In all Core Mountains, regardless whether the magnetic fabrics in crystalline rocks are coaxial with those in cover sedimentary rocks, the magnetic fabrics in granitic rocks, which are mostly Carboniferous in age, are coaxial with the magnetic fabrics in metamorphic rocks, which are in general older than Carboniferous. This coaxiality is interpreted as resulting from Variscan ductile deformations that operated evidently before Triassic (sometimes before Upper Permian) when started the sedimentation in Palaeo-Tethys. The Variscan ductile deformation took evidently place in relatively deep parts of the crust (thick-skinned tectonics), what suggest pressure conditions of granite emplacements and/or metamorphism of the host metamorphic rocks (400–600 MPa), while the Alpine deformations are rather superficial (thin-skinned tectonics).

Even though the magnetic fabrics of crystalline rocks are oriented in different ways in individual Core Mountains, the degree of AMS and the magnetic fabric shapes are relatively homogeneous in all Core Mountains. Consequently, it is very unlikely that the stress and strain fields controlling the formation of the magnetic fabric had more or less the same magnitudes in all the Core Mountains, but different orientations of the principal directions in each Core Mountains. It seems to be more probable that the orientation of the magnetic fabric was rather homogeneous originally and only later, probably in Neogene, during splitting the superunits into smaller blocks, tilting and rigid body rotations of smaller segments took place and the magnetic fabric was differentiated in orientation as observed today.

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# Unusual Subduction Mechanism Recorded in Blueschist Clasts from Cretaceous Exotic Conglomerates of the Klape and Manín Units (Pieniny Klippen Belt, Western Carpathians) as Inferred from Geochemical Study

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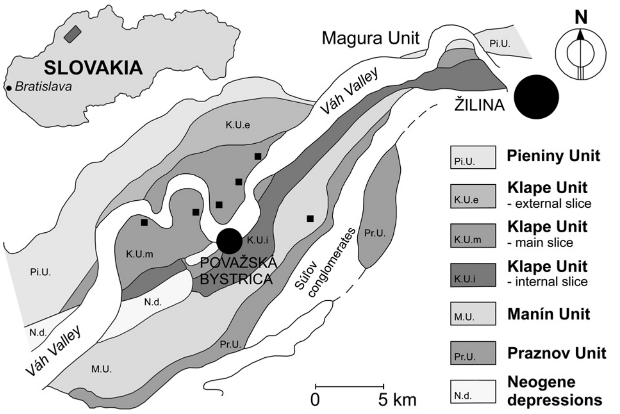
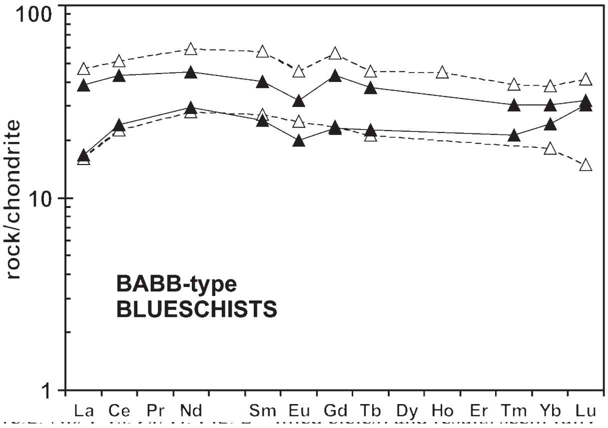
Comprehensive geological study of exotic conglomerates seems to be important tool for the reconstruction of geological structure and tectonic history of crustal segments completely eroded away during the evolution of orogenic belts. Very interesting results can be obtained if volcanic rocks or blueschists occur among clasts. They can be undergone geochemical study to provide additional information to elucidate of the plate tectonic history of removed crustal segments. Possibilities of such study are demonstrated on the example of the Cretaceous exotic conglomerates from the Pieniny Klippen Belt.

The Pieniny Klippen Belt (PKB) is a term for a narrow thrust system between the outer and central Western Carpathians. Western part of the PKB is generally divided into three units: (1) Czorsztyn-Pieniny, (2) Klape and (3) Manín Unit. Huge wild flysh complexes together with thick prisms of Albian exotic conglomerates are most characteristic feature of the Klape Unit whereas similar conglomerates in the Manín Unit form thin layers only associated with flysh of higher (Cenomanian to Turonian) stratigraphic level. Carbonaceous or clastic sediments belong to the most widespread exotic clasts, but igneous and metamorphic rocks also occur in lesser amount. Most of these rocks are unmetamorphosed (carbonates) or they experienced low-grade metamorphic alteration only (volcanic rocks). Occurrences of blueschists are restricted on a small area in the vicinity of the town Považská Bystrica (Klape Unit) or Hradná village (Manín Unit; Fig. 1 – black squares). Although total content of blueschist clasts in conglomerates do not exceed 1%, variegated petrographic types have been found here. Three groups of blueschists can be discerned based on their starting rocks of (1) sedimentary, (2) metamorphic and (3) volcanic origin. Deep-sea laminated pelagic shales and cherts were sedimentary precursors of the first group. Amphibolites and rarely also gneisses oveprinted by blueschist metamorphism represent the second group of blueschists. Amphibolites contain green Ca-amphibole (magnesiohornblende) relics rimmed by pale violet or blue




