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## **TYPOMORPHIC PECULIARITIES OF PLACER GOLD FROM ALLUVIUM OF THE CHORNYI CHEREMOSH-RIVER LEFT TRIBUTARIES**

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Typomorphic features of native gold from alluvial deposits of the Chornyi (Black) Cheremosh-river left tributaries are characterized. Major morphological types of native gold have been distinguished and the main sources of placer gold have been identified.

*Key words:* native gold, morphology, chemical composition, alluvial sediments, Chornyi (Black) Cheremosh-river, Ukrainian Carpathians.

Chornyi (Black) Cheremosh is the river in the Ukrainian Carpathians within Verkhovyna district of Ivano-Frankivsk region. Black Cheremosh-river originates in the North-Eastern slope of the Chyvchyny Mountains which are the part of Maramorosh massif of the Ukrainian Carpathians. Alluvium of the Black Cheremosh-river everywhere is gold bearing in varying degrees. The river has numerous tributaries. Most of the left tributaries of the Black Cheremosh-river are also gold bearing [1, 2].

Gold-bearingness of the left tributaries alluvial deposits has been studied sporadically. We have a little information about typomorphic features of native gold. Investigations usually have been carried out only in certain areas and tributaries of the Black Cheremosh. Significant contribution to the research of gold mineralization areas and typomorphic features of native gold in different years belongs to S. Byzova, V. Grytsyk, Ye. Grytsyk, G. Dosin, V. Kardash, V. Kvasnytsya, M. Kovalchuk, O. Matkovskiy, G. Sakseyev, V. Salnikov, L. Figura, S. Yablokova and others.

We analyzed typomorphic features of native gold from the streams Chemurnyi, Lostun, Albyn, Dobryn, Pryluchnyi, Dzembronya, Bystrets, Iltsya.

Gold-bearingness of the left tributaries of the Black Cheremosh-river is determined mainly by gold-bearingness of the rocks, which they destroy. The left tributaries of the Black Cheremosh drain the rocks of metamorphic complex (from Chemurnyi-stream to Lostun-stream), Soimulska suite (stream Lostun), Cretaceous flysch (Popadynets, Albyn, Dobryn, Pryluchnyi, Dzembronya and partially Bystrets) and Palaeogene flysch (stream Iltsya).

The streams Chemurnyi, Lostun, Popadynets, Albyn tryout transverse crushing zones, which are the branches of the deep fault zones of the main "Carpathian" direction and in which the hydrothermal mineralization has been identified. The presence of hydrothermal mineralization in zones of crushing is confirmed by the presence in alluvial deposits of barite, galena,

sphalerite, cinnabar (associate with gold), and quartz blocks with pyrite and arsenopyrite. In addition to these minerals, rutile, scheelite, malachite, cuprite associate also with gold in alluvium of the metamorphic rocks development areas, and native copper and native lead – in the placers of Soimulski conglomerates spread. Native silver has been found in alluvium of the effluent of the Black Cheremosh. The largest grains of gold in alluvium of Popadynets-stream have been discovered near the outcrop of acid intrusion, which breaks the rocks of Rakhivska suite.

In the alluvium of Chemurnyi-stream the gold is represented by octahedrons, cube-octahedrons, poorly rounded elongated thick-tabular, rounded thick-tabular, table-like, wire-like and cloddy grains. The surface of gold is mostly dull, pitted-hilly, shagreen, corroded, with numerous imprints of the other minerals faces. Gold with the traces of mechanical bending of projections happens.

Gold from the alluvial deposits of Lostun and Albyn-streams is similar in morphology to the gold from the alluvium of the Chemurnyi-stream. Elongated thick-tabular and cloddy grains dominate. Grains are more rounded (compared with the gold from the Chemurnyi-stream alluvial deposits), in particular, rounded growths of gold crystals have been found.

The rounded-plate gold with imprints of other minerals faces on the surface prevails in the Dobryn-stream alluvium.

In contrast, polymorphic gold grains of irregular and exotic forms are characteristic for the alluvial deposits of the Pryluchnyi-stream.

