Orogenic gold deposits of Kolyvan-Tomsk folded zone, western Siberia, Russia*

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The Kolyvan-Tomsk folded zone (KTFZ) is located in the southern part of western Siberia, Russia, and within the northern part of the major Ob-Zaysan folded system, which includes the Irtysh shear zone extending from Eastern Kazakhstan through Xinjiang, China, to NW Mongolia. The Ob-Zaysan fold system is a fragment of a large Altai collision system, formed in the Late Paleozoic - Early Mesozoic evolved as a single large tectonic unit of the Altai collisional shear system.

Main faults of KTFZ control the structure and spatial arrangement of intrusive complexes and associated mineral deposits. The main type of gold deposits is orogenic gold deposits, usually with late antimony mineralization. In general, these deposits are hosted by carbonaceous terrigenous sedimentary rocks enriched with sulfides. The largest and well-studied of the known orogenic gold deposit of KTFZ is Legostaevskoe with an inferred resource of 173 metric tons of gold at the average grade of 3.5 g/t. It is located at the junction of Hercynian KTFZ and Caledonian Northwest Salair geological structures. Localizations of ores are controlled by faults. According ground magnetic survey under Legostaevskoe two granitoid bodies were determined. Some geologists believes that mineralization is associated with these granitoids. Ore minerals include pyrrhotite, arsenopyrite and pyrite, rarely galena, sphalerite, antimonite, fahlore, and native gold. Telluride of bismuth and silver were discovered by the authors of this study.

In addition, there are a number of small deposits and occurrences such as Baturinskoe, represented by a series of quartz veins and veinlets (stockworks), confined to mineralized crash zones at the sandy-shale sedimentary series. The main ore mineral is auriferous arsenopyrite. Inferred resources are estimated at 12 tons of gold at an average grade of 6.7 g/t. The Larinskoe occurrence is spatially associated with dikes of diabase-monzonite composition, represented by quartz veins and mineralized fracture zones. The gold content in the dike and its altered contact with sulfidized black shale varies from 0.4 to 40 g/t. The auriferous antimony occurrences Semiluzhinskoe, Kamenkoe, Mezhovsky are associated with sublatitudinal mineralized tectonic crush zones, related with regional thrust of northeast strike in Lower Carboniferous carbonaceous clay-shale.

The age of mineralization at Baturinskoe is 281.7 ± 4.2 Ma (Ar-Ar isochrone, sericite). So geological structure of gold deposits of KTFS, structural position of mineralization, its mineralogical and geochemical characteristics, and age are similar to the largest orogenic gold deposits of Central Asia, such as Bakyrchik in Eastern Kazakhstan, Muruntau in Uzbekistan, and Kumtor in Kyrgyzstan. The age of most of orogenic gold deposits of Central Asia (as well as Ni-Co-As and Cu-Ni-Pt deposits) fits into a rather narrow time interval of 285 ± 5 Ma.
Thus, given the similarity of metallogeny and granitoid and mafic magmatism between KTFZ and main ore regions of Central Asia and the presence of carbonaceous terrigenous series, which are required as host rocks for the formation of orogenic gold deposits, the Kolyvan-Tomsk folded zone is promising to discovery of new large gold deposits of orogenic style.