PETROGENESIS OF THE VARISCAN GRANITES IN THE WESTERN EDGE OF THE BOHEMIAN MASSIF

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The Variscan granites in the western edge of the Bohemian Massif can be subdivided into four groups according to their age: redwitzites, the older granite complex (330–325 Ma), the younger granite complex (305–315 Ma) and Li–F granites (ca. 290 Ma). The oldest redwitzites represent a group of typical I-type granites composed of hornblende–biotite to biotite granodiorites to tonalites. They often show a slight foliation and form inclusions of varying sizes in granites of the older granite complex.

The group of the older granite complex is composed of porphyritic biotite monzogranites represented above all in the Babylon pluton, Bor pluton, Mariánské Lázně pluton and in Leuchtenberg and Smrčiny plutons (G1). Medium-grained muscovite–biotite granites are less common in this group. These granites belong mostly to peraluminous granites, only those of the Bor pluton plot on the boundary of peraluminous and metaluminous granites. According to their ASI (alumina saturation index) value they can be assigned to I-type granites or the I/S-granites. These granites are characterized by low degree of differentiation, particularly expressed by low differentiation of the Ba–Rb–Sr contents. Granites of the Leuchtenberg pluton, which show a great oscillation of the Ba/Rb ratio, are an exception. Higher contents of Th are characteristic of granites of the older granite complex.

The group of the younger granite complex is represented in the Smrčiny pluton, in Friedenfels, Bärnau, Flossenbürg and Falkenberg plutons. In the Smrčiny pluton G2- and G3-type granites and the G1Sm-type muscovite granites of its eastern edge belong to this group. This granite group is formed mainly by muscovite–biotite to muscovite monzogranites. Higher degree of differentiation, expressed by a higher Rb/Ba ratio, is typical. The monzogranites usually show a higher U content and a higher U/Th ratio in comparison with the previous granite group. These granites are typical peraluminous granites with ASI value exceeding 1.10. The vein-type granite fine-grained monzogranites of the Bor pluton can be probably assigned to this group.

The last group is represented by Li–F alkaline-feldspar granites of the Lesný–Lysina pluton and small granite stocks occurring in the vicinity of the Bärnau pluton (Křížový kámen, Silbergrube). Pegmatites occurring in the vicinity of Hagendorf and aplites forming a number of veins particularly in the Bor pluton are associated with these granites. In comparison with the composition of the pegmatites, which contain a great amount of lithium minerals, the composition of the aplites is more primitive and resembles that of the older intrusive complex granites. Geochemically, the granites are highly differentiated with high Rb/Ba and U/Th ratios emphasized by low thorium content. Markedly negative europium anomaly is typical of these granites.

Geotectonically, the group of granites of the older and younger intrusive complexes represents a granite group generated by a gradual fractionated crystallization of crust-derived melt. According to the geotectonic models of various authors, these granites were generated during an oblique collision of Moldanubian and Bohemian terranes. Influence of the activity of the West Bohemian shear zone and subsequent gravity collapse during the intrusion of the Bor and Babylon plutons has been stressed lately. This influence was manifested during the formation of the Bor pluton. This pluton was filled by a large number of vein-type granites and aplites, with the veins trending N–S, parallel with the West Bohemian shear zone. The origin of the youngest group of the Li–F granites can be associated with the extensional phase of the post-collisional development in this part of the Bohemian Massif. Hydrothermal zonal uranium mineralization of the Permian age is associated with the genesis of extensional granites and younger lamprophyre veins.