ocentres. Time-slice maps, showing the loci of deposition of roughly synchronous stratigraphic units distinguished in our cross-sections, show an interesting temporal and spatial evolution of deposition in the study area.

Isopachs of units A-C (fluvial and paralic) indicate deposition in elongated palaeovalley of SSE direction between the cities of Litomyšl and Letovice, joining the Blansko Graben further south. This palaeovalley followed the Semanín Fault and the source area was located to the NW. Another palaeotopographic low of the same direction and origin (palaeovalley) is situated in the western part of studied region.

Isopach map of shallow-marine unit D shows an abrupt change of the position and orientation of depocentres, as well as of the source of clastics. Part of the infill of previous palaeovalley was uplifted during the sedimentation of unit D and, as a result of this tectonic activity, a topographic ridge emerged in the position of the former incised valley. Two newly developed depocentres which actively subsided during the deposition of unit D, fringed this SE-oriented palaeohigh in the north and south. The southern depocentre was probably connected to the Blansko Graben. The main source of siliciclastic sediments was the area to the south of the southern depocentre, several tens of kilometers beyond the present extent of the basin.

According to the proposed strike-slip depositional model of the Bohemian Cretaceous Basin (Uličný 1997) and the above results, it is assumed that the main structures controlling the basin evolution were NW-NNW – oriented fault zones active in a dextral strike-slip regime. The study area behaved structurally as a pull-apart sub-basin formed between overlapping segments of the principal displacement zone. The intrabasinal high which emerged during the deposition of unit D is probably related to similar phenomena described from pull-apart basins formed at overlapping fault segments by Dooley and Mc Clay (1997).

This presentation is partly based on a MSc thesis by J. Kanta, supported by an AAPG Grant-in-Aid. We are also grateful to Geofond, Prague, for access to archive well-log data.

References

ULIČNÝ D., 1997. Sedimentation in a reactivated, intra-continental strike-slip fault zone: the Bohemian Cretaceous Basin, Central Europe. Abstracts, 18th IAS Regional European Meeting, September 2-4, 1997, Heidelberg. Gaea heidelbergensis, 3, pp. 347.

DOOLEY T. and Mc CLAY K., 1997. Analog modeling of pull--part basins. AAPG Bulletin, 81 (11), 1804-1826.

The Gneissic Complex of the Staré Hory Mts. – Its Hercynian and Alpine History

Milan KOHÚT

Dionýz Štúr Institute of Geology, Mlynská dolina 1, 817 04 Bratislava, Slovakia

Tectonic significance of the Staré Hory Mountains for the evolution of to the Central Western Carpathians has been recognized for a long time. However, the crystalline rocks from this area were not studied in detail for more than thirty years. Because of its enclosing by sedimentary rocks – verrucano and Mesozoic carbonates, this crystalline complex is commonly denoted as the Staré Hory window. The geological structure and tectonic evolution of the mentioned area were a matter of long lasting discussion between advocates of "fixism" – all crystalline basement is only autochthonous (Hynie 1923; Hynie and Kettner 1924; Kubíny 1954–1965) and advocates of "mobilism"– – part of crystalline basement is autochthonous (granites) and parts of crystalline (gneissic complex) are in tectonic – allochthonous (nappe) position (Koutek 1937; Andrusov 1958; Jaroš 1965, 1971; Vozárová and Vozár 1988). However, gneissic complex was described as an Early Paleozoic "para-crystalline" – sedimentary in origin complex, dominated by muscovite-biotite paragneisses, mica shists and metaqartzites, partly injected by "orthogneissic material" having thus character of banded and augen migmatites (Jaroš 1965, 1971)!? Although orthogneisses were identified in the Staré Hory Mts. already by Hynie (1923) and Koutek (1937), hypothesis of sedimentary and/or migmatitic origin of gneissic complex was preferred. On the basis of petrography, the granitic rocks of the Staré Hory Mts. are generally compared with the Nízke Tatry Mts. (Tatricum) granites while the gneissic complex is compared either with the identical rocks on the southern slopes of the Nízke Tatry Mts., or with those of the Northern Veporicum. The penetrative brittle-ductile overprint of the Staré Hory Mts. gneissic complex is considered to be Alpine in age in analogy to strongly sheared Vepor basement (Jaroš 1965, 1971).

The crystalline complex of the Staré Hory Mts. has been newly investigated in the frame of new geological mapping. The integrated research reveals that gneissic complex is presented in various small isolated "windows and outliers" and/or bigger body composing of three imbricated slices. Within this crystalline complex prevail sheared igneous mainly granitic rocks – orthogneisses. In general various structural types of gneiss are present, e.g., coarse-grained "augen" orthogneiss and medium grained – "banded gneisses" representing ultramylonites in which the relics of K-feldspar megacrysts are still preserved in form of polycrystalline monomineralic elongate aggregates. Fine-grained quartz-feldspathic gneisses represent mylonites to ultramylonites. In between fine-grained orthogneisses felsic weakly deformed fine grained geniss are present and are interpreted as relics of aplitic granites. Sporadically, small conform lenses of amphibolites and younger cross cutting gabbro-amphibolitic dykes are present. The metamorphic conditions of these highly strained igneous rocks have not been determined yet. However, based on microstructural criteria, e.g., generally ductile character of deformation and S-C fabrics, grain-size reduction, elongated feldspathic aggregates and presence of quartz ribbons P-T conditions of amphibolite facies can be depicted. Albeit, the age of magmatic origin is still unknown, the deformation and/or recrystallization were Hercynian in age as indicate new Ar/Ar data from muscovites and biotites. Nearly equal plateau ages (PA) of muscovites 337.4 ± 5.3 Ma resp. 338.9 ± 3.7 Ma from augengneisses and "banded" orthogneisses are consistent with biotite PA from identical samples yielding ages 332.1 ± 5.6 Ma and 332.4 ± 3.2 Ma (Kohút and Frank unpublished data). These data, indicate cooling rate of 16 °C/Ma and suggest that during the Hercynian collisional orogeny exhumation of these rocks occurred not only by erosion, but was driven mainly by tectonic processes. These data show that penetrative foliation of these rocks is Hercynian in age even if the allochthonous position within nappe structure developed during Alpine orogeny. The Cretaceous tectonics in this area is linked only with development of narrow brittle shear zones within gneissic complex not exceeding lower greenschist facies conditions.

