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STRUCTURE OF THE VEPOR PLUTON (WEST CARPATHIANS)

(Figs. 2)

A b s t r a c t: Variscan Veporide pluton of the granitoide composition is conformly emplaced in the paragneisses and migmatite mantle. The primary fabric of the modal inhomogeneity foliations is overprinted and distorted by Alpine structures mainly of the brittle fracture accompanied by cataclasis and recrystallization. The major part of rebuilding on regional scale took place in zones of fracture cleavage and on overthrusts. They transformed the original configuration of lithological varieties, the position towards the mantle and entire pluton shape. The pluton became elongated northeastward and its macrofabric is distinctly imbricated.

Р е з ю м е: Варисский вепоридный плутон гранитоидной композиции в равной мере помещен в парагнейсовой и мигматитовой мантии. Первичная текстура модальной неоднородности расслоений искаженная влиянием альпийских структур, главным образом хрупким изломом сопровождаемым катаклазом и перекристаллизацией. Большинство восстановления в региональном масштабе случается в зонах изломанного кливажа и в надвигах. Они трансформируют первоначальную конфигурацию литологических разновидностей, позицию по отношению к мантии и полной форме плутона. Плутон стал удлиненным в северо-восточном направлении и его макроструктура отчетливо имбрикационна.

In the central part of the Western Carpathians occurs the largest body of Palaeozoic intrusive rocks of the Carpathian system. Its continuous exposed part built by Variscan granitoids measures approximately 60 × 20 km, a continuation may be traced to SW geophysically and by drillings in the neovolcanites and Mesozoic basement. Geological investigation of the body is insufficient compared with plutons of the Core Mountains. Most of the data on the structure and petrography, often generalized for the whole body did derive so far from marginal NE part and one or two traditional localities.

It was thus the aim to get acquainted with the lithology and structure of the pluton at several representative segments. Three zones were chosen across the body (Fig. 1) in which geological strip mapping has been made in the scale 1 : 25 000, as well as structural analysis and sampling for petrographic and petrochemic studies. This contribution comprises only the results of structural analysis in a shortened form.

In view of genesis two main structure groups may be differentiated in the pluton: those originated during emplacement and structures of younger postcrystalline deformation. In field conditions they can be usually distinguished on the basis of tectonic style and crystallization — deformation relations. In both groups structures are in macroscopic domains penetrative and nonpenetrative and of different size. The analysis thus followed from mapped macroscopic structures and from statistic treatment of mesoscopic structures.

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The oldest granitoid structures are foliations of modal inhomogeneity made up particularly by biotite, event. feldspar accumulations, forming the primary mesoscopic anisotropy. They are penetrative in most of the postcrystalline undeformed domains and their density increases in the rule towards the mantle and its enclaves. The degree of primary anisotropy and the frequency of exogenous enclave occurrences increases towards the E and NE, and decreases towards the W pluton margines. In map rarely even in exposure these foliations form folds of 1 to 100 m amplitudes with axes gently dipping to NE. With respect to Alpine deformation of the body only one part of these structures may be considered as primary produced by flow and deformation in plastic state. The general trend of modal inhomogeneity foliations in all the investigated domains is E-W with medium dip to N. Flow lineations are statistically unsignificant, thus the direction of magma movement may be established only in the plane of primary anisotropy. Foliations of modal inhomogeneity are statistically parallel with the group of s_1 foliations in the mantle metamorphites and the pluton can be regarded as conformable.

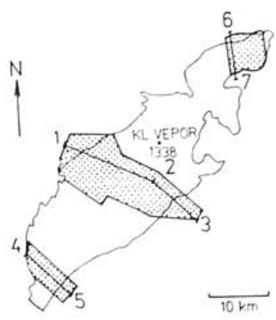


Fig. 1. Location of cross-sections and studied domains in the Vepor pluton.

The enclaves in the pluton are of exogenic and endogenic origin. The first ones being usually of substantially larger sizes (1—100 m) than the commonly micaceous endogenic enclaves. The shape of found enclaves is anisotropic and statistically conformed with the modal inhomogeneity foliations and with s_1 planes in the mantle. The mobility of the enclosing environment is demonstrated by sporadic rotations. In larger exogenic enclaves the mantle structures may be found, sometimes in advanced stages of fold transposition by axial plane cleavage accompanied by neosom injections. These are enclaves in postcrystalline weakly deformed domains, as in granitoids of advanced and penetrative deformation the enclaves are destructed first.

The boundaries between the individual granitoid varieties are important and so far few investigated macrostructures. The boundary of medium-grained granodiorites and tonalites towards porphyric granites is diffusive, while the margins of these to leucocratic granites are usually sharper. Aplite and pegmatite fill up often structures of brittle fracture parallel or perpendicular to primary anisotropy. The so called hybrid facies of conspicuous anisotropy and rich in enclaves appears mainly in the eastern and northern part of the pluton. It contains often white or pink porphyric K-feldspars.

