essays on the Theory of Evolution* (1987). Very important evolutionary-morphological concepts published in these studies are primarily connected to the process of mammalization in theriodonts, in which the independent and mosaic appearance of the *mammalian syndrome* is shown to have appeared in different lineages. Another important

aspect is the problem of the early evolution of mammals, the analysis of which allowed the concept of the independent origin of major evolutionary lineages in this group to be supported and morphologically substantiated. For these excellent studies L.P. Tatarinov was awarded the Severtsov Prize by the Russian Academy of Sciences in 2002.

The study of skull structures conducted by L.P. Tatarinov in various lineages of theromorph reptiles hugely enriched the knowledge of the morphological diversity of this group, which was ancestral to mammals, and of the physiology of its most derived members. These new data include the structure of the entire endocranium, of the olfactory capsules, jaws, middle ear, and other systems of organs and many features of soft tissues. For instance, theriodonts were shown to have had sensory vibrissae, and dermal electrosensory organs were suggested for some semiaquatic taxa. Comparison of different structural types within the radiation of theromorphs once again supported the important role of parallel development in the evolution of these reptiles. The impressive evidence of this pattern discovered by Leonid Petrovich includes his conclusion of the independent origin of gorgonopids on the basis of the sphenacodont type of organization and of the independent development of the middle ear in this group. The same applies to his conclusion on the independent origin of scaloposaurs and therocephals.

Numerous examples of the origin of structurally homologous organs in different lineages of reptiles that are not directly related served as a basis for the evolutionary principle of *independent homology* proposed by Leonid Petrovich. Analyzing the current state of phylogenetics, Leonid Petrovich concluded that all major methods of phylogenetics, including evolutionary morphological, phenetic, cladistic, and molecular-genetic, are valid but not perfect, because even all put together they do not resolve gaps in the fossil record and do not guarantee correct phylogenetic reconstructions.

Among the scientific achievements of Leonid Petrovich is his tremendous influence on the development of evolutionary morphology and paleontology of land vertebrates in Russia. Under his supervision a modern school of research in this field has been formed at the Paleontological Institute. This school inherited the classic traditions of A.N. Severtsov, I.I. Schmalhausen, P.P. Sushkin, and A.A. Borisyak, and is a leading paleontological school in Russia, having no equals in scientific authority, diverse research topics, productivity, and number of highly qualified specialists. It is among the best international paleontological schools. The scope of its studies is very broad and based on abundant material. The research uses classic comparative methods based on a detailed analysis of structure, development and function of objects. Specialized research includes the analysis of adaptations of land vertebrates, the study of morphological and general patterns of evolution,

analysis of diversity of early land vertebrates, recognition of stages in the evolution of faunas, biogeographic regions and animal groups, reconstruction of climates and landscapes of the past based on fossil faunas. The importance of this range of studies conducted by the school led by Academician L.P. Tatarinov and the value of the methods that they are based on are confirmed by continuously high level of publications of its scientists.

For his scientific and organizational achievements Leonid Petrovich received many state awards, including the State Prize of the USSR, the orders of "Labor Red Banner" and "For State Merit," whereas for his contribution in the international cooperation he was awarded the "Order of the Polar Star" in the Mongolian People's Republic and the Leibniz medal of German Academy of Sciences.

The personality of Leonid Petrovich is characterized by his immense life energy. When, as a result of severe illness, he suffered loss of speech, he found strength for everyday exercises that allowed him to develop new centers and links in his brain and to a large extent restore lost functions. This also concerns the restoration of his unique memory, which he is continually checking and training. It is not surprising that exceptional ability of Leonid Petrovich for individual research allowed him to develop a self-sufficient psychology. Books became the main component of his environment. Because of his phenomenal ability to digest and remember what he reads, Leonid Petrovich does not actually live with these books, but in these books, because their pages are always open in his mind. He finds his way remarkably easily in his excellent library.

Those who have frequent recent communication with Leonid Petrovich remark on his attitude to some colleagues. Quite frequently relationships with some colleagues are not perfect and suffer from a lack of understanding, but there is nothing in Leonid Petrovich's behavior that can be interpreted as annoyance. Leonid Petrovich does not avoid talking about these colleagues, but always with respect, paying tribute for their good qualities. Instead of criticism, he expresses surprise about unfortunate disagreements and sometimes even comments on his feeling of guilt. He is quite critical about his activity as a former director of the Paleontological Institute and often thinks about difficulties and mistakes that were not resolved. Remembering that time, he often refers to Ernst Mayr, who considered criticism, including self-criticism, an inherent feature of a scientist.

He talks heartily of his senior colleagues and tutors, including V.G. Geptner, who lectured him on general zoogeography, V.N. Beklemishev and his lectures on general ecology, teachers from the Chair of Vertebrate Zoology L.V. Ganeshina and N.V. Shibanov, his university friend I.S. Darevsky, paleontologists I.A. Efremov,

Yu.A. Orlov, P.G. Danilchenko, K.K. Flerov, B.P. Vjushchikov, P.K. Chudinov, and many others.

The research ability and scientific achievements of Leonid Petrovich are to a large extent determined by his massive knowledge, which allows his immense scale of generalizations and operation by the whole continuum of existing data on morphology, morphogenesis, and evolutionary history of vertebrates. For him this continuum is a solid object available for analysis and research. This global view explains Leonid Petrovich's unique potential in evaluation and interpretation of the facts observed.

Leonid Petrovich's style of work can be described using such keywords as massive knowledge, precision of analysis, clear interpretation, large productivity, and active initiation and production of new ideas. Leonid

Petrovich always remains an outstanding creative personality, who always identifies new targets for his research, confirming his unique status in Russian science. We wish Leonid Petrovich long years of creative work and fascinating new discoveries.

*A.K. Agadjanian, G.A. Afanasjeva, A.F. Bannikov,
I.S. Barskov, L.N. Bolshakova, L.A. Viskova,
V.S. Vishnevskaya, E.I. Vorobyeva, F.Ya. Dzerzhinsky,
E.L. Dmitrieva, M.F. Ivakhnenko, V.A. Krassilov,
Ya.M. Kuzmina, E.N. Kurochkin, T.B. Leonova,
A.V. Lopatin, I.V. Novikov, L.I. Novitskaya,
A.G. Ponomarenko, A.P. Rasnitsyn, S.V. Rozhnov,
A.Yu. Rozanov, B.S. Sokolov, V.B. Sukhanov,
T.A. Tumanova, M.A. Fedonkin, and M.A. Shishkin*