1. Introduction

The Golden Quadrilateral in the Metaliferi Mountains (South Apuseni Mountains) represents one of the richest gold provinces worldwide, concentrating on an area of about 5000 km² as 64 gold deposits and prospects (Fig. 1.2). The mineralization, related to Musaianic subvolcanic bodies, consists of epithermal veins and stockworks, partly accompanied by Cucu-Musuian alteration systems. Telturium and Au-Ag tellurides occurrences are typical, being scattered in about one third of the mined area. It is also a province that the element tellurium was discovered, as well as this type location of 12 tellurium mineralizations, out of which those from Musariu, Elena, and Ilietp lived (Bindi & Cipriani, 2004) and altaite (Nagy et al., 2004).

2. The Musariu orefield

Musariu is located in the westernmost Brad-Săcel-Rădăceni district of the Golden Quadrilateral, lying in the western part of the Deux Fili - Cândealul fault zone. The geodynamic and magmatic setting comprises a continental collision between the Ihering terrane (Bucovina) and the Musaianic terrane (Transylvanian) at about 50-45 Ma. The Musariu deposit (Fig. 3) distinguishes itself by remarkable native gold, tellurium and altaite veins, displaying complex assemblages with tellurate minerals (Fig. 4). The ores are formed by vein mineralization dominated by abundant native tellurium and altaite deposition, the vein material often consisting of coarse-grained, cleavable masses reaching several centimetres in width. Bäuerle & Daniel (1980) described an excess Te silver telluride associated with altaite and frohbergite, while Ciobanu et al. (2007) reported Bi-tellurides such as rucklidgeite and tellurobismuthite.

3. Mineral assemblages and depositional sequence

The Musariu deposit displays complex assemblages and evolution, dominated by prehnite tellurium and altaite deposition. In two depositional stages bracketing this main episode we identified unusual mineral phases of previously unreported compositions. The veins in the Musariu deposits are composed of ores containing pyrite, altaite and quartz. Pyrite-quadriagglomerations contain rucklidgeite grains immediately postdating pyrite, associated with frohbergite, magnetite and altaite. Pyrite containing tellurium associated with pyrite and frohbergite.

The tellurium vein filling is caused by prehnite, typically containing altaite (idiomorphic inclusions). The latter assemblage is phase C described by Cook et al. (2007) and equivalent "jolotcaite" of composition (Bi, Sb) Te . Related compounds are rucklidgeite, empressite (0.2 p.f.u.) are identifiable in the clusters plotted in Fig. 10. The excess-Te silver tellurides, given their optical similarity with empressite coexisting with a derivative of empressite.

4. Mineral compositions

The mineral compositions are fairly constant for most of the phases, including tellurides derivatives and early silver tellurides, but may show significant variations near late-stage empericite-like tellurides (Tab. 1). A few compositional features are clearly distinguishable in Fig. 5.

5. Interpretations and conclusions

The association, optical properties and chemical composition of phase SbBiSe, indicates a chalcopyrite-excess significance to the compositional sequence (Bi, Sb) Te . Related compounds are not quantitative, phase C described by Cook et al. (2007) and equivalent "jolotcaite" of composition (Bi, Sb) Te . Related compounds are not quantitative.

The excess-Te silver tellurides, given their optical similarity with empressite, are most likely derivatives of this mineral. As for the early silver tellurides, it is supposed that the Musariu deposit has two neighbouring Te1 atoms, forming together a Te1 group identical to the structure of the Bi-Sb-Te compound, allowing that excess Te1 to be accommodated as a tellurium in the second layer of the Te1-Tes phase (Fig. 11). One additional double Te layer would result in the composition AgTe , while two layers would yield the composition AgTe . In the compositions analyzed in the Musariu material composition AgTeX (TeX ) is frequent, while assemblages AgTeX , AgTeX , and AgTeX are not recorded. In the electronic data cluster only AgTeX associated with AgTeX corresponding to 0.19 vacancies per formula unit. Similarly, vacant compositions derived from AgTeX (0.33 p.f.u.) and mean from compositions (0.3 p.f.u.) are not identical in the clusters plotted in Fig. 10.

Acknowledgements: Supported by the Romanian Executive Unit for Financing Higher Education and Research (UEFISCDI), grant PN-II-ID-PCE-2011-3-0030.