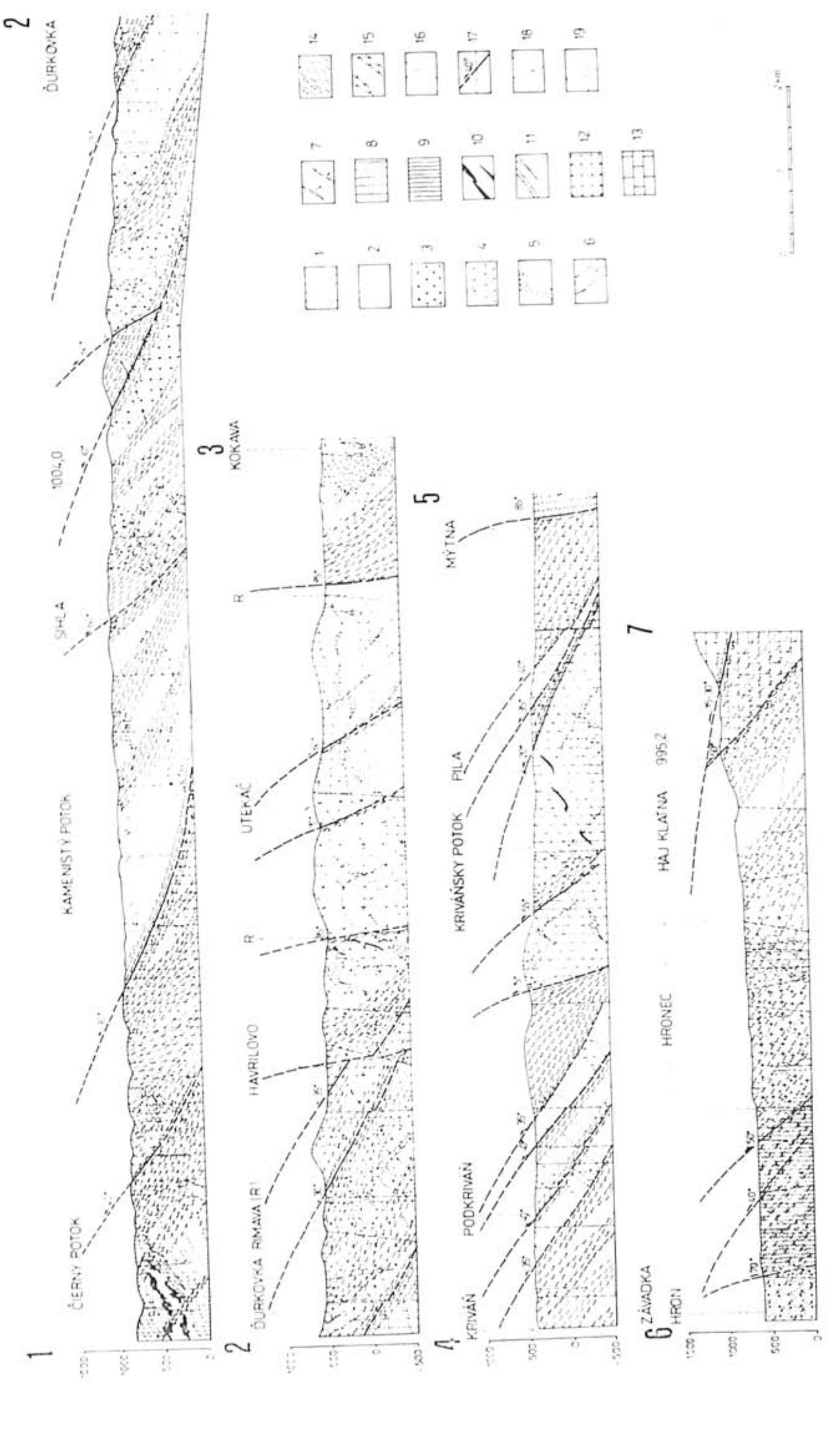
Unfortunately the pattern of primary structure indicated above cannot be applied for the whole body. This is due not only to the scope of the sampled region, but mainly to younger postcrystalline deformation. It acted under physical conditions differing substantially from emplacement conditions, being in places close to the greenschist facies. It gave place above all to various planar structures of brittle fracture. The most important of them is the fracture cleavage penetrative in macrodomains, accompanied by cataclasis and recrystallization. This foliation designated also as s_2 planes (according to the succession of homotactic planes in the metamorphites) had generated in shear zones anticipating or accompanying faulting, rarely even folding. Density of foliation lies in the mm—cm range, in places it may be hardly differentiated from close jointing of identic orientation. Fracture cleavage is in homogenous macrodomains of identic orientation, most often with NE strike and SE dip. Shear zones are usually lathy or lenticular shaped, of several ten meters up to several kilometers thickness. On the mapped area they occupy 50 to 80 % of the surface indicating the range of the substantially Alpine reconstructed parts of the pluton. Fracture cleavage is the site of pronounced translation overgrowing often into faulting in macroscale. The majority of shear zones thus contains younger conform faults frequently of the type of overthrusts towards NW. The faults are accompanied also by younger cleavage in narrow phyllonitization or brecciation zones. In rare cases fracture cleavage occurs in form of axial plane cleavage of mesoscopic folds in anisotropic granitoids and migmatites anticipating or accompanying origin of shear zones.

