of diapiric rise and variable shapes of magmatic intrusions, systematic study using plaster will be carried out. Asphalt will be tested as a more promising and suitable material for modelling the emplacement of volcanic rocks.

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Volcanism of the Jurassic-Cretaceous Triple-Junction Zone in the Eastern Carpathians

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General plate tectonic setting

The triple-junction zone was probably formed somewhere in the present day Eastern Carpathian. The Silesian presumably formed the one arm, the second one was represented by its extension into the Rahiv-Sinaia zone and the third one by the Pieniny Klippen Belt-Magura oceanic realm. The exact location and character of this triple-junction and associated volcanism is one of the subjects of the research undertaken by our team.

The Alpine Tethys includes Penninic, Pieniny Klippen Belt and Magura oceanic realm. This ocean was formed as a result of the separation of Gondwana and Laurasia and connected with the Central Atlantic by a system of transform faults originated during the Pangea break-up process (Golonka et al., 2003). The Pieniny Klippen Belt-Magura basin was characterized during the Jurassic time mainly by pelagic facies containing radiolaria and planktonic algae *Nannoconus*. The submarine Czorsztyn Ridge separated the Pieniny Klippen Belt and Magura subbasins. During Late Jurassic – Early Cretaceous time the Outer Carpathian rift were developed with the extensional type of volcanism. The Silesian Basin originated as a result of the rifting process. The emerged Silesian Ridge (cordillera) separated the Silesian and Magura basins as a result of the fragmentation of the European platform in this area. The subsidence in the Silesian Basin (Oszczypko et al., 2003) was accompanied by the extrusion of basic lavas (teschenites) in the Western Carpathian and the extensive volcanism in the Eastern Carpathians. The Jurassic separation of Bucovino-Getic microplate from European plate is perhaps related to the origin of the Silesian Ridge. The direct connection is obscured however by the remnants of the Transilvanian Ocean in the area of the eastern end of the Pieniny Klippen Belt Basin. These remnants are known from the Inacovce-Krichevo unit in Eastern Slovakia and Western Ukraine. Results of the paleomagnetic research in the Pieniny Kliippen Belt of the Western Ukraine (Lewandowski et al., 2003) shed more light on the dynamic evolution of the basin stretching between Eurasia and Africa-derived Alcapa terrane. They show initially rapid opening (20 cm/y) and then gradual closure of the Pieniny Klippen Belt-Magura oceanic realm in the Late Jurassic time.

Major plate reorganiztion happened during the Tithonian time. The new Atlantic spreading entered the area between the New Foundland shelf and Iberia. The closure of the Meliata-Halstatt Ocean is related to the cessation of spreading in Atlantic Tethys. The Jurassic Alpine Tethys system was abandoned. The change was accompanied by the presumed origination of subduction zone along the margin of the Pieniny Klippen Belt Basin. The age, character and polarity of the presumed subduction are not fully explained. We were assuming the southern dipping of the type B subduction and its location under the southern margin of the Pieniny Klippen Belt Basin. The northern dipping of the subduction and its location under the northern margin of the Pieniny Klippen Belt Basin is also possible. The subduction type B depends on the existence of the oceanic crust, otherwise the type B would occur.

Volcanic sequences

The Eastern Carpathian Mesozoic volcanic sequences are known from the Chivchin – Rahiv ridge (basalts); Uglia (basalts), the Trostianets (basalts, andesites, trachytes) and Vulhovchik streams trough (trachydolerites) as well as from the Transcarpathian depression (basalts, diabases, picritic tuffs). They occur within several tectono-facial units of the Transcarpathian part of the Western Ukraine Carpathian arc. Different path of magma generation within MORB, subduction (A and B) regime (including back arc) as well as stimulated by hot spot allows for recognition various geotectonic environments. This is because products of the appearing magmatism reflect precisely evolution of the events. The research work on geodynamic evolution and on paleogeography of the Polish part of Carpathian during Neo-Cimmerian time (Golonka et al., 2003) showed, that Mesozoic volcanism of the area could be related to complicated development of rift and subduction environments. A setting associating features of both of them is back-arc basin. Evolution of back-arc basins includes magmatic activity showing rift characteristic (inducted by rising mantle diapir) as well as subduction characteristic. The first possibility is supported by some of the volcanic sequences displaying pattern similar to MORB (Lashkevitsch et al., 1995, Varitchev, 1997, Medvedev and Varitchev, 2000). On the subduction-related magmatism could point the LILE behavior in some other sequences occurring in the Eastern Carpathians

