Structural Evolution and Emplacement of the Durbachitic Knížecí Stolec Pluton, South Bohemian (Moldanubian) Batholith

Kryštof VERNER[1,2], František HOLUB[3] and Jiří ŽÁK[4]

[1] *Institute of Petrology and Structural Geology, Faculty of Science Charles University, Albertov 6, Prague, Czech Republic*
[2] *Czech Geological Survey, Klárov 3, 11821 Praha, Czech Republic*
[3] *Institute of Petrology and Structural Geology, Faculty of Science Charles University, Albertov 6, Prague, Czech Republic*
[4] *Institute of Geology and Paleontology, Faculty of Science, Charles University, Albertov 6, Prague, Czech Republic*

Durbachitic bodies in the Moldanubian Zone of the Bohemian Massif represent products of ultrapotassic igneous activity of Lower Carboniferous age. These plutonic rocks vary in composition from durbachite sensu stricto (mafic K-feldspar-phyric amphibole-biotite melasyenite) to melagranite and are accompanied with highly mafic enclaves and small bodies of texturally different ultrapotassic rocks.

The Knížecí Stolec pluton (KSP), about 80 km^2 in area, is situated in the Šumava Mts., about 50 km W of České Budějovice, SE of Volary. It crops out in the area of the W branch of

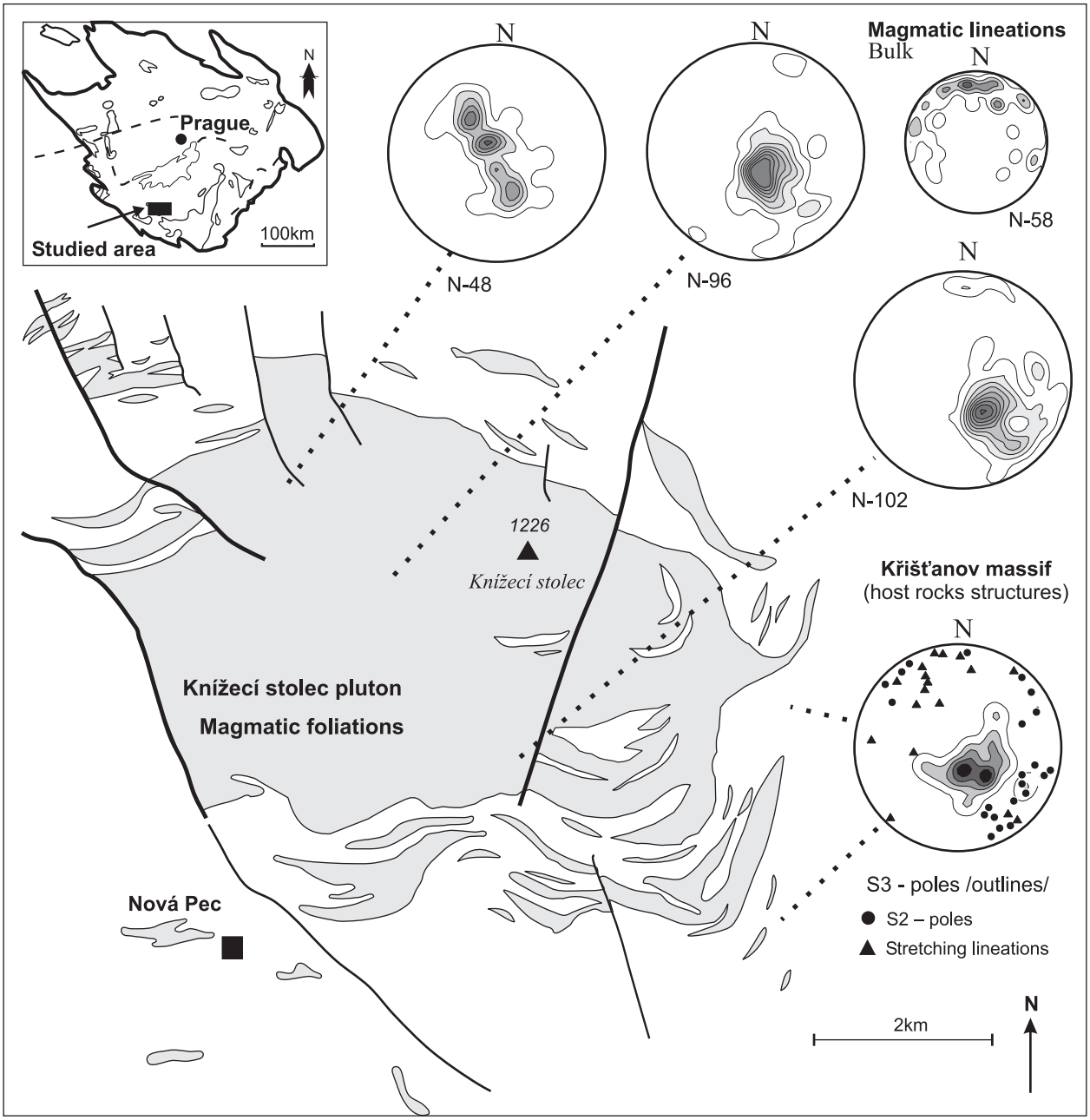

Fig. 1. Structural sketch (poles of the foliations, lineations): Magmatic fabrics in the Knížecí Stolec pluton and structures in the granulite gneisses of the Křišťanov massif (in the East of the pluton).

the South Bohemian batholith (SBB) with a number of isolated (at the present surface) granite intrusions surrounded by metamorphic rocks of the Moldanubian crystalline. The KSP itself is surrounded by retrogressed granulitic gneisses of the Křišťanov Granulite Massif at N and E, by several varietis of biotite to two-mica granites of SBB at S and W.

