Tectonic School of the Geological Institute, Russian Academy of Sciences

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Abstract—The tectonic school of the Geological Institute, Russian Academy of Sciences (GIN RAS), was created in the second half of the 1930s. Its founders were Academicians A.D. Arkhangelsky and N.S. Shatsky. Three periods are distinguished in the history of the tectonic school. The first period lasted until the 1960s and was based on the geosyncline theory. The Tectonic Map of the USSR and Adjacent Territories (1956) was the acme of the scientific creative activity of this period. The second period corresponded to the 1960s and was characterized by transition to the mobilistic theory. The third period is characterized by the mobilistic theory itself. The concept of tectonic delamination of the lithosphere, which is widely claimed by geological mapping, is a great achievement of this period, which continues to the present day. The concept of involvement of the entire Earth’s mantle down to its core in the tectonosphere is developing currently. The final conclusion is that the work of the tectonic school of the GIN RAS continues in the areas of both regional and general tectonics.

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A scientific school is a community of scientists who similarly perceive the challenges facing a certain field of research and have similar views on the directions of possible solutions. The founders of a school are eminent authorities recognized in science; they create the methodological basis of the given line of research. An academic institution may belong to one scientific school, but often the number of schools increases owing to broadening of the lines of research. The Geological Institute of the Russian Academy of Sciences (GIN RAS) is a versatile institute. The tectonic school is only one, but a very significant, line of research.

The origin of this line dates back to the early 1930s and is related to the activity of A.D. Arkhangelsky and N.S. Shatsky, famous Russian geologists. The distinctive feature of the tectonic school is that consideration of tectonic processes starts from specific tectonic forms rather than from tectonic movements, which are pivotal in some new scientific schools. The approach developed by Shatsky, who became the leader of the scientific school after the death of Arkhangelsky in 1940, was directed to historical tectonic reconstructions and the modeling of tectonic movements. In fact, this approach carries on at present.

The geosyncline concept was the theoretical basis for the geological study of the Earth until the mid-20th century. At that time, the GIN was involved in extensive investigations of platforms, fold regions, and boundary zones from the Carpathians in the west to the Pacific margins in the east and from the Arctic Region to the southern boundaries of the USSR.

The performed studies advanced our knowledge on the tectonics of all of the above-mentioned categories of structures. As concerns the platforms, the principal point was their subdivision into ancient and young ones. The typical features of both platform types formed the basis of the concept of their structure and evolution.

The same is true of foredeeps, which previously did not attract attention; they are, however, very important structural forms for petroleum resources.

As concerns fold regions, their analysis in the described period did not fall outside the scope of the geosyncline theory. The most significant attention was given to the age of main folding that formed the corresponding tectonic assemblies. At present, this is a forgotten theme, but precisely this approach led to the identification of well-known tectonic epochs: the Alpides, Mesozoic, Hercynides (Variscan epoch), and others. In the author’s opinion, the confirmation of the existence of such epochs remains one of the principal achievements of geotectonics, despite the fact that the corresponding terminology is currently out of use.

The peak of tectonic studies at that period was the compilation of the Tectonic Map of the USSR and Adjacent Countries on a Scale of 1 : 5000000, which was published in 1956 and presented at the Session of the International Geological Congress in Mexico, where it generated considerable interest. The presented map became an impetus for recognizing tectonic cartography as one of the most important lines in the activity of the international geological community.
The session adopted a resolution to create the Sub-commission on Preparation of the Tectonic Map of the World under the supervision of Shatsky as president.

The Tectonic Map of the USSR and Adjacent Countries on a Scale of 1:5000000 ushered in new reasoning on regional and general tectonics. The most significant was the concept of the main tectonic asymmetry of the Earth and its subdivision into the Pacific and Indo-Atlantic segments differing in structure and geological history (N.S. Shatsky, N.P. Kheraskov, Yu.M. Pushcharovsky, and others). This concept continues to attract the attention of Russian geologists up to the present day.

It should also be noted that the first multicolored Tectonic Map of the Arctic Region on a Scale of 1:10000000 was compiled and published at that time, and the principles of the Tectonic Map of Europe on a scale of 1:5000000 were lain. The related scientific inferences were published in papers and the seminal monograph *Tectonics of Eurasia*.

The Tectonic Map of the USSR was created by the tectonic school of GIN. The concept of deep faults elaborated by A.V. Peive, a recognized tectonist from GIN, had and continues to have a profound impact on the development of tectonic ideas.

At the same period, A.L. Yanshin, who headed the Department of Regional Tectonics in GIN, developed the principle of inheritance in the evolution of the Earth’s crust.

Tectonic ideas were not stagnant in GIN. Fieldwork uncovered new facts.

It is not unusual for science that researchers may begin to sense the arrival of some change, before