(Lashkevitsch et al., 1995, Varitchev, 1997, Medvedev and Varitchev, 2000). The LILE behavior could result from melting process induced within mantle wedge above subducted slab, metasomatised by fluids released from the slab. The process could be more intensive acting jointly with hot spot.

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Collomorph Calcite in Hydrothermal Veinlets from Culmian Greywackes: Possible Relationships to Genesis, Fluid Flow and their Bacterial Content

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The collomorph calcites were found in the Culmian rocks of the Nízký Jeseník Upland, near Jakubčovice and Hrabůvka villages (Kučera, 2002). The origin of these collomorph aggregates can theoretically correspond to process of microbial precipitation of calcite.

The conditions of origin and features of these aggregates have been, therefore, studied, and main emphasis was put there on tectonic structures, previous mineral generations, mineral, chemical and isotope compositions of carbonates and ore minerals, as well as fluid inclusions or cement microstratigraphy, both seen using the cathodoluminescence and fluorescence microscopic techniques.

The calcite veinlets with collomorphs, 0.1–5 cm thick, were sampled on lower two levels of Jakubčovice Quarry. They filled fissured greywackes in many directions, but they are rare in shales. The cemented structures contain small angular clasts of greywackes, with no features of any younger deformation. Many collomorphs cover the previous hydrothermal generations, which consist of crystals. The typical plan of these fills have preferred direction NNE-SSW and WNW-ESE, which characterize the majority of post-Variscan hydrothermal swarms in eastern part of Culmian outcrops.

The collomorphs are calcite-dominated, and they form veinlets, coatings and thick bothryoid crusts. A part of them have nearly a "tufa" -appearance. Accessoric pyrite and marcasite (both determined in reflected light) form thin and alternating lamellar to patchy intergrowths within framboidal, coating or cauliflower-aggregates, which are smaller than 3 mm. The relevant calcites yield typical contents of 0.12 wt.% Mn, 0.24 wt.% Fe and 1.3 wt.% Mg. These contents of manganese and iron are four to six times smaller in comparison with averages on other post-Variscan calcites (Kučera 2002), but magnesium contents are much higher than these referenced values (×4).

The C and O stable isotope compositions of collomorph calcites are characterized by $\delta^{13}C$ values −27.6 to −48.5 ‰ and $\delta^{18}O$ values −4.2 to −6.3 ‰ PDB. As a proxy to original composition of fluids there was used an equation by O'Neil et al. (1969), for temperature 50 °C. The model isotope composition of "collomorph-precipitating" fluids corresponds to values $\delta^{18}O$ ~+0.35 to +2.5 ‰ SMOW. Using the equation according to Deines et al. (1974), the same temperature level 50 °C corresponds to $\delta^{13}C$ −29.3 to −50.2 ‰ PDB (if source is HCO_3).

The closely preceding transparent calcite crystals (Jakubčovice Q., 2nd level) contain rare and irregularly spaced, one-phase spherical inclusions (size 2–15 μm). Thus, the relevant temperature can be easy kept <50 °C. Approximately 10–20 thin growth bands per 1 mm were observed using the CL method. The intensity/color have strongest variations – from black to bright orange (CL) – that suggest great fluctuations in rock microenvironments.

According to $\delta^{18}O$ values (and other above mentioned indications), the mineralisation at crystalline-collomorph transition