14th Czech-Slovak-Polish Palaeontological Conference
9th Polish Micropalaeontological Workshop

Abstracts Volume

Edited by:

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J. Kowal-Kasprzyk
A. Waśkowska & M.A. Kaminski

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and

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Abstract Volume

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14th Czech - Slovak - Polish Palaeontological Conference and 9th Polish Micropalaeontological Workshop Abstracts Volume

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Preface

Since 1998, the Grzybowski Foundation supports joint meeting of micropalaeontologists and paleontologists from around the world that are hosted in Poland. In this year we will meet together in Kraków on common Ninth Micropalaeontological Workshop andFourteenth Czech - Slovak - Polish Paleontological Conference. AGH University of Science and Technology will again host Palaeontological meeting, as before, in 2011, when we met together on common MIKRO-2011 and Annual TMS Foram-Nannofossil group meetings. Thanks to the hospitality and kindness of our Sponsors from AGH UST we are able to meet again in beautiful historical capital of Poland. We hope that this event will serve to bring all the Participants closer together by fostering the sharing of ideas and collaboration in the subject of Palaeontology and Micropalaeontology.

In Kraków, research and training in the subject of Palaeontology & Micropalaeontology is currently undertaken at several universities and institutions: The Jagiellonian University, The Pedagogical University, the Academy of Sciences, and the Polish Geological Institute. All these efforts are logistically supported by the Grzybowski Foundation Library, which is located at the Geology Museum of the Jagiellonian University. The AGH University of Science and Technology in Kraków is one of the Polish Universities where the Palaeontological & Micropalaeontological studies have been carried on since the early beginning of the XX century. The micropalaeontological school at AGH UST were initiated by Professor Stanisław Liszka who studied intensively foraminiferal fauna from the Cretaceous deposits in the vicinity of Kraków and in the Polish Outer Carpathians. After the Second World War researches were conducted in the Palaeontological Department of AGH under the guidance of Professor Franciszek Bieda. Over the years many of the Polish researchers worked here on macro- & microfossils. Studies are conducted mainly in the ancient basins of the Western Tethys and Paratethys. Today micropalaeontological studies are part of the scientific task of the Faculty of Geology, Geophysics and Environmental Protection.

We take this opportunity to thank the Organizers and the Sponsors of the meeting. Many people worked together to make this meeting possible. Secretary took care of registration and collected the abstracts for this volume. All the members of the Organizing Committee rallied their creative energy to make this meeting possible. We want to thank the AGH University of Science & Technology for letting us use their facilities and the Grzybowski Foundation for sponsoring.

With all the various scientific and social activities planned during this year's meeting, we are certain that there will be lots of opportunities to network and to share ideas.

We wish you a pleasant stay and successful discussions!

On behalf of the Grzybowski Foundation,

Marta Bąk, Anna Waśkowska & Mike Kaminski

Volume dedicated to Professor Jan Golonka

With this issue of the Grzybowski Foundation Special Publication, we wish to honour Professor Jan Golonka, in 45th anniversary of the beginning of his scientific career.
Prof. Jan Golonka is worldwide known expert on the global geology and palaeogeography, global seismology, regional geology, plate tectonics and petroleum geology. He also conducts research in the field of geotourism and geodiversity. The area of his research include developing of geodynamic evolution models of Arctic, Tethys, South Atlantic and SE Asia, palaeogeography and petroleum system of Carpathian basins, regional geology and plate tectonics of the circum-Caspian area, and source rocks prediction studies. His scientific activity focused on petroleum system of Arctic basins, Carpathians, Caspian Sea, Black Sea, South China Sea. He is a consultant in major Polish and international petroleum companies (prospective and exploratory projects). He developed palaeoenironmental and paleolithofacies maps for Shell. Prof. Jan Golonka edited and wrote books for Elsevier, SEPM and AAPG. In its authorship is more than 450 publications including several monographs.

He began his scientific way as an assistant at the Faculty of Geology of the AGH in 1967. From 1969 to 1981 Jan Golonka worked in the Carpathian Branch of the Geological Institute in Cracow, first as a senior assistant and then, for many years he was Head of the Department of Regional Geology of the Carpathians. In this period he carried researches in different field as sedimentology of carbonates, microfacies, stratigraphy, palaeontology of coralline algae, and regional geology of the Carpathians and their Foreland. In 1978 he received a degree of Doctor of Natural Sciences at the Institute of Geology in Warsaw based on a doctoral dissertation untitled "Algae and biosedimentation of the Miocene limestone from the visinity of Rzeszów".

In 1982 he started his work in the USA for the Mobil Technology Company. He cooperated with many geological scientific institutions as University of Texas in Arlington, University of Texas in Austin, University of Chicago, Columbia University, Rice University, SCRIPTS, Russian Academy of Sciences, Moscow University. Together with Chistopher Scotese of UT Arlington and Malcolm Ross at Rice University, he published a series of Palaeogeographical and Palaeoclimatic Maps of Phanerozoic time (Cambrian - Neogene). In the USA, he conducted regional research and evaluation of sedimentary basins in different parts of the world. His studies of regional-exploration include: the area around the Gulf of Mexico, West Texas, Wyoming, the North and South Atlantic, Arctic, Sakhalin, Ochotskie Sea, Mediterranean basins (Tunisia, Italy Adriatic), Persian Gulf, Pakistan, Afghanistan, and North-West shelf of Australia. More recently, he specialized with investigations of CIS basins, particular in areas of the Black Sea, Caucasus, Caspian Sea, Turkmenistan, Kazakhstan and Uzbekistan. These studies integrated geological and surface drilling data with interpretation of satellite images, and geophysical data. Together with colleagues from Mobile TC, Columbia University and SCRIPTS he participated in the development of technologies using SEASAT satellite images for mapping the gravity of the seas and oceans. As a part of his study on global geology Jan Golonka made, together with A. Dronkers, Global Map of the thickness of the sedimentary deposits. This map is still useful for strategic evaluation of sedimentary basins.

Jan Golonka achieved a detailed study of oil fields in the context of the green economy and environmental protection. He designed the drillings of "spider wells" type which minimize the technical impact on the natural environment in the Santa Barbara Channell. He modeled the exploitation of the oil field Berri for ARAMCO (Saudi Arabia) and the impact of *hydrocarbons and their replacement of pumped seawater. Such studies were also carried out in the North Sea (Beryl and Statfjord fields) in the Beaufort Sea (Alaska, North Slope) and West Texas. He has also conducted research on reservoir properties of Permian carbonate rocks of West Texas.*

In 1999 he came back to Poland. Soon, he assumed the position of Assiociate Professor at Jagiellonian University and made habilitation in Geology in 2003. In Kraków, he continuing the study of plate tectonics model of the Carpathians and the western Tethys. As one of the editors, he working on a book untitled "Phanerozoic Reef Patterns". In this period he also completed the work on the synthesis of plate tectonics and paleogeography of the Earth in the Phanerozoic. The results were presented in a series of publications (Elsevier, SEPM).

In 2004 he returned to the home Academy – AGH UST, and was appointed as a Professor . In 2010 he received the official title of Profesor in Earth Sciences from the President of the Republic of Poland.

Professor Jan Golonka passion is teaching. He is a great teacher and supervisor of master's and doctoral thesis. He is teaching physical and applied geology, plate tectonics and geotourism. He also conducts lectures abroad in Berlin, Erlangen, Munich, London, Edinburgh, Oslo, Moscow, Hanoi, Beijing, and Ulan Bator.

Anna Waśkowska & Marta Bąk

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Radiation and evolution of earliest pelagic orthocerid cephalopods: genus Bactroceras Holm, 1898 from the Ordovician of Bohemia

Martina AUBRECHTOVÁ and Štěpán MANDA

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Ordovician genus *Bactroceras* Holm, 1898, the oldest known orthocerid cephalopod, is characteristic in possessing a slender, straight shell with deep phragmocone chambers, narrow ventral siphuncle, low annular elevation and sub-spherical embryonic shell lacking a cicatrix. Appearance of this combination of morphological features marks a revolutionary step in cephalopod evolution (Kröger et al., 2009; Kröger & Zhang, 2009) because it enabled the expansion of cephalopods from their original tropical, shallow-water environments to pelagic, deep-water realm. Consequently, cephalopods spread globally as top predators in the oceans and especially the orthocerids became incredibly diverse and abundant. However, the knowledge on morphology and mode of life of the earliest orthocerids is insufficient due to poor preservation and the evolution of the whole order has thus been confusing and unclear for a long time. Genus *Bactroceras* fills this gap and reveals some of the crucial information on the first great expansion of cephalopods during the Ordovician.

A remarkably large yet previously unstudied collection (about 120 specimens) of exceptionally well-preserved specimens from the Prague Basin (Bohemia) was examined and assigned to the two species of genus *Bactroceras*: 1) *B. sandbergeri* Barrande, 1867, found preserved in siliceous nodules of the Šárka Formation (Dapingian, Middle Ordovician) and 2) *B. interpolatum* Barrande, 1870 from Upper Ordovician (Katian) claystones of the Králův Dvůr Formation. *B. sandbergeri* has been synonymised with the type species of the genus, *B. "avus"*, which was previously known from only one specimen described and pictured by Holm (1898). Consequently, a better understanding of the morphology of the type species, as well as emendation of diagnostic characters of individual species and the genus was possible. Also, exact stratigraphic and palaeograpraphic occurence of genus *Bactroceras* was refined and evaluated.

Results of the present study are interpreted as follows: 1) the similarities between genus *Bactroceras* and the bactritids (e.g. Erben in Moore, 1964) constitute a morphological convergency of two unrelated lines caused by a similar mode of life; 2) the relatively small, sub-spherical embryonic shell without a cicatrix known in *Bactroceras* and other early orthocerids contrasts remarkably to embryonic shells of other cephalopod groups. We consider these features to be the main diagnostic character of the Orthocerida, especially when distinguishing orthocerids from the morphologically similar order Pseudorthocerida; 3) the relatively small embryonic shell of early orthocerids proves a transition to pelagic life-style and planktonic feeding strategy for the early hatchlings; 4) based on the slender straight shell and a narrow empty siphuncle, we can conclude that *Bactroceras* and other early orthocerids were primarily pelagic, slowly swimming, vertical migrants that passively migrated with oceanic currents and that were able to withstand high hydrostatic pressures of greater depths. Mentioned shell morphology in combination with worldwide palaeogeographic distribution implies a high dispersion potencial of the early orthocerids. Associated deep-water fauna, as well as frequent preservation and accumulation of *Bactroceras* and other early orthocerids in pressumably off-shore sediments and black shales supports conclusions mentioned above; 5) stratigraphic and palaeographic occurrence of various species of genus *Bactroceras* suggest origin of orthocerids in high-latitude, cold-water environments and their subsequent dispersion to low-latitute tropical realm; 6) mentioned changes in life-style and feeding strategies mark a critical step in cephalopod evolution and correspond well to reported changes in the structure of ecosystems and biodiversity during the Great Ordovician Biodiversification Event (Servais et al., 2010).

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The Late Cretaceous gastropods from Volyno-Podillya (Western Ukraine) – diversity and distribution

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Nearly two thousands specimens of the Late Cretaceous gastropods, collected from the Volyno-Podillya (Western Ukraine), were analysed. As a result of the study, 130 species belonging to 67 genera and 27 superfamilies have been identified. All samples are kept at the State Museum of Natural History NASU (Lviv).

A thick Upper Cretaceous strata from the region investigated is compiled by carbonate-terrigenous sediments and yields abundant and well preserved fossils. Gastropods are present in many assemblages of the Late Cretaceous and frequently they form an important part of fauna.

Throughout the section gastropods occur at several layers: in Lower Cenomanian, Campanian and Maastrichtian. In Santonian they are rare and have not been establish in Turonian and Coniacian. The Early Cenomanian gastropod assemblages are distributed in the south-eastern part of Volyno-Podillya and are distinguished in the basal conglomerates. They are characterized by the prevailing of superfamilies Pleurotomarioidea, Trochoidea, Stromboidea, Ringiculoidea. The species *Avellana cassis*, *Avellana telegdii*, *Eucyclus tuberculatocostatus*, *Solariella sobetskii* are dominated in Early Cenomanian gastropod assembladges. Santonian-Maastrichtian gastropod assemblages occur in Lviv Trough (north-western part of Volyno-Podillya) and are distinguished in the marly sandstones of Santonian, sandy and silty marls of Campanian and Maastrichtian. The superfamilies Stromboidea, Muricoidea, Cerithioidea, Buccinoidea are more diverse and the species, such as *Drepanocheilus substenoptera*, *Aporrhais pyriformis*, *Avellana inversestriata*, *Cerithium binodosum*, *Calliomphalus inaequecostatus* are the dominant species. The Early Cenomanian gastropod assemblages completely differ from Santonian-Maastrichtian assemblages both at the species and at the genus levels. Only 7 genera are common to these assemblages: *Emarginula*, *Bathrotomaria*, *Conotomaria*, *Nairiella*, *Gyrodes*, *Confusiscala*, *Avellana*.

