The Story of Bory Granulites – Early Thoughts

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The Bory massif is located within the Strážek Moldanubicum in the N vicinity of the Třebíč durbachite massif. The lens-shaped ENE–WSW-elongated granulite body structurally occurs in the hangingwall of the Variegated Group (Ostrong Unit) with abundant amphibolites and marbles to the SE.

The massif is formed by granulite-facies crustal rocks associated with eclogites and mantle rocks, including garnet peridotites – the assemblage characteristic of the Gföhl unit of the Moldanubian Zone. The granulitic rocks feature extensive overprinting under moderate to low pressures and high temperatures, unlike the other exposed granulite bodies. Major rock types of the massif are granulite-facies rocks. The granulites contain ellipsoidal bodies of dunites, peridotites, pyroxenites and eclogites up to several metres in diameter. The granulites are crosscut by late dykes of granitoids and pegmatites with sharp contacts and irregular cordierite-bearing leucosome bodies overprinting the late biotite foliation.

The best conditions for observations are in the Horní Bory quarry in the NE part of the Bory massif. The granulite-facies rocks are represented by white felsic granulites with mineral assemblage Qtz-Afs-Pl-Grt-Ky/Sil±Bt, alternating with dark Grt-Bt±Crd-rich granulites (so-called "hornfels granulites") to granulitic gneisses in layers of cm-m thickness. The rock structure is mylonitic, with quartz ribbons and asymmetric deformation structures such as σ-type porphyroclasts of feldspar and kyanite/sillimanite with asymmetric pressure shadows. The deformational features can be locally obliterated by primary recrystallization even though the structures are always disequilibrium ones.

The rocks feature remarkable reaction textures – transformation of kyanite into sillimanite ("dist-sillimanite"; Staňková, 1982), hercynitic spinel coronas around alumosilicate, cordierite-quartz and orthopyroxene-plagioclase symplectites consuming garnet. The extent of this medium- to low-pressure overprint is such that the original higher-pressure conditions cannot be precisely constrained any more. Garnet composition is controlled by bulk rock chemistry, however, the rather low Grs contents (up to 2 mol%) in garnets from felsic granulites and flat zoning profiles in their cores reflect rather low pressures and high-temperature homogenization. Both the garnet zoning and reaction textures document a significant decompression under rather high or even increasing temperature.

The foliation in granulites dips slightly to the NW in general. Foliation planes are folded by large- and small-scale upright to moderately inclined folds. Duplex structures indicating top-to-the-NW movement can be observed in the E part of the quarry.

The late dykes crosscutting the granulites are of granitic and pegmatitic character. Apart from the light minerals and micas, they contain tourmaline (schorl), cordierite and dumortierite. Their finer-grained parts show a distinct foliation. The dykes are associated with steep ductile shear zones striking NNW–SSE to NNE–SSW and dipping to the W, characterized by normal to dextral normal slip motion. Dykes of small thickness within these shear zones are disintegrated into barrel-shaped boudins (Fig. 1). Granulites within the shear zones are enriched in hydrous phases (biotite) and their foliation is re-orientated according to the sense of shear.

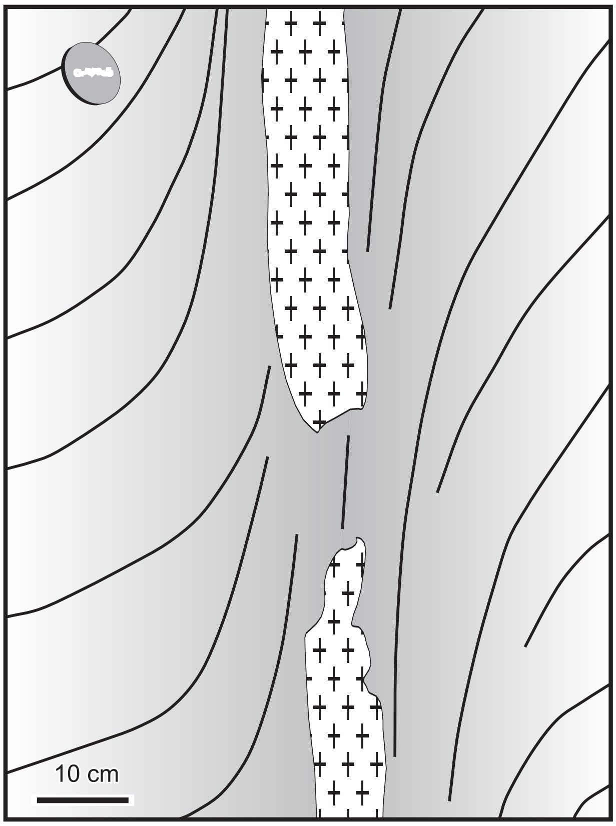

Fig. 1. A typical relationship between the strained and boudinaged granitic dyke and a shear zone of anomalously steep orientation.

Our up-to-date knowledge can be interpreted in terms of a polyphase tectonometamorphic evolution recorded by the rocks of the Bory granulite body. The HP–HT event forming the granulites was followed by the development of foliation (transposed?) represented by the lithological banding and also preferred orientation of minerals (micas, quartz ribbons), now flat-lying. These foliation planes were folded and the duplex structures developed, which points to a compressional regime. The exhumation could have triggered extensive decompressional melting facilitated also by the influx of hydrous fluids. The fluids brought by the intruding dykes were responsible for the weakening of the granulites due to extensive biotite formation. We assume that the steep shear zones are related to a late extensional event (subvertical σ_1) possibly due to gravitational collapse of the unstable structure.

References

STAŇKOVÁ J., 1982. "Dist-sillimanite": its importance for assessment of polyphase metamorhpism in the leptynite body near Bory, Czechoslovakia. *Krystalinikum*, 16: 53-66.