■ **Fig. 1.**

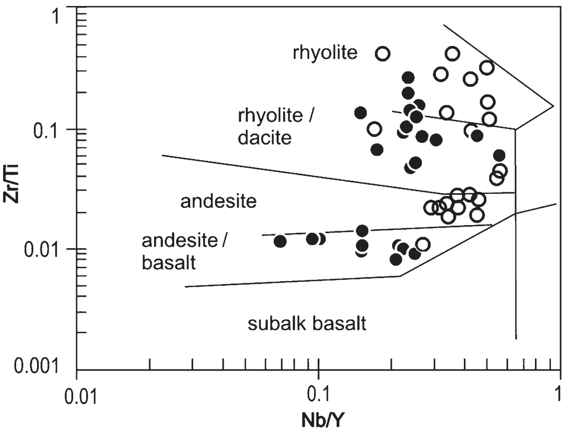



■ **Fig. 3.**

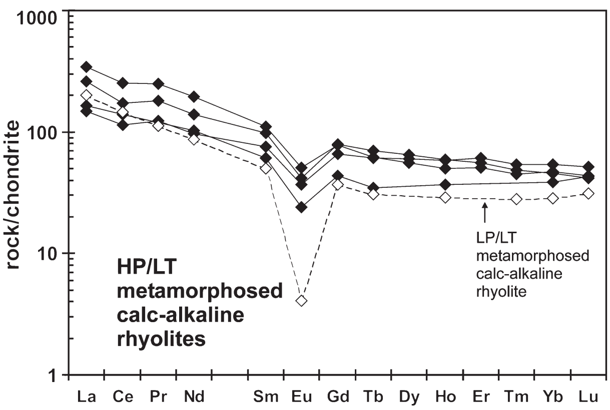
sodic amphibole, former plagioclase was transformed to lawsonite, ilmenite to titanite. Major and trace element distribution indicate that amphibolites were formed by transformation of basaltic rocks geochemically close to N-MORB.

Majority of blueschists from the Cretaceous exotic conglomerates of the Klape and Manín Units were formed by transformation of volcanic and volcaniclastic rocks. Based on their petrographical and geochemical features they can be classified into two petrogenetic groups: (1) blueschists with back-arc basin basalt (BABB) signature (in the Klape Unit only) and (2) blueschists with calc-alkaline (CA) affinity. Metamorphosed basalts, dolerites and gabbrodolerites with usually well-preserved phantoms of magmatic glassy, variolitic, intersertal, ophitic, doleritic and gabbrodoleritic textures make up the former group. Their basaltic character can be illustrated also chemically using Nb/Y vs. Zr/Ti diagram (Fig. 2 – all filled circles in the basalt field fully inside of basalt field). Transformation to lawsonite-, epidote- and also garnet-bearing blueschists or low-temperature eclogites indicates variable p,T conditions of HP/LT metamorphic phase. Similarly to the basalts from some recent back-arc basins (BABB type – e.g. Gribble et al. 1998) they display flat REE patterns (Fig. 3 – filled triangles) with small medium REE enrichment in some samples and small negative Eu anomalies, which indicates their fractionated character (removing of plagioclase). Fully analogical rock types, inclusive metamorphic alteration, have been found in the Bôrka Nappe (Meliatic Unit of the inner Western Carpathians, Ivan 2002, Fig. 3 – open triangles) ... tion of types with well-preserved textures for analytical studies. Most of chondrite normalized REE patterns display generally similar shape from basaltic andesites to rhyolites only with some increasing of total REE content. Differentiated LREE/HREE enrichment with small negative Eu-anomaly is typical (Fig. 4). REE patterns as well as distribution of other trace elements confirm calc-alkaline character of these rocks. The identical calc-alkaline affinity display also LP/LT metamorphosed basic to silicic volcanic rocks forming clasts occurring with blueschist ones in exotic conglomerates (Fig. 2 – empty circles). Similarly to the their high-pressure metamorphosed analogues they are thought to be produced in the volcanic arc setting mostly on subaeral stratovolcanoes, because of extrusive varieties inclusive ignimbrites have also been found here. On the other hand there are also some differences in trace element distribution between both groups most evident in the case of silicic volcanics. Generally higher Zr, Nb and Yb contents, less fractionated LREE/HREE, less pronounced negative Eu-anomaly in blueschist facies rhyolites (Fig. 4) probably reflect some differences in source composition, but some exceptions exist in both groups.