In general, gastropods are distributed in the sections and on the area irregularly. They are abundant in the sediments rich on a clastic material (basal conglomerates, calcareous sandstones, sandy and silty marls). In the carbonate deposits species diversity is reduced and in the high carbonate sediments (chalky limestones and chalk) they disappear completely.

New brachiopod fauna from the Silberberg Formation (Late Eocene to Early Oligocene) of Atzendorf, Central Germany

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Oligocene brachiopods of Europe, contrary to the Eocene and Miocene ones, are still poorly known. They have been so far described in modern terms only from the Mainz Basin, Germany (Bitner & Kroh 2011) and from the Aquitaine Basin, France (Bitner et al. 2013). Brachiopods described here come from the locality of Atzendorf. This locality is situated about 100 km north of Leipzig, Germany (Müller 2011). The Late Eocene to Early Oligocene deposits (the stratigraphy is under discussion) cropping out in the gravel pit of Atzendorf are represented by silts with rich and diverse fauna of tropical to subtropical character (Müller et al. 2013). Geologically those deposits are part of the North Sea Basin.

The brachiopod fauna contains six species belonging to six genera, i.e. *Discradisca* sp., *Cryptopora* sp., *Pliothyrina* sp. cf. *P. grandis* (Blumenbach, 1803), *Terebratulina* cf. *tenuistriata* (Leymerie, 1846), *Rhynchonellopsis nysti* (Bosquet, 1862), and *Orthothyris pectinoides* (von Koenen, 1894). The two latter species dominate and constitute 95 % of the material.

Rich and excellently preserved material of *R. nysti* and *O. pectinoides* allows to investigate their internal structure for the first time. Based on external morphology *R. nysti* was attributed to the family Cancellothyrididae Thomson, 1926. This family is characterized by a short loop with crural processes united to form a ring with transverse band while the loop in *Rhynchonellopsis* is simple with subparallel descending branches and wide, horizontal transverse band – a typical brachidium of the family Chlidonophoridae Muir-Wood, 1959 which never has crural processes united. Thus, *R. nysti* should be transferred to the latter family. Also *O. pectinoides* has a brachial skeleton of chlidonophorid type, however, a transverse band in this species is incomplete.

The species *R. nysti*, originally described from Belgium, is known only from the North Sea Basin. For long this species has been considered as restricted to the Oligocene, however, the present studies show that it also occurs in the uppermost Eocene. In turn, *O. pectinoides* is known since the Early Eocene, being widely distributed in whole Europe during the Eocene. From the Oligocene deposits it is reported only in the North Sea Basin.

Gastropod predation intensity is usually very low in most Cenozoic brachiopod populations, and the investigated material is not different; drillings were observed on less than 1% of specimens.

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First Early Sarmatian brachiopods and accompanying fauna from the Central Paratethys

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The Sarmatian (13.0 to 11.6 Ma) is a regional stage used in the Central Paratethys for part of the Middle Miocene (Upper Serravallian). Its brackish-water character was for long considered as common scientific knowledge. However, Piller and Harzhauser (2005), reinvestigating taxonomically the biota and studying geochemistry and microfacies of carbonates, proved normal marine conditions for some of the Sarmatian sediments in the Vienna Basin.

The Miocene fauna described here come from the locality of Sandberg. This locality is situated close to the village Devínská Nová Ves, about 700m south from the centrum of the village (GPS: N 48°11'59", N 16°58'32", 218 m above sea level), southern Slovakia, representing an abandoned sandpit (Hyžný *et al*. 2012). Two distinctly different lithofacies occur in Sandberg, lower part consists of sands with sandstone beds interpreted as typically beach environment, the upper part is formed by massive beds of bioclastic and corallinacean limestone with marly intercalations interpreted as reef environment with sheltered caverns. The uppermost part of the section, based on the presence of nannoplankton *Calcidiscus macintyrei*, is interpreted as Early Sarmatian age (Hyžný *et al*. 2012). Both bryozoans and brachiopods studied here were collected in the uppermost part of the section in Sandberg. Thus, this is the first record of brachiopods from the Early Sarmatian.

Three brachiopod species have been identified in the Early Sarmatian (Middle Miocene) deposits of the Slovakian part of the Vienna Basin, short-looped terebratulide *Gryphus miocenicus* (Michelotti, 1847), and two megathyrid species *Argyrotheca cuneata* (Risso, 1826), and *Joania cordata* (Risso, 1826). The species *G. miocenicus* and *J. cordata* dominate in the studied material while *A. cuneata* is extremely rare. This is the first record of those species from Slovakia. Both megathyrid species, *A. cuneata* and *J. cordata* are one of the commonest species in the Central Paratethys. *Gryphus miocenicus* was originally described from Italy, and in the Paratethys it has been so far reported only from Hungary and Austria (Bitner & Dulai 2004).

The bryozoan association is composed of 10 species, and dominated by *Umbonulla macrocheila*, one of the commonest species in the Miocene sediment in the Vienna Basin and Carpathian Foredeep (Zágoršek 2010). The other genera (like *Margaretta*, *Schizoporella*, *Smittina* etc.) indicate stenohaline conditions and are very different from those traditionally assigned to be Sarmatian (*Schizoporella* is subordinate, *Cryptosula* is absent in the studied association).

The presence of brachiopods in the rocks dated as Early Sarmatian is a warning for the interpretations of other sequences of the Central Paratethys as Badenian in age solely on the occurrence of brachiopods.

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Middle Miocene (Badenian) brachiopods from the Carpathian Foredeep in Moravia (Czech Republic) – rediscovered

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The Carpathian Foredeep (CF) is a peripheral foreland basin developed from subsurface loading of the Alpine-Carpathian orogenic belt on the passive margin of the Variscan Bohemian Massif. The part of the CF studied is filled with Neogene clastic deposits. The sedimentation started in Late Egerian/Early Eggenburgian and continued in the area of the Czech Republic up to the Late Badenian. During the early Middle Miocene the CF geometry was re-organised because the NNW- and NW-oriented compression of the Carpathian orogenic wedge changed towards NNE- and NE-oriented compression.

Brachiopods, although of low diversity, are very common in various Middle Miocene deposits of the Central Paratethys. In the Moravian part of the CF (Czech Republic), however, Miocene brachiopods are very rare, both in species and in number. Despite the intensive recent investigations they were found at only eight localities: Kralice nad Oslavou, Židlochovice, Vranovice, Rebešovice, Podbřežice, Přemyslovice, Hluchov, and Služín. All the studied sections are of Early Badenian age, interpreted mostly as shallow-water, warm environments.

In the locality of Kralice nad Oslavou the Miocene sediments are composed of yellow marls and calcareous sandstones with very rich fauna of foraminifers, bryozoans, mollusks and echinoderms. In this locality brachiopods are most diverse and most numerous among Moravian localities (Bitner *et al*. 2013). Eight brachiopod species, i.e. *Novocrania* sp., *Cryptopora lovisati* (Dreger, 1911), "*Terebratula*" sp., *Megathiris detruncata* (Gmelin, 1791), *Argyrotheca cuneata* (Risso, 1826), *Joania cordata* (Risso, 1826), *Megerlia truncata* (Linnaeus, 1767), and *Platidia anomioides* (Scacchi & Philippi, 1844), were recognized. The dominance of *C. lovisati* and *P. anomioides* makes this assemblage very unusual, indicating an environment deeper than 100 m. This is the first, and so far the only record of *Novocrania*, *C. lovisati* and *M. truncata* from the Moravian part of the CF.

The section in Židlochovice represents the faciostratotype of upper part of the Lower Badenian – Moravian sequence. The Miocene deposits are represented by clayey marls, marls, and algal limestones. Brachiopods are rare, represented by four megathyrid species *M. detruncata*, *A. cuneata*, *Argyrotheca* sp., and *Joania* sp; *A. cuneata* is most common (Pavézková *et al*., in press).

Calcareous silty clay, clayey silt, mudstones with numerous foraminifers and bryozoans are reported from the locality of Vranovice. Brachiopods are very rare, and only two species, *A. cuneata* and *J. cordata*, were identified.

The brachiopod assemblage from the borehole Rebešovice comprises two species *A. cuneata* and *J. cordata* occurring in lime marls with rich association of bryozoans.

The Miocene in the locality of Podbřežice is represented by limestones intercalated by marl layers with very rich faunas of bryozoans, mollusks and echinoderms. Brachiopods are rare and poorly preserved, represented only by *Platidia* sp.

The Middle Miocene deposits in Přemyslovice consist of red-algal limestones and calcareous sands. Four species of brachiopods were identified in this locality (Zágoršek *et al*. 2012): large, smooth terebratulide *Terebratula* sp. and three micromophic megathyrid species *M. detruncata*, *A. cuneata,* and *J. cordata*. The species *A. cuneata* dominates in this locality.

In Hluchov the Miocene deposits are represented by sandy gravels, sands, sandy and silty clays and sandy limestones with abundant fossils (mainly foraminifers, bryozoans, mollusks, echinoderms, and cirripeds).

Brachiopods are rare and of low diversity, represented by three micromorphic species: *Argyrotheca bitnerae* Dulai, 2011, *J. cordata*, and *Platidia* sp.; *A. bitnerae* is a dominant species in this locality (Hladilová *et al*., in prep.).
The Miocene marls from the borehole near the village of Služin yielded only one brachiopod species, *J. cordata*.
Altogether twelve, predominantly micromorphic species have been recognized in the Moravian Miocene deposits; some of them, because of poor preservation, determined only to the genus level. The locality Kralice nad Oslavou shows the greatest diversity with eight species. One species has been identified in the localities of Podbřežice and Služin. All species mentioned above are known from other Miocene Paratethyan localities, however, the diversity of the Moravian brachiopods is lower.

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Results of the microbiostratigraphical, microfacial and lithological research of the Párnica Formation at Kraľovany locality (Krížna nape, Western Carpathians)

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In our contribution we present results of the research of the Párnica Fm. of the Fatric Krížna nape (northern rim of the Malá Fatra Mts.). The section at the road-cut on the left river bank of the Váh valley, 400 m SSE from the Kraľovany village, was exposed during the highway construction. The log consist of 6 partial profiles (Kraľovany Kr-1 to Kr-4B), as it was not possible to determine fully continuous sequence.
Lithological, microfacial and microbiostratigraphical research of the profile brought new scientific knowledge. We find a new occurrence of the Vlkolínec breccia – its lower horizon of the carbonate paraconglomerate. Especially in the lower partial sections we noticed a large amount of the sandy to silty grains of clastic quartz with undulate dim out, until now not mentioned from elsewhere of known Párnica Fm. localities. Some of the sediments represent sandstone with calcareous matrix.
During the study of the marly slates at the partial section Kraľovany Kr-3 we found an atypical facies containing amount of disordered and unsorted clasts (washout) of marls, marly limestones and sandy marls. The composition of the majority of the clasts is same, or nearly identical to the matrix of the sediment, such a facies from Párnica Fm. was not described so far. By analyze of the planktonic foraminifera, which are of the Late Aptian age, we proved that clasts and the matrix are more or less contemporary. Stratigraphically eminent planktonic foraminifera here were noticed at first from the

sample Kr 15 (section Kraľovany Kr-1). That was *Schackoina cabri* SIGAL**,** its first occurrence is as Late Aptian and spans up to Early Albian (BouDagher-Fadel et al., 1997).

In the section Kraľovany Kr-3 we noticed interesting association of planktonic foraminifera with prolonged chambers „*Globigerinelloides*“ gr. *bizonae* (CHEVALIER) – *saundersi* (BOLLI) and *Lilliputianella globulifera* (KRETCHMAR and GORBACHIK). Here we identified for the first time stratigraphically distinct forms *Globigerinelloides barri* (BOLLI, LOEBLICH and TAPPAN) and *Globigerinelloides ferreolensis* (MOULLADE), indicating Late Aptian age, foraminiferal biozone *Globigerinelloides ferreolensis* or younger, restricted by the occurrence of the species Globigerinelloides ferreolensis (Robaszynski and Caron, 1995; Moullade et al., 2002 and others).

In the matrix of carbonate paraconglomerate we noticed also rare tintinid *Colomiella mexicana* BONET.

On the occurrence of the index planktonic foraminifera and on the superposition of the Kraľovany Kr-1 and Kraľovany Kr-2 sections we range the succession of the Párnica Fm. from Kraľovany to the Late Aptian.

Our research is closely related to former study of pelagic and slope deposits of Párnica Fm. from the localities Lúčky – Hlboké (Boorová and Filo 2009, Boorová and Józsa 2009), Žaškov (Boorová and Filo 2012 a, 2013) and Vlkolínec (Boorová and Filo 2012 a, b). Knowledge gained from these localities correspond to present results.

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New find of testate amoebae in the Miocene of Moravia (Czech Republic)

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Although the testate amoebae are undoubtedly ancient protozoans, the fossil record is rare even in the Miocene. The first reliable Miocene testate amoebae were described from tuffs and limestones of northern Patagonia by Frenguelli (1933). He assigned them to a new variety of modern species (*Tracheleuglypha dentata* var. *miocenica* Frenguelli). After the WWII testate amoebae were described from the Miocene of the Central Paratethys in Hungary (Kövary 1956) and Slovakia (Brestenská 1977). Holcová (2008) recently revised both *Silicoplacentina* of Kövary and *Calcisacculus* of Brestenská. The systematic position of these forms remains uncertain because of their large test size and different nature of wall, usually several grain thick. The reliable testate amoebae were recently reported from wells in Eastern

Colombia by Fiorini (2010). This amoebae fauna was assigned to genera *Difflugia*, *Heleopera*, *Centropyxis* and *Pontigulasia*. Accompanying agglutinated foraminifera clearly indicate brackish environment like a mangrove swamp or marsh.

The author of this communication attempted to find testate amoebae many times in brackish or freshwater lacustrine clays of Lower Miocene (Ottnangian) in Brno surroundings but without success. Also the organic rich clays accompanying the lignite seams of Late Miocene in Moravian part of Vienna Basin were examined with negative result. Finally the greenish and brownish clays from the Ochoz HV-1 borehole drilled in 2012 near Lomnice gave testate amoebae fauna. The age of the clays is not precisely known. Similar clays occur at the base of the Badenian in the area but also in the Lower Miocene (Ottnangian).

Temporarily six different forms can be distinguished in the assemblage:

Difflugia aff. *oblonga* Ehrenberg (length 0.16-0.32 mm; most frequent form);

Difflugia aff. *acuminata* Ehrenberg (length 0.18-0.25 mm);

Difflugia sp. (length 0.28 mm; the test is widest near the peristom, opposite end is tapered);

Centropyxis sp. (length 0.24 mm; broadly oval, nearly smooth test with circular peristom). Other two unidentified forms can be described as small circular form (cysts?) and semicircular/sacklike form with elongated (and ususally broken) neck. All specimens are compressed by compaction of sediment. The test wall of *Difflugia* representatives is composed of single layer of quartz grains. Comparing with the problematic Miocene taxa *Silicoplacentina* and *Calcisacculus*, the forms from Ochoz are undoubtedly testate amoebae well-comparable with modern lacustrine species. Accompanying fauna comprises single valve of unornamented ostracod. Taphonomical conditions, like fast burial and lack of bioturbation, may be necessary conditions for preservation of testate amoebae with generally very low preservation potential.

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Fe-Mn related bacterial communities from the Cenomanian deep-water settings of the Silesian Basin, Outer Carpathians

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Ferruginous and manganese coatings occurring in the Cenomanian deep-water turbidites of the Outer Carpathians, present as ferrous- and ferromanganes oxides/hydroxides, represent the iron related bacteria. They have been formed on calcareous and siliceous bioclasts, filled pore space between mineral clasts and bioclasts, or locally, formed continuous, parallel microlayers, surrounding grains. The singular grain coatings and those one formed the mats consist of densely packed elongated capsules, of 5 μm width, with wall of 0.1 μm thick, which are remnant of the original bacterial sheath. The chemical composition of the capsules and their morphology show that they may be representatives of the *Sphaerotilus–Leptothrix* group, living recently around the low-temperature hydrothermal vents. Such vents are here also interpreted as the source of metals for bottom sediments in the Silesian Basin, where the bacteria could live and precipitate oxidized iron and manganese during the Cenomanian.

Diatoms occurrence in the Upper Cenomanian–Lower Turonian Anoxic Event deposits from the Outer Carpathians

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The enhanced diatoms sedimentation is clearly recorded in the upper part of the organic-rich sediments belonging to the Barnasiówka Radiolarian Shale Formation (BRSF) (K. Bąk et al., 2001), (age and facies equivalent of the Bonarelli Level) and the overlying Variegated Shale. It is well visible in thin sections, where diatoms are abundant, but also it is manifested macroscopically by distinct silicification of these deposits. Common diatom frustules have been found during the thin sections analysis of deposits from the Silesian and Subsilesian nappes (M. Bąk, 2011). In the lower part of the BRSF, which consists there predominantly of thin- to medium bedded calciturbidites and siliciclastic silty and fine-grained turbidites, frustules are less common. Under a 1000 x magnification 1–10 specimens may be present in each view field. Specimens, probably colonies, representing chains of frustules, are usually large, up to 70 μm long. Abundant diatoms are present within the upper part of the sequence which is more silicified. Frustules of predominately pennate-type are small, usually less than 10 μm long, with single longer specimens. Their content varies from 40 to as much as 100% of a view field, but their presence is detectable only under magnification of 1000 x. The higher content is present in claystones, both green and black, especially those with higher amount of fecal pellets. Under the maximum magnification, frustules can be the only component of this microfacies, present within both, the pellets and the matrix. Being so rich in frustules, these deposits macroscopically recognized as green or black shales, are in fact diatomaceous claystones or even diatomites. Diatoms and coccospheres are also abundant in claystones enriched in radiolarians and even in radiolaritic laminae sometimes being the main component of the matrix.

Diatom enriches in section studied coincides with weakening of the detrital input, which is observed toward the organic-rich deposits of the OAE2. Diatoms presence suggests also that surface waters in the Silesian and Subsilesian basins contained bio-limiting ingredients rich enough to sustain diatoms activity at that time. The same could be observed in the Umbria Marche basin (M. Bąk, 2011), where an increase of diatoms content also coincide with macroscopically visible silicification of the upper part of the BL deposits. This coincidence is interpreted as wide propagation of environmental conditions, which enhanced diatoms growth in both regions.

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Olistostrome deposits in the Eocene Hieroglyphic Foramtion (Silesian Nappe, Outer Carpathians)

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The Silesian Series was deposited in the Silesian Basin and preserved within the Silesian Nappe, one of the main tectonic units of the Outer Carpathians. The section of Silesian Series represents most complete in the Outer Carpathians, continuous basinal sedimentary succession (Late Jurassic - Early Miocene), that is developed mainly of flysch facies. It contains intercalations of numerous olistostromes that occurre in the most of its lithostratigraphic divisons. Specially interesting is olistostrome sequence in the Hieroglyphic Formation of Middle to Late Eocene in age, which occur in surroundings ot the artificial Rożnów Lake. Olistostrome is represented by sediments of sub-marine debris-flows containing various clasts and olistolits. The matrix of sandy-gravel debris-flow is composed mainly of quartz, with admixture of feldspars, muscovite and plant detritus, as well clasts of sedimentary rocks, maily mudstones, marls or occasionally limestones. It contain separate bigger exotic gravels of Jurassic, Stramberk-like limestones and crystalline rocks. Different size olistolits (from several meters up to 100 m or more) consists mainly of flysch deposits typical for Hieroglyphic Formation as well as Ciężkowice-like thick-bedded sandsones and variegatet shales. Very common are clasts and olistolits of mudstones.To determine the age of olistostrom were sampled mudstones from sourronding it deposits of Hieroglyphic Formation. Foraminiferal assemblages contain Middle Eocene taxa. Characteristic is numerous occurrence of *Reticulophragmium amplectens* (Grzybowki) and single *Haplophragmoides parvulus* Blaicher. Additionally assemblages taken from mudstones overlaying olistostrome contain *Ammodiscus latus* Grzybowski, *Eratidus gerochi* Kaminski et Gradstein and *Praesphaerammina subgaleata* Vasicek. Coocurrencce of this taxa suggests early Bartonian age (Lutenian/Bartonian?). Biostratigraphial study included the olistoslith material redeposited within olistostrom. The popular muddy clasts occurring in debris flow matrix contain assemblages of Early Eocene age. Numerous and small in sizes *Karrerulina conversa* (Grzybowski), *Karrerulina coniformis* (Grzybowski), *Glomospira charoides* (Jones et Parker) and *Spiroplectammina navarroana* Cushman are present. Single specimens of *Annectina grzybowskii* (Jurkiewicz), *Glomospra* cf. *diffundens* Cushamn et Renz cooccur. The debris-flow material as well as olistolites were derived to the basin from south, from the Silesian Ridge and its slope. Composition of olistostrome is an important source of knowledge about the geological structure of Silesian Ridge and connected basinal slope, which recently are not preserved. Debris flow matrix with crystaline and Mesosoic calcareous rocks were derived frome core of the ridge, while mudstones and marls, as well sandstone turbidites with calcareous organic remnants frome the slope. Large olistoliths, even olistoplaques, of deep sea flysch deposits that represents Hierogypic Formation facies, variegated shales or Ciężkowice-like sandstones represent basinal sedimentation. Probably the innermost part of the Silesian Basin had been tectonically intercorporated to the Silesian Ridge. It was uplifted and then formed a part of ridge's slope. Olistolites together with debris-flow sliced down from there to the basin.

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Imaging interiors of fossilized coccospheres: a non-destructive technique

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Coccospheres are external skeletons of coccolithophores – unicellular marine phytoplankton, generally less than 30 μm in size. Coccosperes are composed of minute calcite scales – coccoliths, useful for rock dating and for paleonvironmental studies. However, minute structural details of coccospheres and their debris are difficult to study. Mechanical disintegration of rock is the method often used for study of this material, but it generally results in destruction of coccospheres. Other methods, such as a direct study of rock chops or picking up and manual cracking of coccospheres in order to obtain both, external and internal views (Hildebrand-Habel and Mai 1999), only partially resolved the problem. Both methods are generally limited to slightly or moderately cemented rocks and to coccospheres which still can be cracked.

Here I present a method that allows to obtain clear SEM images of coccospheres, with their internal views, from thin sections of variously lithified porous rocks, such as solid limestones, carbonate-rich mudstone and claystone (Fig. 1). Thin sections were prepared as follow: glued with araldite (epoxy resin) on a glass microscope slide and well polished using diamond suspensions: first with grain size of 3 μm and then of 1 μm, until approximately 35 μm thick; not covered with glass. Thin sections without any coating were studied in low vacuum conditions under: (M1) Environmental Scanning Electron Microscope (ESEM) (e.g. FEI Quanta, 200 FEG) and (M2) Scanning Electron Microscope (SEM) with possibility of using low vacuum conditions (e.g. FEI Nova NanoSEM 200). The technique known in literature as charge contrast imaging (CCI) was used to obtained images of coccosphere debris (see Ciurej, 2010 and references therein). CCI provides structural information as unique contrast variations in secondary electron image (SE) mode, obtained by adjusting operating parameters. The structural information can be supplemented by chemical information obtained using BSE (backscattered secondary electrons) mode.

The observation parameters are individually adjusted for each microscope and for each type of sample. However, optimal images for M1 were obtained at acceleration voltage (HV) of 15 keV. Environment: water vapour at a pressure of 100 Pa. Working distance between sample surface and detector (WD) was approximately 10.0 mm, and scan speed (SS) from 32 - 37 s/frame. The parameters for M2 were: HV – 20 keV; WD – from 8 to 10 mm; environment: water vapour at pressure 100 to 130 Pa.

The method presented is useful for the study of the coccospheres and as well as single coccolith plates. It may prove especially helpful when coccolith material from solid rocks is studied

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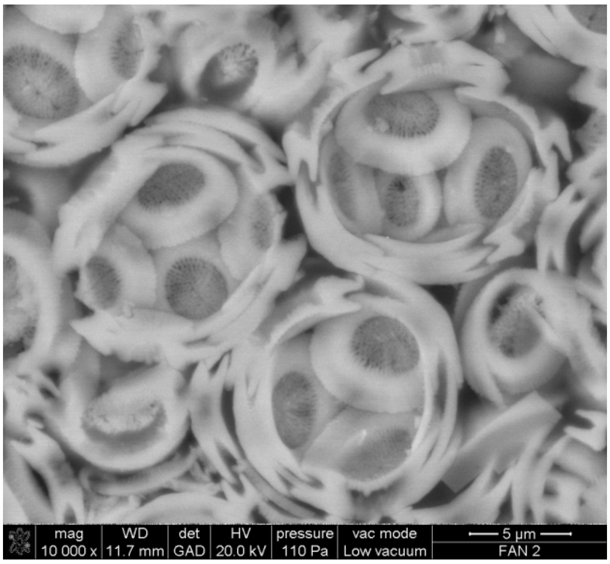

Fig. 1. SEM image of coccospheres and their interiors, with details of individual plates, obtained from thin sections of calcareous laminae in claystone under low vaccum conditions in SEM (M2 – see text).

Animal inclusions in Baltic amber from Lithuania

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Amber (electrum, succinite) is petrified fossil resin, mainly of coniferous trees, in rare cases, resinous of leafy trees. In the Baltic amber were identified eight species of pines, combined for simplicity to one species of *Pinus succinifera* (Krzemińska et all., 1993). Detailed studies show that Baltic amber is age of 40-50 million years and comes from the resin of pine trees close related to today's Weymouth pine, cedar, araucaria or ponderosa pine (Grimaldi, 1996). However, even today there are plenty of resinous trees mainly in tropical and subtropical environments, and also in our temperate climate resin giving leafy tree is old specimen of sweet cherry *Prunus avium* “Pink grand” of unknown origin.

There are several features to assess the authenticity of amber. It has a slightly lower density than the density of seawater, and therefore floats on the water surface, and does not drop to the bottom as plastics. The smell of burning amber of leafy trees recalls sweet burnt wood and amber of coniferous trees is more like burned incense. While, combustion of synthetic resins gives sharp, irritating odor. Amber has the phenomenon of fluorescence of the yellow-green color to brown-white and while the rubbing broadcloth (wool) is charged negatively but full assurance of authenticity gives Fourier Transform Infrared Spectroscopy (FTIR). Before buying amber with animal inclusions should be payed attention to too model emplacement and completeness of their body. Large animals preserved in amber with the whole body are rare. Caught in a sticky trap became easy prey for predators that can draw them from the resin.

At the conference will be presented photographs and amber specimens from private collection of the author of the most common insects like true flies (Diptera), wasps, bees, ants (Hymenoptera), as also quite rare like spiders (Araneae), cockroaches (Blattaria) and very unique mammalian hair in amber from

Palanga in Lithuania. Will also be shown typical forgeries and resin specimens of *Prunus avium* “Pink grand”.

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Benthic foraminiferal assemblages around the Maastrichtian – Paleocene boundary of the Skole Unit (Polish Outer Carpathians)

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Studies on identification of the late Cretaceous extinction event were initiated in the area of Rzeszow district in the Skole Unit in the last few years (Gasiński & Uchman; 2009, 2011). On the basis of a well-preserved specimens of planktonic and benthic foraminiferids, Maastrichtian-Paleocene boundary has been located within the interval of 40cm of the studied sections. Currently, studies on the boundary of extinction, have been launched on the southeast of Rzeszow in the area of Dynów and Bircza. In this area has not been yet conducted micropalaeontological studies, which establish the local biostratigraphic zonation, paleoenvironmental analysis and correlation with the neighboring regions (Lublin Upland, Subsilesian Unit). Studies conducted by the author are the complementation of the Gasiński & Uchman project, and focus mainly on the aspect of paleoenvironmental analysis and the lateral variability of foraminiferal groups depending on paleobatymetry of the Skole Basin. To date the studied area were mapped, many new assemblages were found and over a hundred samples were sludged. Many of them contain well-preserved and quite diversified foraminiferal.

The physical disintegration of the samples is carried out by using the standard method with Glauber's salt, and a new method using liquid nitrogen (Remin i in., 2012), which was modified for the purpose of research on foraminifera. This new method rely on alternate treatment of the sample with liquid nitrogen and boiling water, which can significantly reduce the time of disintegration from four weeks up to one hour in the case of weakly cemented rocks and claystones, marls and mudstones of the studied area. Using the new method does not damage foraminiferal tests and can significantly reduce the time of rock disintegration and reduce the cost of laboratory studies.

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The significance of benthic foraminifera in deciphering the Santonian stratigraphy of the European epicontinental sea sediments

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Calcareous benthic foraminifera are very common and abundant in the almost whole European epicontinental Upper Cretaceous. Because of their widespread distribution and a relatively fast evolution this group of fossils have been widely used in the Upper Cretaceous biostratigraphy and were also discussed as potential markers for the Upper Cretaceous stage and substage boundaries (e.g. Koch, 1977; Schönfeld, 1990; Gawor-Biedowa, 1992; Hampton et al., 2007, Wilkinson, 2011).

Most of the papers concerning the benthic foraminiferal biostratigraphy of the Santonian are related to western Europe. Stratigraphical position of the benthic foraminiferal distribution in the Santonian of the central and eastern Europe are very poorly documented and should be revised.

A detailed micropaleontological study and the calcareous benthic foraminiferal distribution in the uppermost Coniacian – lowest Campanian part of the well stratigraphicaly documented by macrofauna Dubivtsi succession, western Ukraine (Walaszczyk et al., in press), allowed to distinguish 19 foraminiferal events, and their stratigraphical position were correlated with macrofossil division. From bottom upward these events are: FAD (first appearance datum) of *Stensioeina bohemica*, FAD of *Stensioein polonica*, LAD (last appearance datum) of *Stensioein bohemica*, LAD of *Stensioein* sp. D, LAD of *Stensioein* sp. C, FAD of *Stensioein granulata perfecta*, LAD of *Gavelinella vombensis*, LAD of *Stensioein polonica*, FAD of *Gavelinella* sp. B, FAD of *Gavelinella pertusa*, FAD of *Eouvigerina aspera*, FAD of *Stensioein gracilis*, FAD of *Gavelinella stelligera*, FAD of *Gavelinella* ex. gr. *clementiana*, FAD of *Bolivinoides strigillatus*, FAD of *Stensioein* cf. *gracilis*, FAD of *Stensioeina* sp. G, consistent occurrence of *Gavelinella* ex. gr. *clementiana*, FAD of *Bolivinoides culverensis.* These events can be correlated with same events recognized in the critical sections in western Europe. The foraminiferal assemblages allowed to subdivide the Santonian in the western Ukraine with very high resolution that is far more precise than the subdivision based on macrofossils. Benthic foraminiferal events recorded herein turned out to be useful for correlation between sediments of western and eastern Europe. In addition, some of them may be used as good markers for the proximity of the Coniacian/Santonian boundary, Santonian/Campanian boundary and Santonian substages boundaries across Europe.

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Micropalaeontological Analysis of the Lower Carboniferous deposits from the Raclawka Valley, Cracow Upland

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The aim of this study was the micropaleontological analysis of the Lower Carboniferous grey grainstone outcropped in The Raclawka Valley. The research area is located in Poland, in the Malopolska province, 30 km north-west from Cracow. Layers of the grey limestones from which the samples were taken are on the east bank of brook Raclawka. 31 samples of grey, pelitic limestones were collected.
Samples were divided into two parts: the first part underwent a process of disintegration, the second part was cut into a thin sections. Samples destined to disintegration were smashed into smaller parts and dissolved in an acetic acid (CH_3COOH). Microfossils obtained in this way were observed in a binocular loupe. Thin sections were obtained by a diamond blade saw and later glued to glass slides (Bolewski, 1988).
The deposits of Lower Carbonifeorus are sediments of a carbonate platform (Bełka, 1987). In the inner, shallow part of the platform the common microfosills are: smaller benthic foraminifera, algae (red and green algae), representatives of Calcisphera and ostracods (Flugel, 2010).
Fossils identified are: red and green algae, fragments of Chelicerata, ostracods, trilobits, agglutinated and calcerous foraminifers, unidentified fragments of arthropods (probably limbs) and Calcispheres. Foraminifers were identified into Subfamilies of Septabrunsiininae, Endothyrinae and Nodosarinae. Considering the fact of poor condition of preservation, observations were carried out only on the basis of thin section. Results of this study are documented in photos of the thin sections.
With this labor it is possible to determine the conditions of sedimentation of the examined area. Remains found (otracods, trilobits, foraminifers) indicate sedimentation of carbonate platform.

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Cuneus minutus (Marsson) - a periodically highly dominant component of the Late Maastrichtian foraminiferal assemblages from the Lublin Upland (Eastern Poland).

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Cuneus minutus (Marsson, 1878) [syn. *Pyramidina minuta* (Marsson,1878)] belongs to family Turrilinidae (Cushman, 1927). This Maastrichtian species was cosmopolitan in NW Germany, Rugia, Eastern Poland, Ukraine as well as in Russian part of the East European Platform and Arctic Region (Gawor- Biedowa, 1992; Frenzel, 2000, Beniamovski, 2008). Abundance fluctuations of this species has been observed within the foraminiferal assemblages of samples collected from five Upper Maastrichtian section, which represent different sedimentation zones of of the Lublin part of the Border Depression *C. minutus* domination level, which exceed up to 70% within benthic assemblages was noted from marls and opokas but in White Chalk its abundance is not so high, calculated as 5% to rarely 20% . In the levels of *C. minutus* domination, the other species from the same morphogrup (CHB4 *sensu* Kutsoukos & Hart,

1990) are not so numerous. Fluctuations of *C. minutus* abundance correspond to the benthic juvenile forms and dwarfs specimens appearance as well as to the abundance of planktonic *Guembelitria cretacea*. P/B ratio decrease in relation to the abundance of *C. minutus*, which is probably caused by its bloom episode due to the fluctuations of environmental factors. Most probably phytoplankton blooms were the main factors controling the species abundance as the result of surface water eutrophisation. Above observations establish *C. minutus* as a good marker of high primary production as well as terrestial nutrients influx, which in consequence indicate the distance from the land. However, any permanent correlation to the appearance of the high productivity -anoxic conditions benthic foraminiferal ecomarkers has not been observed.

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Biodiversity Heritage Library for Europe - past, present and future

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Biodiversity Heritage Library for Europe project had a clear vision and mission – mobilise and preserve digital European biodiversity heritage literature and facilitate the open access to this literature through a multilingual community portal, the Biodiversity Library Exhibition (BLE) and Europeana portal. During the project BHL Europe developed the multifunctional portal (www.bhl-europe), an ingest system, additional services using name services as CoL, PESI and VIAF, a unique metadata format “Open Literature Exhange Format (OLEF)” - able to handle bibliographic data (MODS), policy expressions IPR (ODRL), still image data (MIX) and scientific names (DwC Taxon Terms), and also BLE (www.biodiversityexhibition.com). The project officially ended in June 2012, but the vision and mission still continue. At the completion of the funding, several institutions from Czech Republic, Germany, Austria, United Kingdom, and Belgium continued to advance the BHLE technical maintenance and the content flow. Content ingest started just before the project end and is continuing. The BHLE portal currently has about 20,000 items representing about 1.8 million pages; new content is added daily via the ingest system. BHL Europe still has more than 70,000 items in the pipeline ready to be processed and in March 2015 will start to ingest whole BHL content. There are several requests from new content providers and also continue with dissemination together with the Global BHL family via social media channels. BHLE is no longer a project but a product and service supported by the afore mentioned consortium which represents the European node in Global BHL. BHL Europe is now in process of negotiations to become a part of the Consortium of European Taxonomic Facilities (CETAF) to help mobilise even more European content, partners and possible funding. The future is always a challenge, but BHLE group will do their best to be part of it.

The genus *Helicosphaera* in the sediments of the Polish Flysch Carpathians

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The oldest forms described as unnamed *Helicosphaera sp*. appeared in the Middle Paleocene (Haq, 1971). The first reasonably described species are: *Helicosphaera seminulum* and *H. lophota* from the Early Eocene. During the Eocene they diversified rapidly, less rapidly in the Oligocene and Miocene. At present day only four species are living. The species of Lower and Middle Eocene are relatively large in size, oblong and egg-shapped in outline (*H. lophota, H. seminulum, H. compacta*). In the upper part of the Middle Eocene and in the Upper Eocene *H. reticulata, H. bramlettei*, *H. euphratis*, *H. intermedia* appeared. They have more intermediate character between the large ovoid older helicoliths to long-elliptical forms of the Oligocene and Miocene. In the Oligocene evolved subrectangular forms, such as *H. perch-nielseniae* and *H. recta*. During the Late Oligocene and especially in the Lower Miocene (*H. ampliaperta, H. scissura, H. kamptner*i, *H. mediterranea*) the typically long-elliptical forms with wide overlapping wings evolved. Most of them have a short stratigraphic range, but only few of the 47 species have been used as biostratigraphical markers for zonation of the Cenozoic (e.g. *H. seminulum*, *H. reticulata*, *H. compacta*, *H. recta*, *H. ampliaperta*, *H. scissura*, *H. kamptneri*). This is probably due to their paleoenvironmental requirements. They are found mainly in hemipalegic (shallow hemipelagic, nearshore) sediments, most are restricted to low and middle latitudes. They didn't occur in open pelagic sediments. According to Báldi-Beke (1982) helicoliths are "neither purely oceanic nor typical nearshore forms". They are common in unstable and dynamic environments (Polish Flysch Carpathians). Based on the characteristic optical pattern – all helicoliths are birefringent in the light microscope (interference figure) and characteristic structural elements (distal cover, basal plate, wing, bar, bridge) helicoliths are relatively easily recognized in the light microscope (in cross polarization light), see: Theodoridis, 1984, Aubry, 1990. In some cases have been observed the transition from one species to another (the transitional form between *H. euphratis* and *H. intermedia* species is according to Young *H. rhomba*). These are important microfossils for stratigraphic investigations in Polish Flysch Carpathians. Helicoliths are described from deposits of the Silesian, Skole (the Globigerina Marls, the Menilite-Krosno beds) and Dukla Units, the Magura Unit (see e.g. Oszczypko-Clowes, 2001), and the Podhale Flysch (Garecka, 2005).

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Correlation of the Middle Miocene deposits in SE Poland and western Ukraine based on foraminifera and calcareous nannoplankton

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The aim of our study is to compare the assemblages of foraminifera and calcareous nannoplankton from the Middle Miocene sediments from SE Poland and western Ukraine. Detailed investigations revealed a high degree of similarity of foraminiferal assemblages of the Pecten/Spirialis beds of Poland and Kosiv Formation of Ukraine. Assemblages of both areas are characterized by numerous arenaceous species of foraminifera (*Hyperammina granulosa*, *Ammodiscus miocenicus*, *Haplophragmoides indentatus*, *H. laminatus*), radiolarians, pteropods and index planktic species *Velapertina indigena*. High degrees of similarity also display assemblages from the Krakowiec beds (Poland) and the Dashava Formation

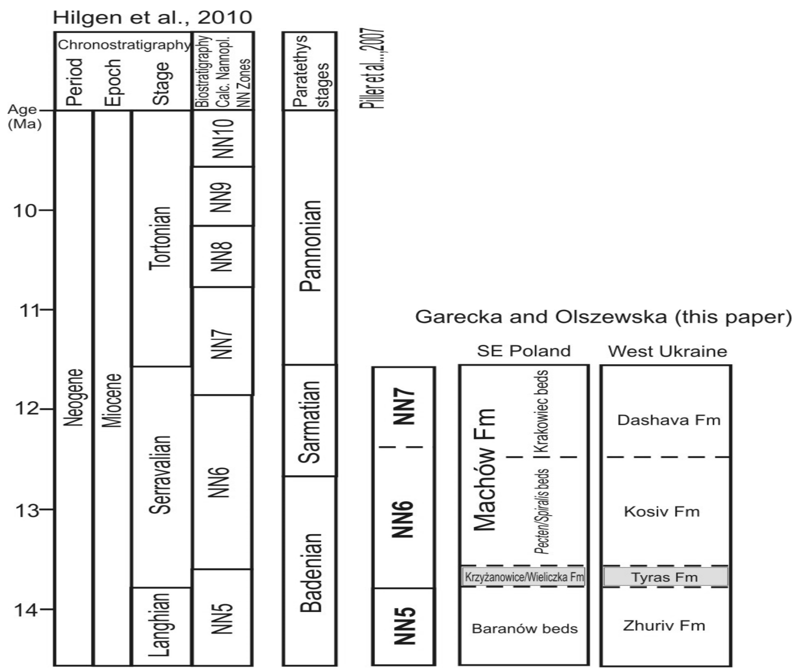

Fig.1. Biostratigraphical scheme of the investigated Miocene deposits of the SE part of the Polish and NW part of the Ukrainian Carpathian Foredeep (Bilche-Volytsia Zone).

(Ukraine). The lower parts of both subdivisions are characterized by the presence of *Anomalinoides dividens*. *Saccammina sarmatica*, *Bolivina sarmatica*, *Brizalina nisporenica*, and *Porosononion granosum* occur in the upper parts. The deposits lying above the evaporites (which belong to the NN6 zone) are included into the NN6, undivided NN6-NN7, and NN7 zones based on calcareous nannoplankton investigations. In the majority of the analyzed wells of the Ukrainian part of the Carpathian Foredeep it is not possible to discriminate the calcareous nannoplankton assemblages of the highest part of the Kosiv Formation from those of the lower Dashava Formation. The gradual impoverishment of species in the assemblages of the upper part of NN6 and the lower part of NN7 Zones are observed. The assemblages are of low diversity and mainly restricted to a few species with high abundance i.e., the Krakowiec beds and upper parts of the Kosiv and Dashava formations). The high number of reworked nannofossils and damaged elements of the coccoliths suggest a high supply of terrigenous material, unstable condition in the basin and suggest shallow-water conditions.

Middle Jurassic foraminifera and organic-walled dinoflagellate cysts from the dark shale of the Szlachtowa and Skrzypny Shale formations between Jarabina and Litmanová, Pieniny Klippen Belt, Slovakia

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The results presented are a part of our biostratigraphical and palaeoenvironmental studies on microfauna and organic-walled dinoflagellate cysts from the Mesozoic dark deposits of the Pieniny Klippen Belt. We present the latest results from the Middle Jurassic strata, including the Szlachtowa and the Skrzypny Shale formations that occur between Jarabina and Litmanová villages. Material for the present study comes from the exposures along the Malý Lipník and Veľký Lipník streams and from the Jar-1 borehole near Jarabina, and represents the deposits of the Šariš (Grajcarek) Unit (Plašienka et al. 2012).

The microfauna studied show two different assemblages, presumably reflecting various palaeoenvironmental settings. The first one occurs in the Skrzypny Shale Formation (the upper part of the Šariš succession in the Jar-1 profile) and consists almost exclusively of calcareous benthic foraminifera and ostracods. Epifaunal morphogrups are the most frequent there. Black, occasionally organodetritic, marls yielded assemblages composed of dominating *Epistomina* associated frequently by common small *Ophtalmidium* and *Spirilina*. The only samples with lower ratio of *Epistomina* are those which contain increase of smooth-walled ostracods and *Lenticulina*. Abundance of lagenids is low (mainly *Lenticulina*); they represent morphogroups C5-C8 *sensu* Tyszka (1999). Alike agglutinated foraminifera represent only small part of the assemblage (mainly the epifaunal erected *Rhabdammina* – morphogroup A1). Infaunal morphotypes of both agglutinated and calcareous forms are rather less frequent (*Ammobaculites* A6, *Laevidentalina*, *Nodosaria*, *Lingulina*, *Falsopalmula* and *Eoguttulina* C5-C7). A different assemblage occurs in the Szlachtowa Formation. The most of the samples studied from the Malý Lipník Stream and the upper scale in the Jar-1 borehole contains rare foraminifera, mostly agglutinated forms. Their assemblages are dominated by strict epifaunal morphogroups A1 (*Rhabdammina*), A4 (*Trochammina*) and occasional A3 (*Glomospira*). Other morphogroups that share mostly infaunal mode of life, e.g., *Conotrochammina* (A5), *Recurvoides*, *Ammobaculites* (A6) or *Reophax* (A8), are very rare or absent, especially when calcareous benthic foraminifera are absent. Calcareous benthic foraminifera from the Slachtowa Formation in upper slice of JAR – 1 borehole if present contain scarce poorly preserved *Epistomina*, *Spirilina*, *Opthalmidium*, *Lenticulina*, *Laevidentalina* and *Falsopalmula*. The composition of the agglutinated foraminiferal assemblages corresponds with Trochammina globoconica zone (Aalenian). Two samples from the Szlachtowa Formation exposed in the upper course of the Malý Lipník Stream yielded assemblage very similar to the ones from the Skrzypny Shale Formation. They differ, however, from the typical assemblages of the latter unit by the occurrence of *Marginulina* (infaunal morphogroup C6), which were not noticed in the Skrzypny Shale Formation.

Both assemblages reflect oxygen-depleted bottom-water conditions. But differences between the assemblages from the Szlachtowa (dominating epifaunal agglutinated foraminifera, occasionally missing the infaunal morphogroups) and Skrzypny Shale (epifaunal morphogroups of mostly calcareous, less agglutinated foraminifera which dominate above infaunal morphogroups) formations suggest that the latter unit was deposited in slightly better oxidized bottom environment (dysoxic) compared to almost anoxic environment of the Szlachtowa Formation. Palynofacies of both units shows high ratio of land-derived organic particles, partly responsible for low oxygen content in the bottom waters. But their character, and especially their influx rate, can explain differences in different microfaunistic assemblages.

Sporomorphs and black to dark-brown phytoclasts in the Skrzypny Shale Formation point to a slower sedimentation rate, whereas frequent cuticles in the Szlachtowa Formation presumably reflect high rate of terrestrial input into the basin. Deposition of high amounts of land elements at the bottom causing the oxygen-depleted conditions, due to decay processes, combined with higher sedimentation rate in case of the Szlachtowa Formation, made bottom living conditions less favourable for microfauna.

Biostratigraphical interpretation of both micropalaeontological groups gave slightly different results. Generally, ages of the dinoflagellate cysts from the Szlachtowa Formation studied ranges from the Aalenian (?Late Toarcian) to Late Bajocian, whereas foraminifera seem to be Aalenian-Early Bajocian. In some cases both groups give similar results: the upper scale of this unit from the Jar-1 borehole (92–80 m) and the most of the exposures along the Malý Lipník Stream contain the oldest assemblages with *Nannoceratopsis* and *Phallocysta*. A similar age from the upper scale of this unit from the Jar-1 borehole was concluded on the base of the agglutinated foraminiferal assemblages, correlated with the Aalenian Trochammina globoconica Foraminiferal Zone of Tyszka (1998). Although the most of the Szlachtowa Formation exposures studied along the Malý Lipník Stream contains only low abundances of agglutinated foraminifera we assume a correlation with the same zone. But dinoflagellate cyst assemblages found in the lower part of the Jar-1 borehole (135-128 m) indicate a younger age: Early Bajocian (assemblage with *Dissiliodinium giganteum*), and Late Bajocian (assemblage with *Ctenidodinium*); the assemblages with *D. giganteum* occur also in exposures. No foraminifera of this age were found: the youngest assemblage correlated with the uppermost Aalenian-Lower Bajocian Epistomina arcana Foraminiferal Zone of Tyszka (1998) was found in a single exposure only, which yielded Aalenian ammonite and dinoflagellate cysts. This zone was also recognized in the Skrzypny Shale Formation in the Jar-1 borehole and at Litmanova village. But most ammonites from the same outcrop at Litmanova support a Late Aalenian age (Scheibner 1964).

Comparison of our data suggests that composition of microfaunal assemblages is controlled by palaeoenvironmental conditions (particularly by the rate of food supply and, as a consequence, by oxygen content in the bottom waters). Samples with impoverished assemblages are related to facies, regardless its age. Flysch facies of the Szlachtowa Formation, characterized by high rate of organic matter supply, contains impoverished assemblages correlated with the Trochammina globoconica Foraminiferal Zone; dinoflagellate cysts from this unit show various ages ranging from Aalenian (Late Toarcian?) to at least Late Bajocian. More pelagic facies of the Skrzypny Shale Formation and partly of the Szlachtowa Formation, contain more diversified microfaunal assemblages corresponding to the Epistomina arcana Foraminiferal Zone, dated by the dinoflagellate cyst assemblages and ammonite as Aalenian.

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New record of genus *Caryanthus* from the Cretaceous of South Bohemia (Czech Republic)

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An inflorescence / infructescence of *Caryanthus* sp., has been found in the clay pit at Zliv-Řídká Blana (Klikov Formation, Late Cretaceous) South Bohemia (Czech Republic). It represents the first more complete specimen of *Caryanthus,* member of the Normapolles complex (Friis, Pedersen, & Schönenberger, 2006), showing the arrangement of flowers / fruits and thus allowing for a more precise interpretation of the genus (Heřmanová & Kvaček, 2012). This newly found inflorescence / infructescence of *Caryanthus* is small, 1.4 mm long and 0.8 mm broad and consists of three bisexual, epigenous flowers / fruits. Each flower / fruit is supported by several bracts. The tepals are fused basally forming a hypanthium. Fruits in the inflorescence are closely spaced. Hypanthium is characterized by three distinct grooves on each side. The gynoecium is bicarpellate, bearing two free styles in the apical part. The androecium of each flower consists of six stamens.

In the arrangement of flowers / fruits *Caryanthus* is similar to the Cretaceous genus *Budvaricarpus* and in minor degree also to *Endressianthus* and *Normanthus*. The similarity of *Caryanthus, Budvaricarpus* and extant genus *Rhoiptelea* provides additional support for the interpretation of *Caryanthus* as belonging to the juglandoid clade in the order Fagales.

Caryanthus is similar to *Budvaricarpus* in several important characters. The inflorescence of *Budvaricarpus* is composed of three or four fruits arranged in row, it is born in common bract. Position of fruits in *Caryanthus* inflorescence is similar, but *Caryathus* lacks a common bract. Only medial flower of *Budvaricarpus* is bisexual, its androecium consists of six stamens, similarly as in *Caryanthus*. Both *Budvaricarpus* and *Caryanthus* have gynoecium bearing two free styles.

Type species *Carynathus knoblochii* Friis and two other *C. elongatus* and *C. deltoides* have been properly defined by Friis (Friis, 1983). Seven other species has been defined by Knobloch et Mai (Knobloch & Mai, 1986). The new non-destructive method allowed us detailed study of inner parts of the inflorescence / infructescence from the type specimens. The inflorescence / infructescence described here shows similarities to several species of *Caryanthus*: *C. triasseris*, *C. pseudooctocostatus* and *C. trebecensis*. Due to the variability of the type collection and lack of details in some species diagnosis (Knobloch & Mai, 1986) the inflorescence / infructescence is currently difficult to be classified in species level.

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The Langhian (Early Badenian) carbonate production event in the Moravian part of the Carpathian Foredeep (central Paratethys): multiproxy record

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As the carbonate production event in the central Carpathian Foredeep has been named deposition of carbonate-siliciclastic complex in the marginal part of basin which can be correlated with interval from the last occurrence of *Helicosphaera waltrans* (14.36 Ma) to the first occurrence of *Globorotalia praemenardii* (13.92 Ma). Sedimentological and microfacial data, analysis of foraminifera, calcareous nannoplankton, red algae, molusk, palynology and oxygen and carbon stable isotopes from foraminiferal tests were used to interpret specific paleoenvironment of the carbonate production event. The event was accelerated by decrease of terrigenous input due the high-stand conditions and aridification of climate. Production of carbonate is connected with oligotrophic condition, expansion of sea-grass meadows, downwelling circulations and well-stratified water column. Autochtonous and semi-autochtonous bodies were deposited in shallow-water conditions near the wave base, allochtonous carbonates were transported to the outer shelf by gravity flows. Climatic unstability and strong tectonic and volcanic activity caused that carbonate bodies are small with high ratio of clastic compound indicating only short-time and spatially restricted establishment of condition suitable for carbonate production. Clastic intercalations in the limestones bodies represent catastrophic rain-fall events which tranported to basin higher amount of terrigenous material. Specific climatic conditions of the carbonate production event: the climatic unstability, aridification of climate with the episodic intensive rain-falls were connected with the climatic changes of the Middle Miocene Climatic Transition in studied area.

Preliminary reports of the Jurassic ammonite research in the Northern Bohemia

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The Upper Oxfordian - Lower Kimmeridgian localities in the Northern Bohemia (Krásná Lípa town vicinity) have provided numerous fossils (including ammonites) in the past. Ammonite specimens, predominantly belonging to the family Perisphinctidae, Ataxioceratidae, Aulacostephanidae and Cardioceratidae have currently been revised based on the material rediscovered in the museal collections.
New systematic revision signficantly extended ammonite diversity and, subsequently, markedly changed point of view of stratigraphy and paleogeography of the Northern Bohemia during the Upper Jurassic.
Of the high importance, it is the existence of the Boreal family Aulacostephanidae and Cardioceratidae. Representatives of Aulacostephanidae (i. e. *Microbiplices anglicus*, *M. microbiplex*, *Prorasenia hardyi*, *P. bowerbanki*, *Rasenia involuta*, *R. inconstans*) show migration patterns southward to the Sub-Mediterranean Province, suggesting the opening new channels accross the Europe in the Upper Jurassic.

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High resolution study of the holotype locality of the CPN8 Zone (*Globigerina druryi – Globigerina decoraperta*)

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In the present work we try to contribute into the debate on solving problem of Badenian biostratigraphy. The term Badenian was introduced and defined as a chronostratigraphic stage by Papp & Cicha in 1968 and was subdivided into three substages: Moravian, Wielician and Kosovian. The previous zonation based on benthic foraminifers proposed by Grill (1941, 1943) for the Vienna Basin still remained in use entirely for whole Central Paratethys; filled by local biozonations is the most widely used scheme today. The zonation consists of a vertical succession of benthic foraminiferal assemblages – based zones namely Lower and Upper Lagenidae, Spiroplectammina carinata (= *Spirorutilus carinatus*) and Bulimina-Bolivina, impoverished or Rotalia Zones and was revised by Papp & Turnovsky (1953). Subdivisions based on planktonic foraminifers were proposed by Cicha et al. (1975), but due to poorly represented planktonic organisms especially for shallow-water deposits is not always adopted. In the most problematic zone of Spiroplectammina carinata (= *Spirorutilus carinatus*) (agglutinated foraminifera zone, sandshaller zone) which seems to be lateral equivalent of Upper Lagenidae, and Bulimina-Bolivina Zone the planktonic foraminifera are often observed. In the study we try to correlate planktonic foraminiferal events with calcareous nannoplankton ones in the Ratkovce 1 well core, where the Middle Badenian CPN zones (CPN8 Globigerina druryi – Globigerina decoraperta / Pseudotriplasia elongata-Uvigerian semiornata brunensis) Cicha et al. (1975) were defined.

In the scope of the APVV project (DANUBE) we show here reevaluation of the mentioned sediments based on foraminiferal, calcareous nannoplakton as well as the polenspectra for refining of biostratigraphy. The sediments of the well core Ratkovce – 1, (depth 1052 – 1056 m in detail) are correlated with coeval sediments of the nearbourgh wells (Nová Vieska 1, Abrahám) based on the foraminiferal and nannoplankton events

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Systematic revision of the Central Paratethyan ghost shrimps – preliminary results

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One of the greatest challenges of modern decapod crustacean palaeontology is the interpretation, both systematic and ecological, of callianassoid ghost shrimp remains. Callianassoids are soft-bodied, fossorial shrimps inhabiting predominantly shallow intertidal and subtidal marine habitats mainly in tropics and subtropics (Dworschak 2005).

The fossil record of ghost shrimp is very robust and they are present in most associations of Cenozoic decapod crustaceans described so far. However, the generic assignment of their remains is very difficult, because their preservation is often insufficient and there are inconsistencies in the biological classification and taxonomy of the group.

Hyžný (2011: table 2), in his listing of the Middle Miocene callianassids of the Central Paratethys, showed that, so far, virtually all of them were treated under „*Callianassa*“ as a *nomen collectivum* in the widest sense. Since then, however, several taxa have been reassigned to biologically defined genera (Hyžný 2012; Hyžný & Hudáčková 2012; Hyžný & Müller 2012; Hyžný & Dulai in press). The revision is ongoing.

Preliminary results of the systematic revision of the Central Paratethyan ghost shrimps as presented herein clearly shows that they were more diverse in Europe during Neogene than they are today (see Ngoc-Ho 2003). This may be explained by the Messinian salinity crisis which severely impacted Mediterranean faunas (Krijgsman et al. 2010).

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The Cretaceous-Paleogene boundary in carbonate and siliceous clastic deposits of the Silesian-Subsilesian Zone based on calcareous nannoplankton and foraminifers: examples from the Polish Western Carpathians

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The Cretaceous-Paleogene deposits of the Silesian-Subsilesian series (Polish Western Carpathians) are represented by marls, marly shales and siliceous turbidities. These deposits belong to lithostratigraphic units: Węglówka Marls (Silesian unit), Frydek Marls and Rybie sandstones (Silesian and Subsilesian units), and also variegated shales, which occur as separate formation or intercalations in coarse clastic complex of the Istebna beds.

The biostratigraphic positions of studied deposits are based on assemblages of small foraminifers including planktonic and calcareous benthic or agglutinated forms (Jednorowska 1975; Geroch & Nowak 1983; Liszkowa & Morgiel, 1985, Olszewska 1997; Gasiński *et al*. 1999, Machaniec et al., 200). In the deposits of the Cretaceous-Paleogene boundary major changes in assemblages of small foraminifera are associated with the disappearance of the species and whole groups of foraminifers.

However the indentification of the Cretaceous-Paleogene (K-P) boundary in turbidic deposits of the Silesian and the Subsilesian units is usually problematic, mostly because of the absence of index fossils, especially planktonic and calcareous benthic foraminifers, and because of redeposition processes which led to breaks in a stratigraphic record. Moreover microfauna is irregularly distributed in turbidite series, which include often reworked foraminifers accompanied by very rare agglutinated long-living forms. But sometimes in hemipelagic variegated shales of the Istebna beds (Silesian unit) planktonic foraminifera, including *Globotruncana* species groups were replaced with agglutinated foraminiferal assemblages.

In noncalcareous deposits of the Subsilesian unit similar assemblages were found. In carbonate deposits of this unit occur planktonic foraminifers, which used to be considered as indicators of the K-P boundary (Jednorowska, 1975). These forms are now correlated with the upper part of the Paleocene and the early Eocene. Sometimes planktonic forms are present in the mud flows occurring in the upper part of the Istebna beds (Nescieruk & Szydło, 2003)

Calcareous nannoplankton from the Upper Cretaceous deposits of the Subsilesian unit is very diversified taxonomically and usually well preserved (Gasiński et al. 1999; Jugowiec-Nazarkiewicz & Jankowski 2001, Jugowiec-Nazarkiewicz, 2007). However, described associations do not allow to document boundary between the Cretaceous and Paleogene sediments and to determine the lowest Paleocene zone because of the lack of index forms. In deposits of the Silesian unit this group of nannofossils has not been investigated yet.

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Fauna of the Lower Cretaceous hydrocarbon seep locality from Czech Carpathians

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A new hydrocarbon seep site has been identified in the Lower Cretaceous sequence at Baška in the Czech. The seep carbonate and associated mollusk fauna have been encountered in deep-water claystones and siltstones of the upper part of the Hradiště Formation associated with pillow lavas of so-called teschenite association. Ammonites *Partschiceras infundibulum* and *Costidiscus rakusi* found in the claystone layers indicate their deposition took place during the early/late Barremian boundary interval (Vašíček et al. 2004).

The investigated carbonate displays petrographic characters typical of seep sediments (clotted micrite, isopachous rim cements and layered pyrite aggregations). The carbon isotopic composition (-20.0 to -23.5 ‰ vs. V-PDB) most likely indicates anaerobic oxidation of thermogenic methane.

The fossils recovered from the seep locality at Baška are of relatively poor preservation. The specimens preserved in the mudstone are slightly decalcified what results in spongy shell substance. The fossils found near or in the carbonate concretions are usually covered by thin carbonate film which obscures observations. Nevertheless we were able to recover a total number of 10 fossils including 7 gastropods and 3 bivalves.

Hokkaidoconchid gastropods and lucinid bivalves in association with trochid and zygopleurid gastropods are identified. This finding confirms existence of seep faunas in the Western Carpathians anticipated due to presence of seep mollusks and brachiopods in old monographs covering Lower Cretaceous fossils of this region (e.g., Ascher 1906).

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A new Pliocene agglutinated benthic foraminifer from the southern Bering Sea with a perforated wall structure

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The Bering Sea is the third largest marginal sea in the world surpassed only by the Mediterranean and South China Seas (Hood, 1983). IODP Expedition 323 drilled two sites on the Bowers Ridge in the southwestern part of the Bering Sea, an extinct arc system that extends 300 km north from the Aleutian Island. Drilling at Site U1341 recovered nearly 600 m of organic-rich diatomaceous sediment with laminated intervals. The site is located just below the modern Oxygen Minimum Zone (OMZ), which causes the formation of laminated sediments in parts of the section. Fluctuations in the intensity or depth of the OMZ on a variety of timescales should have an impact on the benthic foraminifera at this site. The diatomaceous noncalcareous claystones recovered from the Pliocene interval of Hole 1341B contain a benthic foraminiferal assemblage consisting exclusively of agglutinated foraminifera (Kaminski et al. 2013).

One of the most abundant species in this assemblage is a small enigmatic species of *Karreriella* that has a perforate wall structure. In the case of *Karreriella* sp. the canaliculae are open at the test surface. The test surface does not appear to be damaged by abrasion or dissolution, and the pores are only present on the lower half of the chambers of the last whorl, which leads to the conclusion that this is a primary feature. Although open canaliculae have been observed previously in the genus *Clavulina* (Coleman, 1980), this *Karreriella* sp. presents perhaps the clearest example of such a feature that has ever been described in an agglutinated foraminifer.

Such a feature in an agglutinated species recalls the perforate wall structure of a calcareous benthic foraminifer such as in the bolivinids, and is likely to be an adaptation for survival in severely hypoxic conditions present in the deep Bering Sea.

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The revision of Cirripeds (Thoracica, Crustacea) from Bohemian Cretaceous Basin.

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The 9 genera of cirripedes are known recently from BCB. The 3 genera *Smilium* ?= *Pollicipes, Arcoscalpellum* and *Calantica* s. l. persist to present-day. These 9 genera contains 11 species and 2 subspecies and 1 unlikely species. Only 2 species *C. glabrum* (ROEMER) and *A. angustatum* (GEINITZ) range throughout the BCB, but most are quite rare. We studied all cirripeds material, which is deposited in coll. of NM-Prague and material from field works from 2001 - 2013 from nearshore/shallow water locality at Velim, material from field works from hemipelagic locality at Úpohlavy 2003 – 2009. Next data of occurence of cirripeds in BCB we gained from check list fauna (Žítt et al. 1999, 2006; Košťák et all. 2010). Unfortunately some of original types of Kafka (1885) and Fritsch –Kafka (1887) are lost, from their original types are deposited in NM Prague these species *Stramentum pulchellum* (G. B. SOWERBY), *Scalpellum maximum* var. *bohemica* KAFKA = *Arcoscalpellum maximum* (SOWERBY), *Pollicipes fallax* DARWIN = *Brachylepas fallax* (DARWIN), *Pollicipes košticensis* (KAFKA) = *Cretiscalpellum striatum* (DARWIN), *Scalpellum tuberculatum* Darwin = *Calantica* (*Titanolepas*) *tuberculata* (DARWIN). Fortunately, species *Zeugmatolepas cretae* (STEENSTRUP), *Loriculina laevissima* (VON ZITTEL), which were collected from Middle to Upper Turonian locality Na Vinici by J. Šulc in 1933 and *Calantica* (*Scillaelepas*) *conica* (REUSS) from locality Kaňk, which was collected by A. Frič are deposited in MNH-London (Withers, 1935). The 1tergum of species *Proverruca vinculum* WITHERS from locality Na Vinici is lost. Next part of NM cirripeds material come from end of 20th cent. and contains species *C. glabrum*, *A. angustatum*. From recent fields works we described new species *Zeugmatolepas sklenari* sp. nov. together with J. Collins,from locality Velim (Kočová Veselská et all. submit.) and we have found new record of *Smilium*? *parvulum* (WITHERS) = *Pollicipes* (Collins, 1974). The last find from NM collection of Dr. O. Nekvasilová is very unlikely specimen of Eochionelasmatid or early Pachylasmatid from locality Předboj. The interest of this specimen is - the most earliest occurence of sessile barnacle. The rev. spec. are: *Smilium*?*parvulum* (WITHERS), *Zeugmatolepas cretae* (STEENSTRUP), *Z. sklenari* sp. nov. (submitt.), *Calantica* (*Scillaelepas*)*conica* (REUSS), *C.* (*Titanolepas*) *tuberculata* (DARWIN), *Cretiscalpellum glabrum* (ROEMER), *C. striatum* (DARWIN), *Arcoscalpellum angustatum* (GEINITZ), *A. maximum* (SOWERBY), *Stramentum pulchellum* (G. B. SOWERBY), *Loriculina laevissima* (VON ZITTEL), *Proverruca vinculum* WITHERS, *Brachylepas fallax* (DARWIN), *Eochionelamasmatidae* or early *Pachylasmatidae* ? (W. Newman - personal communication).

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A lobster genus *Paraclytia* Fritsch, 1887 (Crustacea: Decapoda: Nephropidae) from the Lower/Middle Turonian of the Bohemian Cretaceous Basin, Czech Republic

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Paraclytia Fritsch, 1887 is a rare nephropid genus which is restricted to the Upper Cretaceous (Turonian-Maastrichtian) strata of Germany and Czech Republic in central Europe and northern Iran, where *Paraclytia* was able to spread through the shallow epicontinental sea.

Paraclytia with the type species *P. nephropica* was erected by Fritsch (in Fritsch & Kafka 1887) to accommodate the Upper Cretaceous lobsters with the general form of recent *Nephrops* Leach, 1814, which was considered as descendant to *Paraclytia* (Mertin 1941). *Paraclytia* is distinguished markedly from all other Nephropidae in exhibiting a unique sculpture of the abdominal terga and pleura, comprising deep transverse furrows and prominent longitudinal ridges, and in possessing a telson with submedian carinae converging (instead of diverging) posteriorly (Tshudy et al. 2007, McCobb & Hairapetian 2009). *Paraclytia* also differs from *Nephrops* and *Metanephrops* Jenkins, 1972 in possesses noticeably heterochelous chelipeds, which can be characterized as morphological analogues of the crusher and cutter claw of homarine lobsters (Tshudy & Babcock 1997).

Mertin (1941) provided the first (and only) thorough treatment of the genus, describing four species, all from the Upper Cretaceous of central Europe (including *P. nephropica* from the Bohemian Cretaceous Basin). The species were distinguished on the basis of the position of thoracic carinae, the nature and position of a protuberance above the hepatic groove and the strength and characteristics of the abdominal sculpture (McCobb & Hairapetian 2009). In 2009, McCobb and Hairapetian erected a new species of *Paraclytia* from northern Iran, which represents the first record of the genus outside central Europe and simultaneously its significant southeastward expansion of the geographical range.

The fossil record of *Paraclytia* is rather rare in the Bohemian Cretaceous Basin. Single species *P. nephropica*, which was described in the respective area is so far limited to the Lower-Middle Turonian marlstones of the Bílá Hora Formation at the now completely overgrown locality Bílá Hora in Prague and represents the oldest fossil record of the genus. Studied taxa consist mainly of carapaces often with abdomens and chelipeds, which are mostly very good preserved even with original cuticle. Exoskeleton parts are usually laterally compressed and some nearly complete specimens exhibit position typical for moults, when carapace is rotated in relation to the rest of the body and proximal pereiopod elements meet at one point. Specimens of *P. nephropica* are deposited in the palaeontological collections at the National Museum in Prague, Institute of Geology and Palaeontology (Charles University, Prague) and in the Museum für Mineralogie und Geologie in Dresden (Germany).

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Upper Jurassic crinoids from sponge biofacies

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Late Jurassic crinoids are well known since long but their biogeographical and/or facies/ecological context is rarely studied. Here I report late Jurassic crinoid fauna associated with sponge biofacies occurring across Europe, i.e. from Poland, Germany and Spain. Upper Jurassic sponge biofacies in Europe are situated between shallow water deposits in the north and deep water Tethyan facies in the south (Pisera 1997 and literature cited therein).

The base of the present study are loose crinoid ossicles from Spain (Aragon, localities Aguilon and Tosos – Oxfordian), southern Germany (Swabian Alb, classical outcrops Lochengründle and Plattenberg – Oxfordian, and Hochwanger Steige – Late Kimmeridgian) and central Poland (Kujawy, Wapienno – Oxfordian, Kimmeridgian). Analyzed material consists of tens of thousands of skeletal elements.
The assemblage from Poland consists of 12 species. Oxfordian samples are dominated by cyrtocrinids (5 species - *Tetracrinus moniliformis*, *Phyllocrinus* sp., *Plicatocrinus tetragonus?*, *Plicatocrinus hexagonus*, *Plicatocrinus fraasi*) and isocrinids (5 species - *Balanocrinus subteres*, *Balanocrinus pentagonalis*, *Isocrinus pendulus*, *Chariocrinus wuerttembergicus*, *Isocrinus* sp.). Both these groups amount to 41,6% of the diversity, while other groups, i.e. comatulids (*Paracomatula* sp.) and millericrinids (*Millericrinus* sp.) are represented by one species each. Two Kimmeridgian samples are dominated by isocrinids (*Balanocrinus subteres, Isocrinus* sp.).
In the Oxfordian material from Spain the most numerous are cyrtocrinids (9 species - *Eugeniacrinites* sp., *Eugeniacrinites caryophilites*, *Pilocrinus moussoni*, *Tetracrinus* sp., *Tetracrinus moniliformis*, *Cyrtocrinus* sp., *Plicatocrinus* sp., *Sclerocrinus* sp., *Lonchocrinus* sp.) that amount to 75% of the diversity. Only 2 isocrinid species, i.e. *Balanocrinus subteres, Isocrinus* sp., and *Millercrinus* sp. have been found.
Very similar is the composition of the crinoid fauna from southern Germany where cyrtocrinids (5 species – *Eugeniacrinites caryophilites*, *Pilocrinus moussoni*, *Tetracrinus* sp., *Tetracrinus moniliformis*, *Cyrtocrinus* sp.) amount to 62,5% of species and isocrinids (2 species – *Balanocrinus subteres*, *Isocrinus pendulus*), and one comatulid (*Paracomatula* sp.) species which are less common. Crinoid fauna from the Oxfordian to Late Kimmeridgian in this area is almost identical and dominated by cyrtocrinids.
Despite large geographic distance the studied crinoid fauna is very similar in taxonomic composition. It is clear that cyrtocrinids, that are rare in other more shallow facies, are a dominant group of crinoids in the sponge biofacies. Only in samples from Poland (Wapienno) also isocrinids are equally common in Oxfordian, and dominate in Kimmeridgian, what may be explained by more shallow water environments than in other investigated areas. Matyja & Wierzbowski (1985) suggest that bathymetric position of Wapienno, during the studied interval, was relatively shallow due to tectonic movements. Process of gradual shallowing is observed during the Oxfordian that located this area at the wave basis. This presumption was agreed with analysis of brachiopod fauna by Krawczyński (2007). On the other hand, based on preferences of Recent cyrtocrinids and isocrinids (Hess 1999) the depth of deposition of the studied sediments with crinoids may be estimated as exceeding 200 m what well agrees with estimations of bathymetric position of sponge biofacies (Pisera 1997).

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Stratigraphy of the Jurassic and Cretaceous exotic limestones from the Silesian and Sub-Silesian Nappe of the Polish Outer Carpathians – preliminary results of micropaleontological study

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Carbonate sedimentation took place along the southern margin of the European Platform and around the Silesian Ridge, during the latest Jurassic–earliest Cretaceous (e.g., Krobicki et al. 2004). The remnants of these platforms occur in the Outer Carpathians only in the form of klippens, boulders, and pebbles and they are traditionally called "the Štramberk-type limestones", with regard to similiarity to the Tithonian-Early Berriasian limestones occurring in the vicinity of Štramberk (Moravia, Czech Republic) (e.g., Houša 1990). The studied rocks were collected from 30 localities situated within the western part of the Silesian and Sub-Silesian Nappe of the Polish Outer Carpathians.

The oldest of found exotics represent the upper Oxfordian-lower Kimmeridgian outer shelf deposits. Typical microfossils are foraminifera of the genera *Cornuspira, Globuligerina, Rumanolina, Spirillina, Ophthalmidium* and calcareous dinoflagellates: *Cadosina parvula, Colomisphaera carpathica, Colomisphaera fibrata, Colomisphaera lapidosa, Committosphaera czestochowiensis, Crustocadosina semiradiata, Orthopithonella gustafsonii, Schizosphaerella minutissima.*

Tithonian platform and slope, occasionally also deep shelf deposits constitute the largest group of exotics. The lower Tithonian is determined by the presence of calcareous dinoflagellates association, especially with the such species as *Committosphaera pulla*, *Carpistomiosphaera tithonica* or *Parastomiosphaera malmica*. In the upper part of the lower Tithonian the Dobeni Subzone of the Chitinoidella Zone – the oldest calpionellid zone (zonation after Reháková & Michalík 1997) – is noticed, and in the lowest part of the upper Tithonian the Boneti Subzone is well marked. *Praetintinopsella andrusovi* typical for Praetintinopsella Zone is rarely observed. Calpionellid associations belonging to the Crassicollaria Zone occur the most commonly. *Crassicollaria intermedia* and *Tintinnopsella remanei* indicate the Remanei Subzone, *Cr. brevis* – Brevis Subzone, and co-occurrence of *Cr. parvula, Cr. massutiniana* and *Cr. colomi* – Colomi Subzone.

Berriasian limestones are less common than Tithonian. Numerous specimens of *Calpionella alpina*, especially the smallest ones, are characteristic for the Alpina Subzone of the Calpionella Zone. Calpionellid associations representing the Ferasini and Ellipitica Subzones were noticed only singly, as well as the upper Berriasian Simplex Subzone of Calpionellopsis Zone. There were also found some foraminiferal-calpionellid-dinocyst association indicating Valanginian Age.

These studies indicates that during the Oxfordian and Kimmeridian along the margin of the Silesian Basin sedimentation of deep-water limestones took place. Probably in the beginning of the Tithonian large calcareous platforms formed and were very well developed during the whole Tithonian. The Lower Berriasian seems to constitute the period of decline for the platforms, but probably some parts of them resist and sedimentation lasted there at least to the Valanginian, what is consistent with previous studies based on foraminifera (Ivanova & Kołodziej, 2010).

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Some Latest Famennian and Early Tournaisian ophiuroids and holothuroids (Echinodermata) from the Moravian Karst

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During biostratigraphic survey focused on conodonts of the Devonian-Carboniferous boundary in the Moravian Karst (Moravo-Silesian Zone, Czech Republic) an abundant microfauna were obtained. Besides the conodonts (Kalvoda et al. in press), diverse ichthyoliths (Kumpan 2013a), eleutherozoid (Kumpan 2013b) and pelmatozoid echinoderms, bryozoans, inarticulate brachiopods and rare foraminifers were found in insoluble residues. This contribution is focused on the eleutherozoid echinoderms remains from interval of the Late Famennian Middle *Palmatolepis gracilis expansa* conodont Zone to the Early Tournaisian *Siphonodella duplicata* conodont Zone from the Lesní lom, Mokrá and Křtiny quarries (NE of Brno). The eleutherozoid echinoderms are generally less frequent than conodonts and ichthyolihs, however in two levels from the Lesní lom and Mokrá quarries (Famennian *Protognathodus kockeli* and Tournaisian *Siphonodella bransoni* Zones) are relatively common. Preservation of the skeletal remains is dependent on selective dolomitization or silicification.

Preliminary ophiuroids of the order Oegophiurida MATSUMOTO 1915 (genus *Furcaster* STÜRTZ, 1900), Phrynophiurida MATSUMOTO 1915 (genus ?*Eospondylus* GREGORY, 1897) and Stenurida SPENCER, 1951 were determinated. Presented are mainly arm vertebrae.

Holothurian sclerites belong to the order Dendrochirotida GRUBE, 1840 (body sclerites of the genus *Eocaudina* MARTIN, 1952) and Apodida BRANDT, 1835 (wheel sclerites and peripharyngeal elements of the genus *Achistrum* ETHERIDGE, 1881; ?*Gagesiniotrochus* BOCZAROWSKI, 2001).

The most distinctive feature is the mass occurrence of the eleutherozoids elements accompanied by abundant goniatites *Acutimitoceras* sp., bivalves *Guerichia* sp. and rare conodonts *Protognathodus kockeli* and *Neopolygnathus communis communis* just after the Hangenberg Event *s. s.* (last Famennian *kockeli* conodont Zone). The mentioned fauna probably represents a pioneer association and the presence of commonly opportunistic generalists as are ophiuroids and holuthuroids fits into this scenario.

The classes Ophiuroidea and Holothuroidea are reported for the first time from the Moravian Karst. The research of the eleutherozoid echinoderms in the Moravian Karst is at its beginning stage and further investigation could bring more detailed taxonomic evaluation and enhanced our knowledge about the Famennian and Tournaisian biodiversity.

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Biostratigraphy of the Lower/Middle Tournaisian (Mississippian) limestones in the Moravian Karst: preliminary results

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In the southern part of the Moravian Karst (NE of Brno, Czech Republic) are well exposed Upper Devonian to Mississippian sequences with excellent sedimentary record through the stage boundaries. The Frasnian/Famennian (Hladil et al. 1991), Famennian/Tournaisian (Kumpan et al. 2013) and Tournaisian/Viseán boundaries (Kalvoda et al. 2010) were determined both biostratigraphically and eventostratigraphically. Preliminary results of the recent biostratigraphic research on the Lower/Middle Tournaisan Substage boundary in the sections Lesní lom, Anaklety and Říčka Valley are presented herein. Joint presence of conodonts and foraminifers gives a good opportunity for precise correlation between the deep to shallow water successions in the Western and Eastern Europe. Ichthyoliths, trilobites, brachiopods and other fauna is also present. Complete succession of the Early Turnaisian conodont zones (from the *sulcata* up to the *hassi* Zone) was previously documented above the the well preserved Famennian beds in the Lesní lom Quarry, Brno-Líšeň (Kumpan et al. 2013). Abundant conodonts of the upper part of the *hassi* and *sandbergi* Zone and foraminiferal association of the foram. zone *Prochernyshinella disputabilis* (Kulagina 2013) were studied recently. Abundant conodonts of the *quadruplicata* Zone were documented 400 m SE to the Bělka Mill in the Říčka Valley together with foraminifers of the top of *P. disputabilis* or the lower part of P. *tchernyshinensis* Zone. In the Anaklety sections are Lower to Middle Tournaisian limestones preserved with hiatus above the Upper Famennian (Rutová 2009). Foraminiferal association typical for the *Palaeospiroplectammina tchernyshinensis* Zone (Poty et al. 2006, Kulagina 2013) were found with conodonts of the M. Tournaisian base (*crenulata* conodont Zone). Trilobite association described from this level consits of very specific forms [*Liobole* (*Sulcubole*) aff. *Castroi*, *Linguaphillipsia cracoviensis*, *Liobole* (*Panibole*) sp., *Piltonia krasensis*] which are known from the Moravian Karst for the first time (except *Piltonia*). Also free small-sized brachiopod valves of the suborder Chonetidina (*Rugosochonetes*?), Productidina and Spiriferida, lingulids and chondrichthyan ichthyolits (e.g. families Phoebodontidae and Protacrodontidae) are present.

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Cretaceous monocotyledon megafossils from Europe

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Fossil leaves of Cretaceous monocotyledons are described from Austrian, German, Spanish and Romanian Late Cretaceous based on their venation pattern. The family Araceae is represented by *Lysychiton austriacus* from the Campanian of Grünbach showing characteristic aroid venation pattern with multistranded costa. *Pandanites trinervis* and its reproductive structure *Gruenbachia pandanoides* are assigned to the Pandanaceae. *Gruenbachia* is characterized by globular infructescences with radially arranged fruittlets on robust axis. Leaves of *P. trinervis* show following characters M-shape if transversally sectioned, pricles on margins and medial pat of the leaf. The pandanoid foliage occurs in number of Austrian localities (Campanian) and also in Romania (*P. trinervis* and *P. spinatissimus*). Palm leaves *Sabalites longirhachis* from Austria, Romania, France and Spain are characterized by costapalmate leaves with robust costa and showing parallel veins of several orders. Monocotyledon leaves *Theiaphyllum kollmannii* from the Campanian of Grünbach and *Zingiberopsis riggauensis* from the Santonian of Riggau (Germany) have less clear interpretations. After recent studies it is clear that *Z. riggauensis* is not a member of the Zingiberaceae.

Occurrence of monocots has interesting geological and geographical consequences. Except *Z. riggauensis* all other monocots are reported from orogenic formations of Pyrenees, Alps and Carpathians. They are clearly associated with tectonically active sometimes coal forming basins of southern edge of Palaeo-Europe. Frequent occurrence of monocots there could be also associated with temperature – all the tectonically active area were originally situated much to south, being tectonically uplifted to the north.

Ellipsocephalus hoffi: the well known trilobite with unknown ontogeny?

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Ellipsocephalus hoffi is a small ellipsocephalid trilobite; it is common especially in the upper part of the Jince Formation (Příbram-Jince Basin, Barrandian area). Despite the mature specimens often occur in clusters containing many articulated individuals, juvenile stages of *Ellipsocephalus hoffi* are in fact unknown. New discoveries of articulated juveniles of this species show quite surprising features. The smallest discovered stages bears comparatively long genal spines as well as long macropleural spines protruding postero-laterally from the second thoracic segment. During the late ontogeny both of these spines gradually disappear. At first, the macropleural spine disappears and genal spines are suddenly shorter. Later, even the genal spines disappear, so the adult stages have no genal spines. Other morphological changes during the ontogeny include especially the slight narrowing of the anterior part of glabella (tr.), and a shortening of preglabellar field (sag.).

The systematic position of ellipsocephalids is still a subject of discussion. There is not a common consensus, whether they are to be classified within the order Ptychopariida or within the order Redlichiida. While the general morphology of ellipsocephalids resembles ptychopariids by natant hypostomal condition and the forwardly tapering glabella, their ontogeny rather resembles redlichiid ones (e.g. presence of macropleural spines in the second thoracic segment, intergenal spines in early ontogeny). It remains a question; weather the morphology truly reflects their phylogenetic relationship, or whether it is only convergent evolution of both groups.

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Ostracodes from the top of the Králův Dvůr Formation (latest Katian)

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Ostracodes are substantially the most abundant living group of arthropods in the fossil record and have been considered as an important palaeoecological and palaeogeographical indicators of the ancient environments. They belong to the significant components of the Ordovician assemblages in the Prague Basin.

A richly fossiliferous clayey carbonate, so called 'Pernik bed' (Štorch & Mergl, 1989), is developed in the topmost part of the thick succession of shales belonging to the Kralův Dvůr Formation (upper Katian). This bed has been recently interpreted as the results of climatic and glacioeustatic changes near the Katian/Hirnantian boundary, followed by Hirnantian glaciomarine deposits (Mergl, 2012).The character of the fauna corresponds to a shallow shelf, which was a result of climate changes and the decline in sea level, and flushed into the deeper parts of the basin. It also explains the fragmental state of the fossils (Mergl, 2012).This stratigraphical interval, mentioned by many authors (Chlupáč, 1951; Havlíček & Vaněk, 1966; Štorch & Mergl, 1989), is famous for its characteristic, diverse and exceptionally abundant fossils, represented mainly by trilobites (e.g. Shaw, 2000), brachiopods (e.g. Havlíček, 1967, 1977; Mergl, 2012), echinoderms and ostracodes. The significance of this fauna was studied and evaluated by Havlíček (1982, 1989) and Štorch & Mergl (1989).

Ostracodes from the Králův Dvůr Formation were described or mentioned by Barrande (1872), Havlíček & Vaněk (1966), Krůta (1968), Jones & Holl (1969), Přibyl (1979) and recently by Schallreuter & Krůta (1984, 1987, 1988). Almost all ostracodes are preserved as cores and moulds, which in many cases show no distinct resemblance to the completely preserved, isolated valves. Washed out material was described and figured only by Schallreuter & Krůta (1988, pl. 4, fig. 2–3).

The rock samples of ´Pernik bed´ for the present study come from the outcrop of Zadní Třebaň locality. These samples were processed for the first time by a physical disintegration method using sodium thiosulphate pentahydrate (also known as sodium hyposulphite) as a crystallizing agent for heating and cooling cycles. Isolated valves of ostracodes were afterwards washed out through the different sieves. The obtained dissolved material is of a variable quality. The purpose of the current study is to evaluate ostracod fauna from the topmost beds of the Králův Dvůr Formation (e.g. eridostracans) and compare it to the previously described species from the beds below with a consideration of environmental changes in the Prague Basin.

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The Turonian-Coniacian boundary in Western Georgia (on the basis of planktonic foraminifera)

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The Upper Cretaceous sediments are widely spread in the Gagra-Java Zone (Western Georgia). Upper Turonian–Lower Coniacian deposits in the western part of the Abkhazia-Racha facies type (Gambashidze, 1979) are mainly carbonate rocks (marl, limestone, chalk, calcareous marl, limestone with multi-coloured flints) and in the Odishi-Okriba facies type the significant role is played by terrigenous-volcanic rocks. They are much more widely spread in Southern Samegrelo and Okriba, where they were named the suite "Mtavari" (K_2t_3-K_2st) (Meffert, 1931; Tsagareli, 1946). The suite is composed of brick-red, brown, yellowish-gray basalt and porphyritic effusive with interbeds of calcareous and sandstones (in the basin of Tskhenistskali river). It should be noted that in the majority of papers dealing with stratigraphy of Abkhazia-Racha and Odishi-Okriba facies types, the major attention was always paid to macrofauna. Biostratigraphical subdivision of the Turonian-Coniacian deposits is based so far on the distribution of the inoceramid remains.

The lower part of Gumurishy suite (the Abkhazia-Racha facies type) is represented by light-gray calcareous flints with rare concretions of pink flints. There occur: *Marginotruncana schneegansi, M. sigali, M. marginata, M. marianosi.* A little higher *Marginotruncana pseudolinneiana, M. angusticarinata,* and *Dicarinella hagni* are recorded. *Hedbergella delrioensis, Whiteinella archaeocretacea, Dicarinella imbricata* still exist. The first representatives of *Heterohelix reussi* and *H. globulosa* are noted, too. This interval is included to the *Marginotruncana schneegansi/M. pseudolinneiana* Zone and correlated with the *Inoceramus lamarcki* Zone. It is Late Turonian in age.

The upper part of Gumurishy suite is represented by light-gray micritic limestone with rare concretions of smoky flint. *Marginotruncana coronata, M. paraconcavata, M. tarfayaensis, M. sinuosa, Dicarinella concavata, D. primitiva* are common there; still exist *Marginotruncana pseudolinneiana, M. sigali, M. schneegansi, M. marginata,* and also great number of small *Hedbergella* spp. In this interval planktonic foraminifers form up to 95% of foraminiferal assemblages; the dominant group are representatives of the genus *Marginotruncana*. The *Dicarinella concavata* Zone here distinguished is correlated with the *Inoceramus wandereri* Zone.

The lower part of "Mtavari" suite (Odishsi-Okriba facies type) is represented by brown-pink varigrained tuff gravelstone with layers of pinkish limestone containing *Marginotruncana pseudolinneiana-M. lapparenti, M. marginata, Dicarinella hagni, D. imbricata, Hedbergella delrioensis, Whiteinella archaeocretacea, Heterohelix reussi, H. globulosa, Globigerinelloides bentonensis*, and benthic foraminifer *Stensioeina exsculpta.* The upper part of suite is represented by brown tuff sandstones with interbeds of red and gray limestones containing *Inoceramus* cf. *stuarti* and *Micraster cortestudinarium* as well as planktonic foraminifers: *Marginotruncana coronata, M. renzi, M. marginata, M. pseudolinneiana, M. schneegansi, Dicarinella imbricata,* and *Heterohelix globulosa.* Among benthic foraminifers, *Stensioeina exsculpta* and *S. granulata granulata* should be mentioned (Mikadze, 2010).

In the conclusion, on the basis of detailed study of planktonic foraminifers (Abkhazia-Racha and Odishi-Okriba facies type) base of the *Dicarinella concavata* Zone is defined at the beginning of the Coniacian.

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Genus Cooksonia from Wenlock of the Bohemian Massif

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Investigated plant residues originate from an outcrop by the road leading from Loděnice to Bubovice village. The locality Loděnice–Černidla is a part of Barrandien Lower Paleozoic (Central Bohemian area, Bohemian Massif). Twenty specimens were found in Barrande's collection, 10 specimens were collected just recently. New specimens were preserved in dark, fine laminated limestone and brown calcareous siltstone. Sediments belong to graptolite zone *Monograptus beleophorus* with an occurrence of the trilobite *Miraspis mira* (Silurian, Lower Wenlock, Motol Formation; stratigraphy according to Kříž 1992).

There are middle and upper parts of sporophytes preserved. The sporophytes are 1–5 times dichotomously branched. Axes terminated to sporangia. Sporangium: oval, 3–4 mm in diameter, length of fragments of sporophyte: 1–8 cm, telome width: 1–4 mm. Several specimens were macerated in HF and Schulze´s solution. Structures similar to C-type tracheid were discovered. Tracheid voids were incrustated and only this incrustation is preserved.

Genus Cooksonia were described by Lang (1937) Gonez & Gerrienne 2010 from lower Devonian sediments. Obrhel (1962) described this taxon from Požáry Formation (stage Pridolí, Upper Silurian). Described plant residues *Cooksonia* sp. from Motol Formation (Lower Wenlock) are the oldest vascular plants from the Czech Republic. