Alpine Deformations in the Area of the Čierna Hora Mts.

Roman FARKAŠOVSKÝ and Robert SCHMIDT

Katedra geológie a mineralógie Fakulty Baníctva, ekológie, riadenia a geotechnológií TU Košice, Park Komenského 15, 040 01 Košice, Slovak Republic

The Čierna hora Mts. is situated in the eastern margin of the Western Carpathian Internides.

The region is characterised by a heterogeneous structure, composed of basic units of the Western Carpathian Internides: the Veporikum unit, the Choč nappe of the Hronicum unit, the Late Palaeozoic of the Gemericum unit and the Meliaticum unit. Furthermore, the formations of Inner Carpathian Palaeogene and Neogene of the Košická kotlina depression take also their shares in its structure. The Veporicum unit consists of crystalline basement and Late Palaeozoic to Mesozoic cover formations. The crystalline basement is made of three lithotectonic complexes which are formed by the strongly diaphtoritised gneisses and micaschists with the intrafolial amphibolite bodies, migmatites with the intrafolial aplitic granites, gneisses, migmatites, amphibolites and Variscan granitoids. The cover sequence of the unit starts with the Late Carboniferous and Permian clastic formations comprising rhyolitic volcanics within the latter. The Triassic to Late Jurassic part of the sequence is mainly composed of carbonates. The Gemericum unit involve mainly slightly metamorphosed Palaeozoic volcano-sedimentary sequences represented especially by polymict metaconglomerates, metasadstones, black shales and phyllites. The Tertiary sediments belonging predominantly to the Inner Carpathian Palaeogene transgressively overlie the older formations. They are composed of flysch sediments, i. e., conglomerates and sandstones with intercalations of claystones and siltstones. The Neogene sediments, conglomerates and claystones in particular, cover some areas near the eastern and southern margin of the region.

Alpine deformations of the studied area have been developed in a polyphase process, influenced by either anisotropy of rocks or by a change of bulk strain regime during its evolution. Structural reworking of the units was accompanied by a low grade progressive metamorphism of the cover formations and by a retrogressive metamorphism in the basement complexes (Jacko et al. 1996). The dominant Alpine structures in the area are NW-SE trending and SW dipping zones of the deformation that segment Čierna hora Mts. into the main lithotectonic complexes. These shear zones were acting from the Lower Cretaceous and later have been reactivated during the further deformation stages (Polák et al. 1997). One of these structures, which represents the boundary between the Gemericum and Veporicum units, belongs to important structures of the Alpine convergence within the Western Carpathian Internides with polyphase evolution, and is known as the Margecany - Lubeník line (Andrusov 1959). The rocks involved are foliated and usually lineated, thus indicating ductile deformation, and contain fabric elements with a monoclinic shape symmetry. Deformed metaconglomerates of the cover sequences of the Gemericum and Veporicum units show strong changes in the pebble shapes depending on their rheologic properties. Shear zones are accompanied by occurrence of the crystalline basement mylonites, especially mylonites of the granitoids and gneisses. The contact of the mylonite zone and unaffected wall rock tends to be a gradual fabric transition. These mylonite zones are interpreted as exhumed "fossil" ductile shear zones. Fabric elements within the mylonites represented by mantled porphyroclasts, mica fishes or C and C' type of shear bands with other foliations show predominantly a sinistral sense of the shear.

Development of younger neo-Alpine fault movements occurred in several stages but the sinistral NW-SE strike -slip faults were dominant. These ones have been arising in the palaeostress field of a transtensional regime with the E-W extension and the N-S compression. As a result the subsidence of the area took place. The blocks of pre-Tertiary rocks are plunged eastwards under sediments of the Eastern Slovakian Neogene basin. Single blocks were separated by the faults of the N-S and NE-SW strike.

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Vertical Ascent from the D-layer up to the Surface in the SW-Margin of the West-Sudetes Area in the Light of Xenoliths from Tertiary Basaltoids

Ferry FEDIUK

Geohelp Praha, Czech Republic

Situated at the triple-point junction Cretaceous - Permocarboniferous - Železný Brod Crystalline Complex, the Miocene Kozákov volcano with its lava flows consisting of nepheline basanite is more than one hundred twenty years known as the

world's pioneer locality in studies of recently so popular lherzolite nodules (Farsky 1876). The average amount of these xenoliths sized over 1 cm is 35/m^2 which corresponds to 2% of the total volume of the basaltoid. The biggest nodule ever found here was 70 cm long.

