DEVELOPMENT OF GREISENIZATION AT THE HORNI SLAVKOV SN-W DEPOSIT (BOHEMIAN MASSIF)

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The Sn-W ore deposit of Krásno near Horní Slavkov is genetically and spatially related to granites of the Younger intrusive complex in the sense of LANGE et al. (1972), which is represented here by the partial Krudum massif. Granite cupolas comprising the youngest granites of the Krušné hory batholith occur on the eastern slope of this massif below country rocks comprising metamorphics of the Slavkov gneiss block. They are alkaline-feldspar (lithium-topaz) granites of the Čistá type which form between Horní Slavkov and Krásno a complex cupola occurring nearest to the present-day surface in the granite stocks of Schnöd and Huber. The group of the Schnöd and Huber stocks is one of the largest granitic structural highs in the Saxo-Thuringian zone that has been mined for several centuries for disseminated, greisen-type Sn-W ores.

Intrusion of the granite stocks was accompanied by an intensive outward forcing of lithologically favourable rocks, mainly of the migmatized paragneisses of the Slavkov gneiss block. Intrusive breccias occur in the upper part of the Huber stock being cemented by albite-topaz fine-grained granites comprehensively described by JARCHOVSKÝ & PAVLŮ (1991). The occurrence of fine-grained granites along with the occurrence of two phases of alkaline-feldspar granites (commoner medium-grained facies and the less represented, fine-grained porphyritic one) argues for a larger number of partial phases within the intrusion of albite-topaz granites that represent the youngest extensional phase of Variscan granitoid magmatism of the Bohemian massif.

The occurrence of Sn-W mineralization is controlled by the course and shape of the granite-gneissic country-rock contact. The highest concentrations of ore mineralization occur, with some exceptions, mainly in the greisens, less frequently in the highly greisenized and argillitized granites. The Sn-W mineralization can, as to its morphology, be subdivided into the disseminated-type mineralization, ore pockets and quartz-vein infills.

All the granite types are affected in area of the Huber and Schnöd stocks by more or less intense greisenization and argillitization. The greisenization is reflected by the increase in content of topaz and lithium mica at the expense of feldspars. The argillitization has affected some of the greisenized granites, particularly those in the upper part of the Huber stock and it is manifested by an increase in occurrence of clay minerals (kaolinite, muscovite, minerals of the smectite group or mixed layers). A considerable portion of the alkaline-feldspar granites is also affected by feldspathization of varying intensity. Besides albite and potassium feldspar, these rocks contain a minor amount of lithium mica. Quartz, topaz, apatite and scheelite appear in accessory amounts in the feldspathized rocks or even feldspathites. Banded lithium-topaz granites with the bands consisting of albites and a minor proportion of potassium feldspars have been found near the contact with the gneissic country rocks. As to the age of individual alterations, feldspathitization is the oldest and argillitization the youngest post-magmatic alteration. Most of the greisens probably predate the intrusion of the youngest alkaline-feldspar, fine-grained granites of the intrusive breccias, in which they occasionally occur as angular xenoliths.

The greisens are mainly represented by topaz-mica to mica-topaz greisens. The topaz-quartz, mica-quartz and mica greisens are less frequent. According to their grain size, they can be subdivided into fine-grained and medium-grained greisens, the latter, nevertheless, predominate. The topaz-mica to mica-topaz greisens are massive, white-grey rocks with macroscopically distinguishable, up to several mm-sized grains and aggregates of quartz, topaz and lithium-mica plates. Genetically, the greisens can be subdivided into greisens I and greisens II. The former form bodies of various size and their grain size depends on that of the parental granites. The greisenization I brought about a gradual increase in the proportion of quartz and topaz and gave rise to large plates and platy aggregates of lithium micas. The greisenization II can be observed only in places where it progressed along fissures and quartz veins, giving rise to greisens surrounding the veins. Microscopically, it can be proved by the arrival of a new generation of topaz, micas and apatite. The origin of the topaz-quartz greisens and ore pockets may be attributed to greisenization II.

An important vertical zoning has been distinguished in the development of the granite stocks. Apical part of the Huber stock consists of quartz or quartz-topaz greisens and of intrusive breccia cemented by lithium-topaz, fine-grained granites. It is also marked by frequent occurrence of sulphide mineralization with abundant Cu, Zn, As, (Mo, Bi) and Sn-sulphides. The quartz-topaz greisens pass downwards into the topaz-mica ones. Deeper portions of the Huber stock consist of medium-grained alkaline-feldspar granites with minor occurrence of greisenization. Irregular horizons of feldspathites and of markedly feldspathized granites occur at places in these portions of the stock.

Microscopic study of fluid inclusions has proved homogenization temperature of the primary inclusions in cassiterite to be 380 °C. Interpreting the pressure values and assuming a closed system, then the mineralization depth can be put at a level of 960 m. Even the occurrence of intrusive breccias may attest to this rather shallow depth, since they must have been generated relatively close to the surface. The homogenization temperature of quartz determined by acoustic method has proved the maximum homogenization at a level of 370 °C. Acoustic method has detected high homogenization temperatures in apatite and topaz of 500 - 600 °C. This temperature could correspond to that of the high-temperature fluid inclusions detected very rarely in cassiterite (0.67 % of all inclusions out of the total number of 297 investigated inclusions). The temperature at the origin of these inclusions is estimated to be 570 °C. This temperature could correspond to that of the transport of ore-bearing solutions. The argillitization temperature was similar and its value can be estimated from data on cookeite stability (VIDAL & GOFFÉ, 1991) at 270 - 350 °C. The above values indicate greisenization and argillitization (cookeite genesis) to take place at temperatures between 600 and 300 °C, particularly within the interval of 300 - 400 °C.

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