or iron hydroxides. Prehnite and chlorite most often fill fissures or replace plagioclase and hornblende. Chlorite fills tensional fissures in plagioclase grains.

Subordinate intercalations of amphibolite-chlorite schists occur in the amphibolitic schists. The amphibolite-chlorite schists are fine-grained, strongly foliated. They are composed of euhedral amphibole porphyroblasts situated in fine-grained chlorite-amphibole matrix. Chlorite occurs in the pressure shadows around the porphyroblasts, too. Accesory opaques are very common. Larger amphibole porphyroblasts exhibit strong zoning. Their cores have the composition of actinolite (0.6–0.8 atoms of Al per formula unit mf = 0.8–0.85), whereas the rims are composed of tschermakite or rarely pargasite (1.8–2.4 atoms of Al per formula unit mf = 0.7–0.75). The smaller amphibole porpyroblasts are not zoned and have the composition of pargasite. The amphiboles from the matrix have the composition of Mg-hornblende. Their cores are enriched in silica relative to the rims.

The amphibolitic rocks of the Polish part of the Staré Město Unit underwent amphibolite-facies metamorphism. The temperature of peak metamorphism for amphibolitic rocks has been calculated at 650–750 °C using plagioclase–amphibole thermometry (Holland and Blundy 1994). The garnet–biotite thermometry (Ferry and Spear 1978; Williams and Grambling 1990) yields temperatures between 680–800 °C for banded amphibolites. Pressures estimated using garnet–hornblende–quartz–plagioclase barometry (Kohn and Spear 1990) yield 8–9.5 kbar for banded amphibolites and amphibolitic schists. This metamorphic event was followed by uplift under greenschist-facies metamorphism, accompanied by brittle deformation.

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Microstructural Studies of the Jawornickie Granitoids, Rychlebské Hory – Preliminary Data

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Polymetamorphic rocks of the Złoty Stok–Skrzynka tectonic zone, SW Poland, have attracted much attention because they may possibly provide important clues to understanding the character of the boundary between Lugicum and Moravo-Silesicum. The origin of this zone was connected with the development of the Ramzová Thrust according to E. Bederke (1929), or, this zone was linked with the Niemcza Shear Zone according to H. Cloos (1922). The Złoty Stok–Skrzynka tectonic zone is comprised of multiple-deformed, medium-grade metasediments, gneisses and amphibolites. This zone is pervasively injected by dikes and sills of the Jawornickie Granitoids. At a map-scale these dikes and sills are aligned SW–NE, parallel to the general trend of the tectonic zone. Despite the widespread effects of the Variscan Orogeny in this part of the Sudetes, some of its details, such as the amount of deformation episodes, spatial development of structures, the duration of the event, and the effects of granite emplacement processes are poorly understood. Don and Gotowała (1980) and Muszer (1989) recognized four stages, Cwojdziński (1977) recognized five stages, and Dumicz (1988) seven stages of deformation in the Złoty Stok–Skrzynka tectonic zone. According to Cymerman (199,6), "a majority of tectonic structures observed in the Złoty Stok–Trzebieszowice shear zone generated as the result of progressive deformation under the conditions of deformational partitioning". The Jawornickie granitoids are considered to be syn-tectonic on the basis of the field structural observations in the country rocks (Burchart 1958; Cwojdziński 1977). However, Burchart (1958) proposed D_1, and Cwojdziński (1977) proposed D_2 and D_3 as contemporary with phases of granitoids emplacement. According to Muszer (1989) solidification of the Jawornickie granitoids took place between D_3 and D_4. The lack of data on the internal structures of the dikes and sills makes these models hypothetical. Structures from both the granites and the country rocks are required for an emplacement model to be established. In regions with complex deformation histories, the internal fabric of granite plutons may preserve a record of the strain field and kinematics associated with the syn-emplacement tectonic event. An accurate interpretation of the internal structures of granite requires a detailed study of its microstructures in order to determine if the deformation took place in the magmatic state or in the solid state.

Dike and sill swarms of the Jawornickie granitoids are composed of up to three different rock types – granodiorites, tonalites and monzonitic granites (Burchart 1958). At the regional scale, contacts of the main dike 1–1.5 km thick, and of smaller granitoid dikes, parallel the country rock foliation. However, at the mesoscale these dikes locally crosscut the main foliation in the country rocks. A penetrative, homogeneous mesoscopicscale foliation can be distinguished on many granite outcrops. Foliation strikes mainly SW–NE, which is parallel to the main planar structures of the country rocks. In hand specimens it is characterized by a pervasive mineral alignment or shape-preferred orientation of biotite (± hornblende) accompanied by less obvious shape-preferred orientation of feldspar and quartz ribbons. Aligned hornblende occurs as independent, euhedral grains, which rather suggests magmatic alignment of the crystals but is not a useful criterion on its own. Lineation, present at almost all outcrops, plunges southwest at low angles.

Despite solid-state deformation and recrystallization, rare but clear microstructural evidence of magmatic flow and deformation in the magmatic to submagmatic state can be found in these rocks. Tabular, euhedral feldspar crystals with zone and twin boundaries parallel to grain boundaries are aligned on foliation planes. Isolated grains of biotite and hornblende also lie on foliation planes. Locally, these minerals are bimodally oriented, defining S-C fabric. Quartz-filled 'submagmatic' extensional microfractures (Bouchez et al. 1992) oriented perpendicular to mineral lineation are indicative of stretching parallel to lineation during late stages of crystallization. Magmatic fabric is overprinted by the solid-state texture characterized by abundant evidence of recrystallization to finer-grained aggregates (e.g., of quartz, feldspar or mica). Solid-state foliation, defined by elongated aggregates of quartz, biotite and muscovite, parallels the main foliation in the country rocks. Several lines of evidence suggest that this foliation was formed at least under moderate temperatures. Feldspar megacrysts are rimmed by myrmekite recording solid-state dynamic recrystallization, which suggests deformation at temperature in excess of 500 °C. Straining of quartz grains is typical of high-temperature plastic deformation, exhibiting a mosaic of square subgrains and forming chessboard-like patterns. These subgrains evolve into new grains, often with irregular boundaries due to grain-boundary migration.

The Jawornickie granitoids show parallel or subparallel magmatic and solid-state foliations suggesting syntectonic emplacement. Kinematic indicators, including shear bands, S-C fabrics, and asymmetric recrystallized tails on feldspar porphyroclasts show evidence of top-up-to-the-southwest displacement. However, attempts at interpreting the type of emplacement and the potential interplay between regional structures and intrusion-related deformation are poorly constrained because of the lack of consistent deformation history in the country rocks.

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Pattern of Seismic Energy Release in West Bohemia

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West Bohemia/Vogtland seismic swarm region covers an area of about 3,000 km². Seismicity is closely related to the system of principal tectonic faults intersecting the region. Weak seismic activity mostly of swarm-like character persists in whole region between the consecutive macroseismically felt swarms. Foci of micro-earthquakes predominantly cluster in at least seven focal zones.

Depth of hypocentres varies from 3 km (near Klingenthal) to 20 km (near Adorf and Plauen). Most seismic events (about 80%) occurred in the main focal zone of Nový Kostel. Foci of the individual swarms in this zone concentrate in very narrow volumes at depths from 6 to 12 km. An important feature of the spatial distribution of hypocentres is the lamella-like character of the focal belt. While the strike of the entire focal belt declines slightly from N to W, the strikes of the particular segments decline generally from N to E. In many cases the hypocentre clusters of individual swarms tie in with one another. Seismic activity of others focal zones is much lower than in the Nový Kostel zone, but events in these zones are often of larger magnitudes.

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