The interest of countless mineral hunters has been focused exclusively on nice olivine crystals some of which are of a gemstone quality. Besides lherzolite nodules, however, there are xenoliths of another lithology present here, too. Of course, most of them are unattractive, substantially less frequent, less striking and therefore mostly ignored. Nevertheless, even these different lithologies provide and complete the information on the composition of the Earth's pile below the volcano in the section underneath the Moho and above it as well.

Following petrographic categories of xenoliths (comp. Fediuk 1973) have been distinguished here:

A) Ultramafic rocks
   a) peridotites (mainly spinel lherzolite, scarcely garnet lherzolite, but also dunite, wehrlite and harzburgite)
   b) pyroxenites and hornblendites (clinopyroxenite, less frequently websterite and orthopyroxenite, sporadic px-hornblendite)
B) Gabbroic rocks (cpx and cpx-hbl gabbro, gabbronorite, rarely anorthosite)
C) Granitoids:
   c) charnockitic rocks,
   d) biotite granite and granodiorite
D) Crystalline schists (usually metapelites)
E) Sedimentary rocks (sandstone and conglomerate)
F) Single xenocrysts (olivine, orthopyroxene, clinopyroxene, hornblende, feldspar, quartz).Based on the above listed set of xenoliths, supplemented by geobarothermometric calculations, geophysical data and some deep boreholes, following model of the vertical profile for the SW periphery of the Jizerské hory and Krkonoše Mts. is proposed:

0 - 1.5 km	Cretaceous and Carboniferous sediments
1.5 - 3.0 km	weakly metamorphosed Early-Palaeozoic sediments and volcanics
3.0 - 8.0 km	medium metamorphosed volcanosedimentary sequence of presumed age with intrusions of cataclastic granites and metagranites
8.0 - 17.0 km	undeformed granite perhaps of Variscan age
17 - 33 km	gabbroic and charnockitic layer
	Moho
33 - 50 km	ultramafic layered cumulate complex composed mostly of pyroxenite
50 - 250 km	spinel lherzolite
250 - 350 km	garnet peridotite

Source of alkali-basaltic "squash", ascending volcanic plume.

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Heavy Minerals in the Wałbrzych Formation and the Biały Kamień Member (Upper Carboniferous, Intra-Sudetic Basin, SW Poland)

Elżbieta FELICKA

Uniwersytet Wrocławski, Instytut Nauk Geologicznych, ul. Cybulskiego 30, 50-205 Wrocław, Poland

The Intra-Sudetic Basin, a Variscan intra montane trough in the central Sudetes, is filled with Carboniferous, Permian, Triassic and Upper Cretaceous deposits. The oldest sediments display considerable lateral and vertical facies variations which reflect intense tectonic and volcanic activity, largely influencing sedimentation in the basin in that time. The sedimentary material was transported from various sources, a good indicator of which, apart from the lithology of pebbles, may appear heavy minerals (Felicka, 1997 b).

The Wałbrzych Formation

The Upper Carboniferous sediments crop out in the NE part of the basin. The Wałbrzych Formation (Lower Namurian), up to 320 m thick, is represented by mudstone-sandstone deposits, with light-grey conglomerates containing mainly quartz and quartzite pebbles (quartz conglomerates) at the bottom, and by series of mudstones and claystones with coal seams at the top (Bossowski and Ihnatowicz, 1994). The Wałbrzych Formation cannot be correlated with any stratigraphic unit in the Czech part of the Intra-Sudetic Basin.

Two samples representing the Wałbrzych Formation were collected for heavy mineral analysis along a profile line in the eastern part of the basin (prolongation of the Lower Carboniferous profile, see Felicka 1997 a, b). In sample AKL, representing the lowermost part of the formation, white mica is the most abundant mineral (> 60 %); apart from that, biotite, epidote, sphen and occasionally zircon and amphibole are found. The heavy mineral spectrum of sample W1 representing the uppermost part of the formation is different and comprises white mica (flaky aggregates of muscovite and chlorite - 30 %), garnet (24 %), epidote (17 %), biotite (6 %) and minor turmaline, zircon, apatite and sphene.

The Biały Kamień Member

The Biały Kamień Member (Upper Namurian and Lower Westphalian) belongs to the Žacleř Formation. These deposits, up to 300 m thick, are represented in their bottom part by conglomerates and sandstones with few interlayers of mudstones and claystones containing two coal seams.

Four samples were collected for heavy mineral analysis, all from the eastern profile line. The heavy mineral spectra are represented mainly by opaque minerals, which form individual grains and intergrow transparent phases. The spectra display variations both stratigraphically and laterally and so far it is difficult to see any correlation between them. Generally, samples W7, W8, and W9 from the Wałbrzych area show rather