

# THE DISTRIBUTION OF GOLD IN THE RECSK ORE COMPLEX, HUNGARY

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**Abstract:** Gold forms important mineralizations in the volcanics of the upper levels of the Recsk ore complex. Gold was also found during several short programs in different geological environments related to the porphyry intrusives beneath the volcanics. Significant gold enrichment was found in the copper porphyry ore zones and in the skarn copper ores. Several other environments have promising, but sporadic gold data.

**Key words:** Recsk, gold, epithermal, mesothermal, ore mineralization

## Introduction

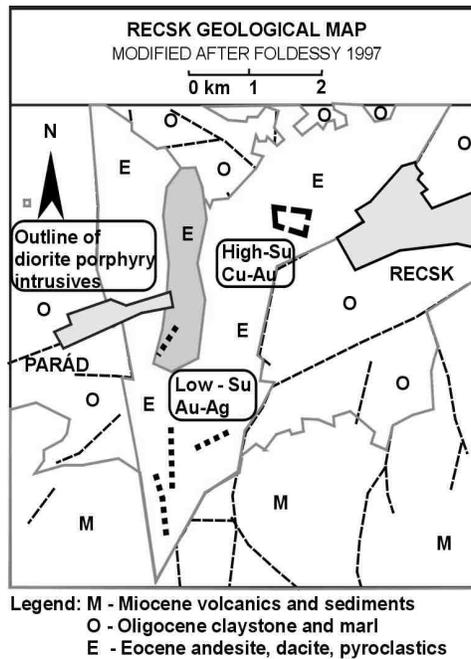
The Recsk ore complex is known as host of major porphyry and skarn copper mineralization (Baksa et al 1980) and significant high-sulphidation Cu-Au mineralization (Foldessy 1997). One of its major components is gold, which is present in several geological environments within the complex and its distribution is summarised here.

## Geology of the Recsk ore complex

The Recsk area is part of a chain of Eocene volcanics. The Recsk area lies in a major displacement zone, the NE-SW trending Darnó zone, in the continuation of the Balaton-line.

The main controlling structure of the Eocene igneous activity was a pre-existing N-S shear zone in the axis of an older horst structure.

The oldest known formations in depth are Triassic carbonate and siltstone-shale sediments. These are overlain by a thick sequence of andesite-dacite volcanics with marine sedimentary intercalations. Oligocene claystones, marls, reworked tuffs form the immediate cover. Miocene volcanics and sediments are the youngest formations in the south (Fig. 1).



**Fig.1.**

The Eocene volcanic sequence consists of three major units. The lowermost (southern) one is built of submarine andesite flows. The second unit includes dacite flows, pyroclastics, extrusives in the central parts. The third (northern) unit is composed of andesite, andesite breccia and andesite subvolcanites, late extrusive domes, dikes plugs. Reworked tuffs, marls, sandstones, reef limestone represent the top part.

The volcanics are genetically linked to a series of diorite and quartz-diorite porphyry intrusives in the depth. These intrusives form five independent centers along a N-S line. The intrusives have a time sequence, with at least three major stages of emplacement. A wide metasomatic alteration zone with internal endoskarn-exoskarn core has formed along the contact of the intrusive bodies (Baksa et al 1980).

### **Hydrothermal alteration and ore mineralization**

Intensive hydrothermal alterations have been developed in both the volcanic centers and intrusive environments. Around the volcanic centers of the third stage andesite advanced argillic alterations are coupled with high-sulphidation epithermal Cu-Au

mineralization. In the southern vicinity of these zones peripheral quartz-adularia alteration is linked to low-sulphidation vein-type mineralization.

In the intrusives the central and deepest core show secondary phlogopite-epidote enrichment. This zone is surrounded by a quartz-sericite zone and an outer propylitic zone. In the carbonate environment endoskarns (dominantly amphibole-garnet-epidote) and exoskarns (mainly diopside-garnet) have developed. The skarns have undergone retrograde low temperature hydrothermal alterations, with development of magnetite-serpentine-anhydrite assemblages (apuskarn) (Csillag 1975). In the non-skarn sedimentary environment argillitization and silicification is recorded. The porphyry intrusives host disseminated Cu-Mo mineralization which grades into Cu-skarn mineralization in the retrograde skarns and exoskarns. Peripheral to this mineralization massive Zn-skarn ore has developed while along limestone-shale/siltstone contacts metasomatic Zn-Pb ore mineralizations have formed.

