could disperse on a temporal floor of the chamber, whereas later mafic magma portions were injected into and supported by the more consolidated granitoid rocks. Although local convective motions of the mingled masses, increased intrusive activity of the re-heated granitoids, and emplacement of relatively late mafic intrusions partially disturbed the original geological relations, the gross structure of the dynamically evolving magma chamber near Příbram is still preserved.

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Geology of Multi-generation Intrusive Rocks in the Příbram Area, NW Border of the Central Bohemian Plutonic Complex

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The Central Bohemian Plutonic Complex (CBPC) is built of variable plutonic rocks ranging in composition from gabbro to prevailing granodiorite to granite plus ultrapotassic melasyenitic to melagranitic rocks. Numerous rock dikes of even more variable composition crosscut the plutonic rocks as well as their roof (the "Islet Zone") and adjacent parts of the Barrandian in the NW, and the Moldanubian metamorphic complex in the S.

Our investigation was focused on the SE vicinity of Příbram, namely on the artificial gas reservoir, which has been mined on the 21st level of the Shaft No. 16, about 1000 m below the present surface. Two groups of granitoid rocks can be distinguished in this area:

(1) The "marginal" type comprising predominantly pink- to reddish-coloured medium- to coarse-grained, often porphyritic biotite to hornblende-biotite granites rich in K-feldspar. Mafic microgranular enclaves are scarce in some parts but extremely abundant in others.

(2) The group of grey-coloured, medium- to fine-grained hornblende-biotite to biotite granodiorites. Some parts are built of highly heterogeneous granodiorite to tonalite, more homogeneous parts correspond petrographically to the Kozárovice and Blatná types. Mafic microgranular enclaves are ubiquitous, often being concentrated into roughly tabular zones. Some more voluminous mafic masses of hornblende gabbro to quartz diorite or quartz monzodiorite occur in close association with these granitoids (see Holub, this volume).

In contrast with current opinions (e.g., Vlašímský 1993), the marginal granite behaves as relatively older in respect to the grey granitoids, being intruded by their dikes and included in the grey granitoids as xenoliths and rafts. As both the granitoid groups are closely associated with roughly coeval mafic microgranular enclaves and mafic masses, there should be present at least two major generations of the mafic rocks, too.

Dike rocks are abundant and highly variable. Some dikes are of a plutonic appearance whereas the typical dike rocks resemble the subvolcanic ones. Of the plutonic types, granodiorite dikes containing mafic enclaves and intruding the marginal granite are contemporaneous with emplacement of the grey granitoids. Also some pegmatitic veinlets and small dikes are closely associated with the grey granitoids and sometimes may evolve from their late apophyses into already consolidated mafic rocks. Fine-grained leucogranites (aplitic granites) seem to be only slightly younger and penetrate all the grey granitoids and the mafic bodies. Locally, they may grade to pegmatites. Many leucogranitic bodies occur as subhorizontal to steeply dipping sheets, 5 cm to about 1 m in width.

As a phenomenon still unknown in the area of CBPC we have found composite dikes of microgranodiorite mingled with dark microdioritic pillows. These unusual dikes display an uncommon strike N50-70°E with a variable dip to NW. Their shape is indicative of intrusion into the already brittle "grey granitoids", probably from some deeper-seated magma reservoir of granitoid magma injected by the mafic one.

Typical dike rocks comprise kersantite, granite to diorite porphyries, dolerites (diabases) and abundant minettes. Kersantite has been found as a single dike system striking N-S to SE-NW, steeply E-dipping, which cuts the marginal granite only. Although its shape suggests an intrusion into brittle fractures, the kersantite itself is injected by small granitic to pegmatitic veinlets and its texture is affected by partial recrystallisation (perhaps due to the thermal effect of the grey granitoids?).

Other dikes are clearly post-dating the grey granitoids. Scarce injections of a light granite porphyry form gently dipping intrusive sheets and thin dikes crosscutting the aplitic to pegmatitic veins. Dark hornblende diorite- to tonalite-porphyries with fine-grained margins of spessartitic appearance occur as gently to steeply dipping irregular dikes.

The numerous E-W to ESE-WNW trending dikes of diabases and minettes are forming a conspicuous subswarm of the regional dike swarm which is typical for predominant parts of CBPC. Diabases and some minettes usually dip about 50-65 to S, but many minettes are more or less vertical. Margins of all these dikes are straight and often stepped with bayonet

terminations of individual segments and bridges of the host rock, sometimes with thin granitoid septa inside the dikes. These features together with textures and grain-size variations resulted from magmafracting and injections of low-viscosity magmas into brittle fractures of the completely crystallised and cooled granitoid complex. Temporal relations are not clear, but the vertical minettes seem to be the youngest. One of them crosscuts both the aplitic granite and granite porphyry. Another thin minette dike contains abundant brown glass which is surprisingly fresh and approaches K-feldspar in composition.

The multiple intrusive pulses of the broad spectrum of magmas typical for the area of CBPC should be derived from various mantle and crustal magma sources. The mantle sources of mafic magmas were heterogeneously enriched in hygromagmatophile elements.

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Tectonics of the Železný Brod crystalline unit in the vicinity of Železný Brod

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The Železný Brod crystalline unit is considered as a part of the Krkonoše-Jizerské hory crystalline unit. The following formations were distinguished by Chaloupský (1983):

1. Velká Úpa Group: Middle (?) Proterozoic
2. Radčice Group consisting of:
   - the lower part: Upper Proterozoic or Lower Cambrian
   - the upper part: Lower to Middle Cambrian
   - Železný Brod volcanic complex: Lower to Middle Cambrian
3. Poniklá Group: Upper Ordovician to Silurian (possibly Lower Devonian)

Marbles with graphitic shales were found within the Poniklá Group in the Koberovy quarry. Based on the graptolith fossils the age of the shales was determined as the Silurian (Wenlock), (Chlupáč 1953).

Another outcrop of the marbles with the graphitic shales was found in the Na vápence quarry close to the Železný Brod railway station. The age is estimated according to a tectonic position as the Silurian (Chaloupský 1989).

Two fold systems were found on the both sites (Ramsay 1987). The older isoclinal fold (F_1) is seen in the Fig.1. The fold F_1 was folded by the younger fold (F_2). Structural data (fold axis, axial planes) shows also two clusters- the older and the younger fold systems.

The two fold system in the Silurian shales suggests another deformation stage (younger Caledonian) in addition to the Variscan orogenesis. The hypothetical younger Caledonian orogenesis was also described by Chaloupský (1989).

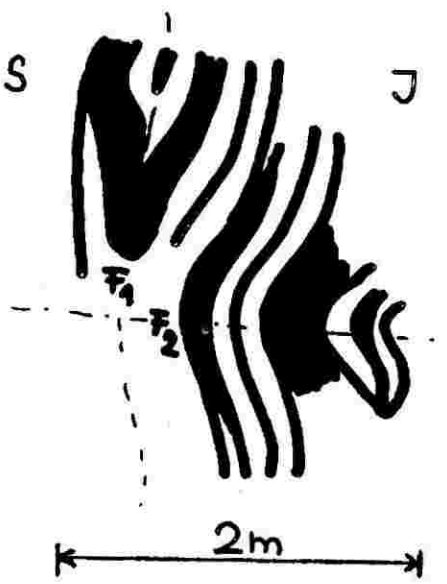

Fig.1. Folded strata, limestones (white), and shales (black), in the Na vápence quarry close to Železný Brod.

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