To summarize all petrographic and geochemical features of all calc-alkaline volcanics from the Cretaceous exotic conglomerates of the Klape and Manín Units it can be concluded that they were generated in the magmatic arc related to a mature island arc or active continental margin. Observed geochemical differences between HP/LT and LP/LT metamorphosed rock types could be probably ascribed to their production in various segments,




■ **Fig. 2.**




■ **Fig. 4.**

centres and/or in different stages of arc evolution. Spatially separated origin of these rocks can be inferred also from their different metamorphic history.

Exotic conglomerates of the Klape Unit were formed in a relatively proximal part of sedimentary fan. Original position of the sedimentary area of the Klape and Manín Units in the Carpathian realm is still a matter of debate, either position between the Pieniny-Czorsztyn and Tatric areas or in the more southern Fatric area is suggested. More internal position of sedimentary source is generally accepted. Variability in exotic rock types (more than 100) indicates of complex geological structure of the source area. Presence of blueschists reflects former subduction and exhumation processes recorded in this crustal segment. However specific starting rocks of blueschists indicate that unusual subduction mechanism must be supposed there. Not only components of back-arc basin oceanic crust (BABB-type basalts, cherts and shales) but surprisingly also uppermost parts of arc crust including subaeral calc-alkaline volcanics and their basement (gneisses and amphibolites) were involved in the subduction zone. Subduction and exhumation of arc crust followed probably the same mechanism as was proposed for explanation of very-high pressure metamorphism of continental crust (e.g. Chemenda et al. 1996) and could be explained as its soft analogy. The substantial part of the arc crust escaped subduction and supplied the Klape sedimentary basin with the highly dominated LP/LT metamorphosed calc-alkaline volcanic and plutonic rock clasts.

A Jurassic nappe stack, formed as a result of the Meliata Ocean closure and reactivated by Cretaceous tectonic movements, seems to be most appropriate candidate as a source area of exotic blueschists (Plašienka 1995). Some components of this stack are partly preserved in present-day structure of the inner Western Carpathians. Identical geochemical type (BABB) and $^{40}Ar/^{39}Ar$ age (Jurassic, 155 Ma) of blueschists in the Klape Unit and Meliatic Bôrka Nappe strongly support such interpretation. Moreover evidence for deep subduction and blueschist facies metamorphism of the arc crust are known from both mentioned areas (cf. Ivan 2002).

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# The Tachlovice Fault – a Well-Documented Thrust in the Barrandian

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The Prague Synform (Teplá–Barrandian region, Bohemian Massif) represents remains of Ordovician to middle Devonian sedimentary units folded into a large synclinorium. The Tachlovice Fault (Svoboda and Prantl 1948) is one of major longitudinal faults in the Prague Synform located in the NW limb of the synform. This fault at least fourty kilometers in length strikes in WSW–ENE direction and dips in 45° SE and could be traced from the surroundings of Beroun through Prague to Běchovice.

In the study of the character of the Tachlovice Fault the stratigraphic separation diagram (SSD) was used. This type of diagram shows a relationships between hanging wall and footwall stratigraphy along the fault and allows us to specify the geometry of a fault – i.e. simply geometry like a normal or reverse fault or a more complex shape like a flat-and-ramp geometry.

The stratigraphic separation diagram for the Tachlovice Fault was constructed using detailed geological maps (1:25 000). Based on the interpretation of SSD, we obtained an exact argument for the flat-and-ramp geometry of the Tachlovice Fault. The hanging-wall fault plane consists of the flats located in the Silurian Liteň Formation in the Beroun-Tachlovice area and in the Ordovician Bohdalec Formation in the Řeporyje-Běchovice area; the ramp is situated in the Tachlovice area. The footwal plane is divided by a ramp in the vicinity of Jinonice (Butovice) in two flats: the first one is in the Ordovician Králův Dvůr Formation in the area between Běchovice and Jinonice, while the second one is situated in the Liteň Formation in the Jinonice-Beroun area.

The Tachlovice Fault was believed by many autors (Horny 1965 etc.) to be a reverse fault with top-to-the NW tectonic movement. The facial difference of the Silurian sediments in each fault side (tuffs + limestones × black shales) seems to be so significant that Bouček (1941) speculated about thrusting. Our new research focused on accompaning structures shows a kinematic pattern which is in strong disagreement with old models. The opposite sense of tectonic transport along this fault top-to-the SE ("normal"