

A new Permian radiolarian fauna from chert associated with limestone and basaltic rocks in the Khabarovsk Complex, Far East Russia

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Mesozoic accretionary complexes are distributed along the eastern margin of Asia. These complexes have formed as continuous belts by accretion and they are separated into several remnants by tectonic movements up to the present time. The relationship between the remnants such as the Mino-Tamba Belt and the Ashio Belt of Japan, for example, has been ascertained by similarity of lithology, tectonic structure and the combination of age and lithology. Correlative remnants to the Mino-Tamba-Ashio Belt are also recognized as the Samarka Belt in Sikhote-Alin and the Nadanhada Belt in northeast China. Farther north continuous remnants are considered to be the Khabarovsk Complex and the Badzhal Belt. Recent study focuses on more precise correlation at an intra-unit level. Even though many investigations in these regions have repeatedly proved the common association of age and lithology, Permian chert is not documented exclusively in the Khabarovsk Complex.

The Khabarovsk Complex, outcropped near Khabarovsk and on the Vandan Ridge 60km north of Khabarovsk, is occupied by melange facies and schist facies. Melange facies of the complex comprises mixed rock and blocks of basic volcanic rocks with pillow structures and altered gabbro, the lower Carboniferous to upper Permian fusulinid-bearing limestone, the lower Triassic to lower Jurassic bedded chert, the upper Triassic fossiliferous limestone associated with chert and tuff, the lower Jurassic to middle Jurassic siliceous mudstone, upper Jurassic tuffaceous mudstone, uppermost Jurassic mudstone and sandstone of the unknown age. Schist facies, in fault contact with the melange, consists of metasandstone and metamorphic rocks of greenschist facies.

We had a chance to observe the outcrop of the Khabarovsk Complex along the right bank of the Amur River near Khabarovsk. On the course of the field trip we collected chert samples at two localities: one sample was collected from a boulder of a chert bed associated with limestone breccia (Loc. 1) and the other sample was obtained from a chert bed with carbonaceous rock and basaltic rocks (Loc. 2). Both samples contain Permian radiolarians, which is the first reliable data on the Permian pelagic facies in the Khabarovsk Complex. The chert at Loc. 1 represents a sedimentary contact with fusulinid-bearing limestone breccia and the chert at Loc. 2 overlies the carbonaceous rocks on the basaltic rock, suggesting that fusulinid-bearing limestone deposited on the shallow portion of a basaltic raise without terrigenous input and limestone-breccia occasionally flowed into the depositional depth of siliceous material on the basaltic rock in the Permian time.

Similar mode of occurrence described above is well documented, for example, in the Funabuseyama Unit of the Mino-Tamba-Ashio Belt. The new data on the Permian sequence of the Khabarovsk Complex with previous studies strongly supports the hypothesis of the possible relationship with the Mino-Tamba-Ashio Belt.

Other character for the Khabarovsk Complex is the presence of the metamorphic rocks. It is correlated to the Ariadne Formation of the Samarka Belt. The Ariadne Formation is indicated the lithologic similarity with the Udeka and Sebuchar Formations correlative to the Ultra-Tamba Belt. Our observations also verified the distribution of phyllite or crystalline schist which is metamorphosed from greenish gray calcareous sandstone and the fine-alternating beds of sandstone and mudstone, whose character is similar to those of the Hikami Formation of the Ultra-Tamba Belt. The lithostratigraphic features and the age associations of the Khabarovsk Complex are suggested the presence of the correlative lithology to the Ultra-Tamba Belt as well as the Mino-Tamba-Ashio Belt.