### **Investigations of gold distribution**

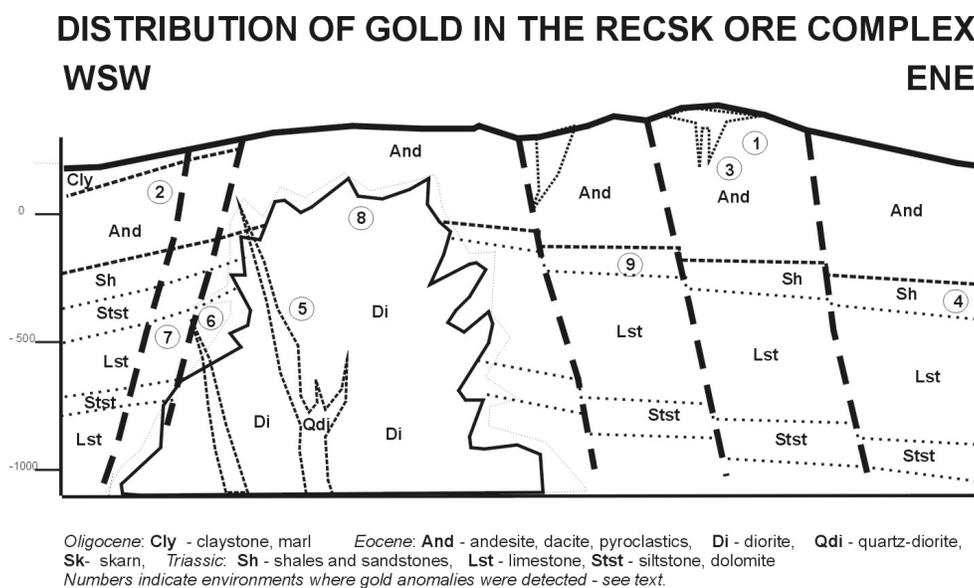
It was known from mining records, that the ores in the old Lahoca copper mine contain gold. This gold content was not considered as having economic value until the end of mine production in 1979. The Lahoca was re-evaluated in 1990-94 and its high potential to detect gold mineralization was indicated upon the geological analogies with epithermal models. A 3-years exploration programme with 69 drillholes, 10,000 assayed samples verified the presence of this mineralization during 1994-1997.

The same explorations have been extended to the connecting epithermal low-sulphidation mineralizations. In this area surface mapping, soil geochemistry, trenching, 4 drillholes, 35 shallow percussion holes were made and, 2600 samples were taken.

During the porphyry and skarn mineralizations the copper-rich intervals were assayed for Au, but the original assays proved to be unreliable by later control programmes. Several limited-scale resampling campaigns were performed between 1990 and 1998. These remained unpublished, and their first summary is given in the present. A continuous block of the higher grade porphyry copper mineralization was assayed for gold in 10m composite duplicates of underground drillhole samples (550 assays) by a

Canadian company. The largest Cu-skarn orebody was resampled and assayed for gold in the Hungarian Geological Survey (146 samples). Several series were re-assayed by the Enargit KFT from: Triassic shales and siltstone sediments (20 samples), pyrite enriched zones of the porphyry intrusives (34 samples), Cu- and magnetite skarns (15 samples). The MAFI has taken 82 samples from Triassic limestone-dolomite lithologies.

### Gold in the epithermal zone



*The numbers show the position of the geological environment on **Fig 2**.*

(1) *High-sulphidation Au-Cu mineralization* is formed in three different environments

- hydrothermal explosive breccias
- contact zones of stratovolcanic andesites with andesite pipes
- intrusive breccia pipes

The gold occurs dominantly in pyrite, less frequently in native form, or as electrum. It is associated with enargit, luzonite, tellurides, Bi, Se sulfosalts. The mineralization forms large orebodies, 36,5 M mt 1,45 g/t Au grade ore was defined in the Lahoca area.

(2) *Low-sulphidation Au-Ag mineralization* occurs in

- quartz adularia veins
- intrusive breccias

The gold is dominantly free gold, and associated with tetrahedrite, galena, sphalerite, chalcopyrite, Au-Ag tellurides. Gold values reached 7,1 g/t in the oxidized zone, 1,2 g/t in the primary zone.

(3) *Feeder zones* probably connect the epithermal environment with the underlying deeper horizons. One possible feeder zone was intersected between the Lejtakna orebody and the deeper porphyry copper mineralization. In two intersections 5-25 g/t grade ore intervals were recorded in breccia veins.

(4) *Sediment-hosted mineralization*. Gold was recorded in Triassic shales in a stratigraphic borehole (Rm-118) 5 km north of the Recsk ore complex (Korpas et al 2000), during the Carlin-gold programme of the MAFI. The Au anomaly (max 0.34 g/t Au) is linked to elevated values of Hg, As, Sb.

### **Gold in the mesothermal zone**

(5) *Porphyry copper mineralization* zones were re-assayed and interpreted for gold. Contrary to the earlier results, high Au values were found in the majority of the 550 tested samples. The average of the 550 samples (representing 5500 sample meters) reached 0.3 g/t. Moderate correlation coefficient was found between the Au and Cu values.

(6) *Cu-skarns* were investigated by 960 duplicate samples from the largest skarn orebody on the –700 level. The results have proven the elevated Au content of the high-grade (> 2.0 % Cu) zones (1,1 g/t Au average, max 9 g/t). The Au content seemed to correlate with Cu content and magnetite content of the ore.

(7) *Zn-skarns* were assayed in the drillholes of surface copper explorations. Significant gold anomaly was found in two drillholes (Rm 33, Rm 39, max 2,8 – 3,5 g/t Au).

(8) *Siliceous cap of the porphyry intrusives* were checked for gold by 25 assays. The values remained below 0,1 g/t, except for one drillhole, Rm 93, with max 0,4 g/t values in one short interval.

(9) *Carbonaceous shales and siltstones* in the vicinity of the largest intrusive body were investigated by 34 samples from surface drillholes. Two anomalies were detected, with max. 0,2 g/t Au value.

## **Conclusions**

The Recsk ore complex contains gold in several formations, many of them is not studied in details. Gold is found in both intrusive and sedimentary environments, and linked to both the copper and zinc mineralizations. The epithermal types of gold mineralization are known in great details in the near surface occurrences. The genesis, time and temperature relationships of the precious metal mineralization in the mesothermal environment needs further research.

## **Acknowledgements**

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