(coarse-tail grading), in some cases fluid-escape structures are preserved. Lithofacies B1.1 originated by the deposition from quasi-steady concentrated density flows (Mulder and Alexander 2001) and is alternating with the thin- to thick-bedded, normaly graded fine-grained sandstones representing turbidites sensu stricto with well preserved Bouma´s intervals (lithofacies C2.1, C2.2, C2.3 sensu Pickering et al. 1986). Tabular geometry, great lateral extent and lack of channelization suggest deposition in lobe and interlobe environments commonly interpreted to be diagnostic of an outer submarine fan (Mutti and Normark 1987).

Sedimentary fill of the Zlín Formation in Rača Unit (near the contact with Bytrica Unit) has a different character. Thick (up to 50–100 m) mudstone dominated horizons are alternating with several metres or tens of metres thick sandstone packages. Mudstone horizons are characterized by low sand/mud ratio (<0.5). Thin to very thick fine-grained sandstone beds are overlain by very thick mudstone drapes (up to 10–15 m, lithofacies C2.4 sensu Pickering et al., 1986). These sandstone/mudstone couplets probably originated by ponding of huge turbidite flows, in which the mud component of the flow was retained within a tectonically restricted depocenter. Paleoflow direction inferred from sole structures are usually oriented from SE to NW. However, some ripple and dune orientations indicate flow direction at a high angle to that deduced from associated sole structures. These different directions are caused by reflection off containing slopes (e.g. Haughton 1994). We suppose the slopes were paralel with basin axis (NW-SE trend) and the gravity flows dispersed from the basin margins were forced by basin topography to flow along the axis (longitudal filling).

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Depositional Environments and Biostratigraphy of the Lower Part of Rača Unit Paleogene (Magura Nappe, Outer Carpathians, Eastern Slovakia)

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We have studied sedimentology and biostratigraphy of the lower part of Rača Unit sedimentary infill at several localities in the eastern Slovakia – near Mrázovce village in the southern part, and in Vyšný Komárnik village and Dolhonec valley in the northern part of the the unit. Near Mrázovce village, the upward-fining and thinning bed succession was interpreted in more then 220 m long, well exposed profile from the basal sandstone-conglomerate horizon to overlying thin-bedded and fine-grained lithofacies of the Beloveža Formation (Kováčik and Bóna 2005).

In the lower part of profile the coarse-grained lithofacies, deposited by concentrated density (gravity) flows (sensu Mulder and Alexander 2001) in submarine channels, are presented. Cobble to pebble conglomerates, coarse-grained to granule sandstones are thick- to very-thick-bedded, massive (lithofacies A1.1, A1.4, B1.1 sensu Pickering et al., 1986), graded (lithofacies A2.2, A2.7) or partially stratified (lithofacies A2.8). The thick-bedded sandstones are rich in intraclasts of grey calcareous mudstones containing mixed foraminifera fauna (plankton>>benthos), ostracods, and inoceramid prisms. Benthos is mostly calcareous. Plankton with *Globigerinelloides subcarinatus*, *Gansserina wiedenmayeri*, and *Globotruncanella petaloidea* evidences the Maastrichtian age. Fauna is of "Frydek-type" biofacies. The mudstones were originally deposited under the well-oxygenated outer-shelf settings and later eroded and transported by gravity flows to the site of deposition (base of slope?).

Towards the top (in the middle part of the profile) the finer-grained, thin- to medium bedded turbidites (lithofacies C2.3, C2.2.) gradually prevail above the coarse-grained lithofacies ha-

ving a more organized character with well preserved Bouma's intervals, sole casts and positive grading. Fine-grained sandstones are often horizontally, ripple-cross or convolute laminated and alternate with grey mudstones. Lamination is usually emphasized by the plant and mica detritus. Well preserved flute and groove casts prove the flows directions prevailingly from W or NW to E or SE. The lithofacies of this horizon were deposited in the transitional zones between channels and overbanks or directly in overbanks.

The uppermost part of profile is represented by the Beloveža Formation built by very thin- to thin-bedded, fine-grained turbidites and hemipelagites. The beds of variegated (red brown, green grey) noncalcareous mudstones represent the condensed horizon. These mudstones contain agglutinated foraminifera fauna dominated by the tubular astrorhizids (*Nothia* sp., *"Rhizammina"* sp.) accompanied by abundant *Glomospira charoides*, *Hyperammina nuda* and *Ammodiscus planus*. No stratigraphically significant taxa were observed among agglutinated species. Single specimen of *Subbotina crociapertura* (?reworked) indicates the early Middle Eocene age. Paleoenvironment can be characterized as oligotrophic, well-oxygenated lower slope or basin plain below the CCD. Oligotrophic conditions are also proved by abundant findings of trace fossils (*Chondrites*, *Paleodictyon*, *Scolicia*, *Helminthopsis*) which is a widespread phenomenon related to global warming in the late Paleocene to middle Eocene (e.g. Uchman 2004)

In variegated shales from both Vyšný Komárnik and Dolhonec localities the solely agglutinated foraminifera fauna dominated by tubular astrorhizids (*Nothia* sp., *"Rhizammina"* sp.) was found. Rare *Saccaminoides carpathicus* evidences the Early Eocene age for both localities. Agglutinated foraminifer fauna indicates the lower slope depths below the CCD. Dominant *"Rhizammina"* sp. and abundant radiolarians from Vyšný Komárnik may indicate eutrophic conditions. Moreover, the finely pyritized radiolarians indicate oxygen-minimum zone in the water column according to the taphonomic interpretation of Bąk (2000). However, the deposition of variegated mudstones lasted until the Middle Eocene, as was recently proved from another localities near Vyšný Komárnik (Kender et al. 2005).

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Temporal Investigations and Retrograde Metamorphism of the North-Eastern Part of the Bohemian Massif

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Indentantion of a lithospheric Brunia continent with the Moldanubian orogenic root produced a crustal wedge, which shows following metamorphic zonality from the east to the west: chlorite-biotite, garnet, chloritoide, and staurolite in the easterly par-autochthon (the Desná dome), staurolite-sillimanite-andalusite in the deeper part and staurolite and garnet at the upper part of the westerly lower allochthon (the Keprník nappe) and kyanite zone in metapelites and eclogite boudins in the westernmost upper allochthon (the Velké Vrbno unit). The structural mapping distinguished fabrics related to burial, reworked by transpressional deformation and folding and finaly by heterogeneous extensional deformation associated with voluminous magmatism. Th-U-Pb dating on monazites provides information on the prograde and retorgrade parts of PT evolution while the closure of the K-Ar isotopic system in muscovite and biotite allows determining the time when the rock passes through the isotherms of about 360 and 320 °C, respectively. Four micaschist samples collected from chlorite-biotite zone (300–400 °C) at the eastern border of the Desná dome yield the K-Ar ages of muscovite that provides the age of metamorphic peak (from 320 ± 4.7 to 343