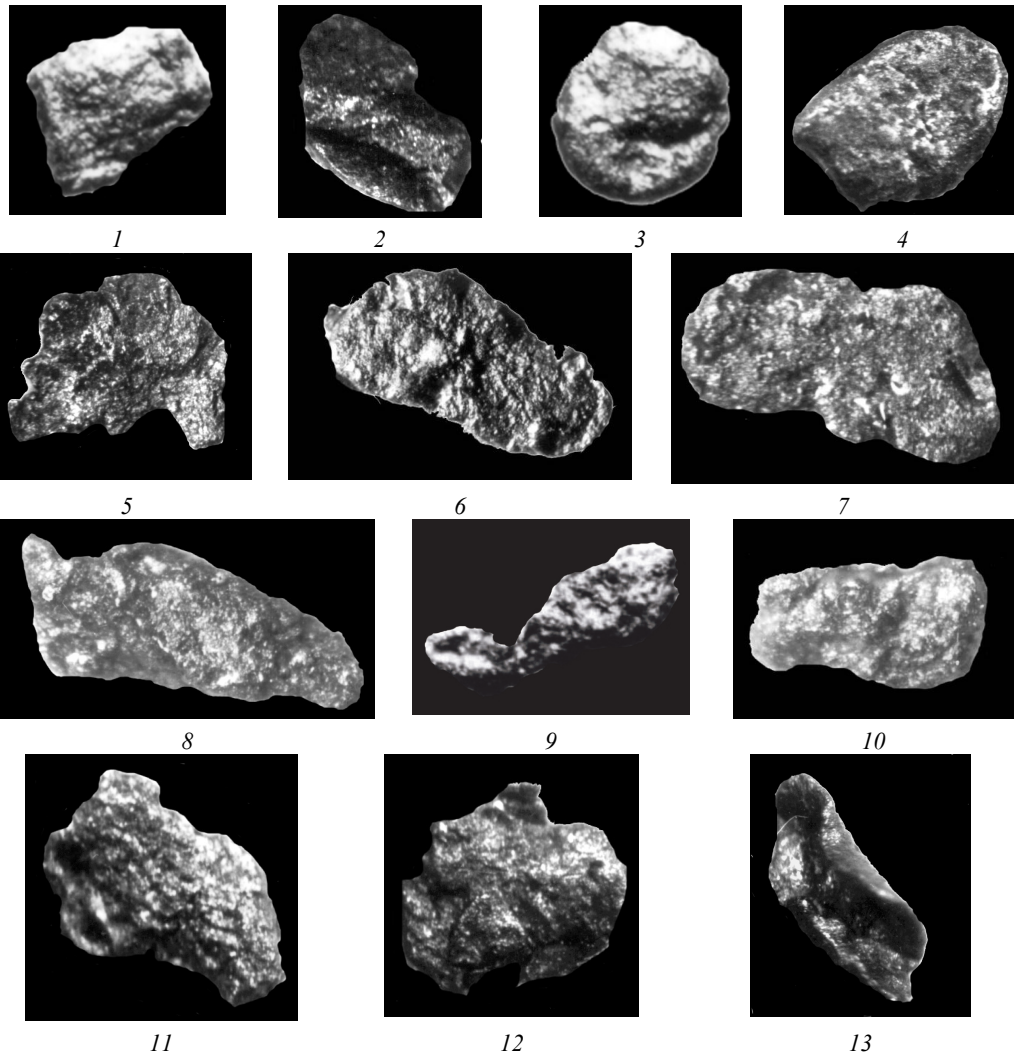
Jointed round-plate and elongated-plate, short-columnar gold grains and geniculate growths are presented in Dzembronya and Bystrets alluvium deposits, as well as the grains of gold, which have kept the ore state.

Round- and elongated thick-tabular, round-tabular, elongated plate gold has been discovered in Iltsya-stream alluvium. Grain edges are rounded, truncated-rounded, some of them are recurvate. Gold grain of cigar-shaped form has been discovered, it is wrapped in a “shirt” made of gold of scaly-like form. Same grain of gold we found in alluvium of Black Cheremosh-river near the Burkut-village. Gold from the alluvial deposits of the Iltsya-stream is characterized by mechanical twisting, bending of edges and projections, rolling and repeated bending.

