Cu-porphyry and Au-epithermal systems in Golden Quadrilateral, Romania. Sofia University SEG Student Chapter field trip 2015

Cu-порфирни и Au-епитермални системи в района на „Златния четириъгълник“, Румъния. Екскурзия на студентската секция на Софийския Университет към Асоциацията по икономическа геология – 2015

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The Sofia University SEG Student Chapter has organized a four-day field trip to Romania at the beginning of October, 2015. The main purpose of the trip was to contribute the students to understanding of main geological characteristics of the Golden Quadrilateral region (South Apuseni Mts.), and to provide the specifics of its exploration, geological features and mining history. Our trip leader was Assoc. Prof. K. Bogdanov from Sofia University.

We have visited four deposits/prospects located in Golden Quadrilateral region. The geological setting of the area is closely related to the Alpine evolution of the Tethys and associated with the Mesozoic–Tertiary tectonomagmatic events in the South Apuseni Mts. The early magmatism is represented by subduction of Middle Jurassic–Lower Cretaceous island arc ophiolite-granitoid assemblages (Nicolae, Saccani, 2003). The subsequent magmatic event yielded an Upper Cretaceous diorite-granodiorite association (banatite) association. After the closure of the Transylvanian-Tethyan Ocean and the Tisian-Dacian collision, the architecture of the South Apuseni Mts. underwent minor or incipient extensional tectonics during the Tertiary. The north-eastward escape of the Pannonian region during the Oligocene–Miocene times, coupled with clockwise rotation, involved the South Apuseni realm (i.e. Tisia-Dacia Block of the Inner Carpathians), and resulted in retracting subduction in the Outer Carpathians. These events are considered to be responsible for such extensional back-arc setting and associated with an extensive Neogene magmatism and metallogenesis (Balintoni, Vlad, 1998).

First we have visited Rosia Poieni open pit (Fig. 1), which is the largest Cu-Au porphyry deposit in the Apuseni Mountains. It is located 80 km north of the city of Deva. The Rosia Poieni lies ~4 km ENE of the Rosia Montana intermediate sulphidation Au-Ag deposit. Both deposits are considered to be related to the porphyry systems in which the mineralization and hydrothermal alteration are spatially linked to the Fundoaia intrusion. The ore occurs as dissemination in pervasively altered rocks, within veins and fractures, forming well-developed stockwork in the potassic zone of Fundoaia porphyric subvolcanic body. Measured and indicated resources in the Rosia Poieni are 431 Mt 0.55% Cu, 0.25 g/t Au (Kouzmanov et al., 2005). It is explored down to 1200 m in depth. According to drilling and underground data, the ore body has elliptical shape with a maximum extension at the +550 m level. At least 90% of the disseminated porphyry copper grade mineralization is located in the Fundoaia subvolcanic body, extending beyond it only locally. Copper grades are roughly concentric in pattern, decreasing toward the margins of the intrusion.

Fig. 1. Rosia Poieni open pit

The Cu-richest zone (0.7–1.4% Cu) was observed between the altitude of +200 and +800 m.

The Rosia Montana Prospect (Fig. 2) is a low- to intermediate-sulphidation Au-Ag epithermal gold deposit (Sillitoe, 2010) situated ~4 km WSW of Rosia Poieni, and 80 km from the city of Deva. The local geology is represented by diatreme-maar complex, consisting of tuffaceous vent breccia, which has a surface expression as an irregular shape with lateral dimensions in excess of 2.5 km and several, mostly dacite-dominated, mineralized breccia pipes. Ore in the area comprises veins, disseminated sulphides, stockworks and breccia fillings. Grades vary between 0.5 and 2.0 g/t Au, with some localised gold grades of over 30 g/t occurring in veins and breccias. The two largest ore bodies are characterised by finely disseminated pyrite within porphyric dacite.

The Certej Au-Ag deposit is located 20 km from the city of Deva. Geology of the deposit is represented by Neogene magmatic formations that consist of volcanic features: composite volcanoes, volcanic necks, lava flows, subvolcanic bodies and volcaniclastic sequences. Most of the rocks occur along a general NW–SE oriented structural trend which follows the orientation of the extensional basins formed along the western part of the Apuseni Mountains. The main ore minerals found in the Certej mineral deposit are: pyrite, marcasite, pyrrhotite, Cd-rich sphalerite, greenockite, Ag-rich galena, chalcopyrite, tetrahedrite-tennantite, arsenopyrite, bournonite, boulangerite, meneghinite, stibnite, mackinawite, native gold, electrum and tellurides (kostovite) (Udubaşa et al., 1979, 1992).

During the last day we have visited Rovina Valley prospect (RVP), which is located ~15 km from the Certej deposit. It includes two open pits (Rovina-Remetea and Colnic) and one underground mine (the "Blind" Ciresata – V. Garzii). The mineralization is hosted by feldspar-amphibole diorite porphyry complex and it is represented by quartz-magnetite-pyrite-chalcopyrite stockwork, with typical grades that range between 0.1–1.0 g/t Au to 0.3–5.0 g/t Au, and up to 0.4–0.6% Cu at the different parts of the RVP.

The Gold museum in Brad gathers in its showcases, over 1300 exhibits of unique native gold samples. About 80% of the samples come from the Brad – Ruda, Musariu, Mill Valley and Brădişor area, and they are displayed exactly as they were removed from the underground. Specialists claim that proofs exists, according to which, in the "Barza" Mine was produced about one percent of the amount of gold existing in the world.

Fig. 2. Sofia University SEG Student Chapter at Rosia Montana deposit

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