References

ANDRUSOV D., 1958. Geológia československých Karpát I. Vyd. SAV, Bratislava.

HYNIE O., 1923. Montanisticko-geologické pomery rudního obvodu Starohorsko-Španiedolinského na Slovensku. *Sbor. SGÚ*, 3: 283-321.

HYNIE O. and KETNER R., 1924. Tektonické studie u Motyček a Jelenců na Slovensku. *Rozpr. České Akad.*, 33 (22): 1-6.

JAROŠ J., 1965. Tektonický charakter krížňanské jednotky v okolí Banské Bystrice. *Geol. Práve, Zprávy*, 35: 41-52.

JAROŠ J., 1971. Tectonic styles of the homelands of superficial nappes. *Rozpr. ČSAV, Ř. Mat. – Přír. Věd*, 81 (6): 1-60.

KOUTEK J., 1937. O tektonickém okne starohorském u Baňské Bystrici. *Sbor. štát. ban. múzea D. Štúra v Banskej Štiavnici*, 1: 83-87.

KUBÍNY D., 1965. Niektoré poznámky o geológii širšieho okolia Španej Doliny. *Geol. Práce, Zprávy*, 37: 113-126.

VOZÁROVÁ A. and VOZÁR J., 1988. Late Paleozoic in the West Carpathians. GÚDŠ Monograph.

From Collision through Delamination to Post-Orogenic Uplift: Three Stages of the Hercynian Granite Magmatism in the Veľká Fatra Mts. (Slovakia)

Milan KOHÚT[1], Ulrike POLLER[2] and Wolfgang TODT[2]

[1] *Dionýz Štúr Institute of Geology, Mlynská dolina 1, 817 04 Bratislava, Slovakia*
[2] *Max-Planck Institute of Chemistry, Department of Geochemistry, PO Box 3060, D-55020 Mainz, Germany*

The distribution of various types of granitic and associated mafic magmatic rocks within the European Hercynian belt is related with distinct thermal and tectonic environments. The granitic plutons well mirror the whole Palaeozoic history of this orogenic realm divided into three geodynamic stages. The *Eo-Hercynian period* (Cambrian–Silurian) corresponds to the pre-collision history, reflecting fragmentation of the northern Gondwana immature crust due to formation of small oceanic basins and followed by final subduction and amalgamation of oceanic lithosphere. The *Meso-Hercynian stage* (Devonian–Lower Carboniferous) corresponds to the proper collision tectonics marked by lithospheric thickening with the formation of crustal-scale nappe structures and the intrusions of collision-related peraluminous S-type granites. The *Neo-Hercynian period* (Upper Carboniferous–Permian) correspond to the final collision with concomitant lithospheric delamination (slab breakoff) which resulted in high heat flows, induced melting of lower crustal calc-alkaline I-type granites and granulitization of lower crust, accompanied by large transcurrent faults. This period was characterized by a shift from compressional tectonics towards extensional tectonics, generally interpreted as recording the post-thickening collapse of collisional belt. Rapid post-collisional uplift was associated with small intrusions of A/S-type granites and/or explosive volcanism.

The Veľká Fatra Mountains typify the Core Mountains of the Tatricum, a major tectonic unit in the Western Carpathians. The crystalline basement represented by the Ľubochňa granitoid massif, shows stratigraphic and/or local tectonic boundary with the Mesozoic autochthonous or paraautochthonous Šipruň envelope sequence. The Upper Mesozoic nappe structure is represented by the Krížna and Choč nappes. The crystalline complex includes four Hercynian granitoid rock types that comprise a normally zoned pluton and/or composite massif, consisting of Smrekovica tonalites (ST) with xenolithes and wall rocks of paragneisses and orthogneisses. Other components of the body in a vertical sequence (Kohút 1992) include the Kornietov granodiorites (KGD), the Lipová granites (LG) and youngest Ľubochňa leucogranites (LLG). The Hercynian age of a granite magmatism was determined by Rb/Sr WR isochron with an age of 342 ± 4 Ma (Kohút et al. 1996). This is in accordance with estimation K/Ar isochron from muscovites and/or biotites showing an age of 338 ± 9 Ma, and/or Ar/Ar mineral PA and TGA determinations of 338 ± 2 Ma (Kohút et al. 1998). The first U-Pb zircon data (356 ± 25 Ma) from two micas granite – LG and monazite data (340 ± 2 Ma) from biotite granodiorites – – KGD (Kohút et al., 1997) showed a good compatibility with previous age determinations. Extensive dating of the Veľká Fatra granites using cathodoluminescence controlled single-grain (CLC) method by TIMS, as well as Ion-Microprobe (Poller et al., 2000a) confirmed Lower Carboniferous age – 337 ± 9 Ma for LG, and exhibited younger granite forming event with age of 304 ± 2 Ma for the biotite tonalites (ST). Partly marvellous was indeed the identification of Permian granite dykes within Veľká Fatra composite pluton (Poller et al. 2001), showing an age from 283 ± 15 Ma to 254 ± 13 Ma. Geochemical studies proved the relative independence of three granite types already by Kohút (1992). Due to observed gradual contact and changes in mineral and chemical compositions within granite types as well as lack