Faults of 10 and more km order belong to the most important structures of the pluton. The faults in shear zones striking E to NE and dipping 20—50° S to SE brought about a remarkable reduction of the pluton in N and NW direction, as well as mutual thrusting of the mantle and pluton. They form an imbricated fabric conspicuous in the map and cross sections (Fig. 2).

The largest faults build sometimes several fault zones conjugated into braided fabric. Some of the fault zone structures prove for repeated deformation, for example overprinting of steep normal faults on overthrusts. Fault cinetics under conditions of lacking lithologic markers and polydeformation, remains in the rule unsolved and complicates the decoding of the pre-Alpine pluton structure.

The joints in granitoids belong to the most numerous structures. In macrodomains some systems are penetrative and in statistical diagrams they are marked by maxima. In mesoscopic and macroscopic domains steeply dipping joints predominate, including with primary or secondary anisotropy of fracture cleavage a 70—90° angle. Their strike is most often northwest. On other places two conjugated systems may be found with the acute angle bisection of this direction. The fault and joint fabric in the pluton and in the mantle is very similar. In most cases they may be interpreted in the Alpine deformation plan with NW and N direction of maximum stress. The steeply dipping smaller faults of km sizes show the structure of the most abundant joints. Their strike is NW to N, in places they shift the macrofaults in shear zones and participate significantly in the orientation of the drenage pattern.

The outline of emplacement and following deformation of the Vepor pluton is so far uncompleted. Processes leading to the recent structure may be rather modellated than detailed. The major part of the granitoids had been emplaced



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in the metamorphite mantle by conform mode. The types of contacts prove for a meso- to catazonal pluton, the lithology varies in the narrow range of granites up to tonalites. One part of granitoids has been emplaced succesively with discordant boundaries, the major part has boundaries diffusive and conformable with primary fabric. In the recent section the eastern part of the pluton is closer to the original mantle in a higher structural level than the western one. The magma flow followed the direction unconform with the recent secondary margins of the body. Its original shape was likely less anisotropic and elongated in E—W direction.

Postcrystalline deformation of the pluton is polyphasic and regional. Its structures generated in different and overlapping structural levels. It did substantially overprint the primary fabric and altered the rocks composition in favour of low-grade metamorphites. The major part of Alpine rebuilding took place in fracture cleavage zones and on overthrusts. Maximum stress of this deformation acted in an approximately horizontal plane in direction NW—SE, in the northern section of the body in N—S direction. Deformation intensity increases east-and northeastward. Fracture cleavage zones, overthrusts and normal faults transformed the original configuration of lithological varieties, the position towards the mantle, and the entire pluton shape. The mantle and the granitoids are often separated by overthrusts, the shape of the body became elongated northeastward. Alpine macrofabric is characteristic imbricated.

Finally I would like to express my thanks to those coworkers who in time unfavourable for field work did all-round support, as well as to those, applying the results of structural analysis in the interpretation of petrological and geochemical data.

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Fig. 2. Cross-sections through the Vepor pluton. 1 — hybrid granitoids (biotite rich with pronounced anisotropy and numerous enclaves); 2 — medium grained biotite granodiorite to tonalite (Sihla type); 3 — porphyritic granitoids with white K-feldspars (Vepor type); 4 — porphyritic granitoids with pink K-feldspars (Ipel type); 5 — leucocratic granitoids; 6 — pegmatite and aplite-rich granitoids; 7 — aplite (α) and quartz veins (Q); 8 — migmatites; 9 — gneisses, mica-schists and phyllites; 10 — metabasites; 11 —acid metavolcanics; 12 — Permian metaclastics and metavolcanics; 13 — Mesozoic quartzites and carbonates; 14 — cataclastic rocks with minor recrystallization; 15 — cataclastic rocks with major recrystallization (phyllonites); 16 — geologic boundary; 17 — macrofaults; 18 — minor faults and zones of jointing; 19 — foliations of modal inhomogeneity in granitoids and s_1 planes in metamorphites.