Gold has complex, heterogeneous structure, even within the same grain. For example, the surface of gold grains from the alluvial deposits of the middle course Black Cheremosh-river left tributaries is presented by numerous crystallites mostly 0.2 to 0.5  $\mu\text{m}$ . Small crystallites fill the interstices between the larger. Individual crystallites are composed of several subparallel growths. The predominant form of crystallites is rhombic dodecahedron, subordinated – octahedron. The surface of most crystallites is uneven, with traces of etching [2].

The presence in placer gold of high fineness margins and structures of recrystallization indicates the existence of periods of calm (conservation in alluvium), during which the gold has been seized from the process of sedimentogenesis (intermediate collectors, and the intervals associated with icing).

As you can see, the native gold from the alluvial deposits of the Black Cheremosh-river left tributaries is characterized by asymmetry of shapes and asymmetry of the surface topography (see Figure). Only a small number of gold grains has retained ore state. In most grains the form purchased in exogenous conditions.



The morphology of the gold grains from the alluvial deposits of the Black Cheremosh-river left tributaries (photo of grains from the collection of V. Kardash, edited by the authors):  
 1, 2 – three-dimensional-table; 3 – round-plate; 4 – elongated thick-plate; 5 – plate with rounded-cut edges; 6–8 – elongated-plate; 9, 10 – three-dimensional-elongated; 11, 12 – cloddy; 13 – plate with twisted edges.

It was found that in alluvium of the streams, draining the rocks of metamorphic complex and Soimulski conglomerates, a significant number of grains has a three-dimensional shape, including a certain number of grains which is represented by forms with crystallography facet.

In the alluvium of the streams, which eroded Cretaceous and Palaeogene flysch, two-dimensional grains dominate and hypidiomorphic grains have subordinate importance. The most rounded and mechanically deformed gold we found in alluvium of the Iltsya-stream, which may indicate a priority of its receipt from secondary collectors.

The size of the gold grains range from 0.01 to 3.0 mm. We fixed the gold of low (550–600), medium (600–780), high (907–950) and very high (990) carat.

High-carat and the very high-carat gold we associate with the rocks of the metamorphic complex, low-carat – with Neogene volcanic rocks, while medium and high-carat – with hydrothermal formations in the rocks of Soimulska suite and Cretaceous-Palaeogene flysch. Note that some of the gold grains have been introduced in the alluvium from intermediate collectors.

Thus, the sources of gold the Black Cheremosh-river left tributaries are such:

1) the rocks of the metamorphic complex with ore manifestations of pyritaceous-polymetallic formation with native gold and silver. The ore bodies form mostly concordant with schistosity lenses or disseminations among chlorite-sericite-quartz, sericite-quartz-feldspar, in places carbonaceous schists and metavolcanic rocks of acid composition (Berlebaska suite). Within the ore formation the manifestations of vein (the manifestation Lostun) and stratiform types are discovered (the manifestations Albyn, Dobryn);

2) intermediate collectors of Soimulska suite with synsedimentary and superimposed mineralization (hydrothermal mineralized zones in tectonic fractures and their intersections);

3) hydrothermal mineralized zones in the Cretaceous-Palaeogene flysch;

4) Neogene volcanic rocks, which break through the rocks of Rakhivska suite [2].

Polygenic and multi-temporal genesis of the gold, discovered in alluvium of the Black Cheremosh left tributaries, reflects in the morphology, internal structure and chemical composition of native gold. The actual material and the situation of gold mining in Ukraine give the possibility to make the conclusion about the need to draw attention to gold-bearingness of Black Cheremosh-river, its left tributaries and areas of denudation of the modern streams. It is necessary to resume the works on identifying and delineating the original sources of placer gold and the audit of the streams gold content.

#### REFERENCES

1. Kovalchuk M. Gold from the sedimentary complexes of the Ukrainian Carpathians / M. Kovalchuk // Mineralogical Review (Mineralohichnyi Zbirnyk). – 2002. – N 52, Is. 1. – P. 74–82 (in Ukrainian).
2. Figura L. A. Lithology and gold-bearingness of Quaternary alluvial deposits of the Black and White Cheremosh-rivers basin: Thesis for Candidate's Degree of Geological Sciences / L. A. Figura. – Kyiv, 2008. – 173 p. (in Ukrainian).