In the present study, we correlate magmatic fabrics and emplacement history of the KSP with structural evolution of the adjacent rocks. Granulite gneisses are dominated by steeply dipping NE or SE metamorphic foliation with relicts of isoclinally folded earlier anatectic structures. This foliation is associated with subvertical mineral lineation. The above structures are overprinted by later gently to moderately dipping NW foliation accompanied with gently plunging NNW stretching lineation that is probably related to the South Bohemian thrust systems. These later structures are also recorded in the magmatic to subsolidus fabric of the fine-grained leucogranites. In contrast, magmatic fabric in the coarse-grained to coarsely porphyritic granites of the Plechý massif, S of the KSP, is sharply discordant with all the host-rock structures.

In the Knížecí Stolec pluton, magmatic fabrics are defined by the alignment of large tabular K-feldspar phenocrysts (2 to 4 cm in length) and biotite aggregates. We have recognized multiple magmatic fabrics in the pluton: (i) older, steeply to moderately dipping NW magmatic foliation corresponding to the regional metamorphic foliation in the granulite gneisses; (ii) a younger, subhorizontal to moderately dipping SE to NW foliation bearing subhorizontal magmatic lineation plunging from the W to the N. The above described magmatic structures grade into narrow zones of high-temperature subsolidus deformation along pluton margins that are associated predominantly with dextral kinematics.

Based on our structural data combined with petrographic study we suggest that several textural and compositional varieties of the durbachitic rocks may represent several magma pulses. However, the preserved younger magmatic fabrics in the pluton postdate its final emplacement and likely recorded temporal evolution of regional strain field during slow crystallization of the magma. The geometry of this fabrics probably reflects the tectonic activity of the South Bohemian thrust systems. We have also found some pieces of evidence for multiple material transfer processes (MTP) that may have accommodated the pluton emplacement and involved ductile wall-rock shortening, sheeting along margins and magma stoping. Timing and structural relationships suggest that the KSP was emplaced roughly at the time of retrograde metamorphism of the Křišťanov granulite body.

New results from the KSP as well as data from other durbachitic intrusions in the Moldanubian Zone suggest that although these rocks are compositionally closely similar each-other and were emplaced during relatively short time span, the emplacement processes could vary dramatically even within the same pluton. Such behavior has significant consequences for the geodynamic evolution of the Moldanubian Zone.

Structural and Petrological Relations among Granitoids Near Nová Pec (Moldanubian Zone, Šumava – Bohemian Forest)

Kryštof VERNER[1,2] and Jaroslava PERTOLDOVÁ[3]

[1] *Institute of Petrology and Structural Geology, Faculty of Science Charles University, Albertov 6, Prague, Czech Republic*
[2] *Czech Geological Survey, Klárov 3, 118 21 Praha, Czech Republic*
[3] *Czech Geological Survey, Klárov 3, 128 21 Praha 1, Czech Republic*

Petrological and structural study of granites, durbachites (amphibole-biotite melasyenites) and retrogressed granulitic gneisses was conducted in the context of geological mapping of the map sheet Nová Pec 32–142. This work is part of the Project No. 6201 of the Czech Geological Survey – Geological mapping of the National Park Šumava.

Durbachites of the Knížecí stolec area show variation in composition of rock-forming minerals. Phenocrysts of perthitic K-feldspar carry Bt and Pl inclusions and exhibit zoning from core Or_{92} to rim Or_{97}. Plagioclase composition varies from core An_{63} to rim An_{10}. Biotite is compositionally homogeneous with $Fe^{2+}/(Fe^{2+} + Mg)$ =0,4. Amphibole (actinolite) cores contain relics of diopside and actinolite with increased Mg.

Fine-grained granitoids contain plagioclase of albitic to oligoclase composition, K-feldspar is homogeneous (Or_{89} to Or_{99}). Biotite shows variation in Mg/Fe^{2+} ratio and Al^{IV} content, deformed granites contain biotite with increased Mg. Biotite in granulitic gneisses contains increased Al^{IV} in biotite, minor garnet contains Alm~70 mol.% and some Sps~15–20 mol.%, Prp~10–15 mol%.

The oldest structures have been observed in retrogressed granulitic gneisses. Three phases of deformation correspond to respective generations of metamorphic foliation planes (S_1, S_2 and S_3). The foliation S_2 (with some relicts of S_1) steeply dipping from the NE to SE. S_3 observed in domains with re-foliated S_2 planes has a shallow to moderate dip to the N and NW and carries lineations plunging to the NNW.

Fine-grained granitoids show sub-solidus deformation of variable intensity. Planar structures dip to the SW under a low angle and become indistinct toward the W. Durbachites show a rather strong magmatic foliation, defined by orientation of feldspar phenocrysts. Two planar textures have been observed: (i) relict subvertical, (ii) penetrative subhorizontal dipping to the NW. Subsolidus deformation in durbachites occurs only in narrow zones along margins of intrusions.

The Plechý granite massif shows weak magmatic planar structures (foliations), which are discordant in relation to the regional structures.

Based on the petrological-geochemical data and the above structural characteristics, several granitoid rock-types are defi-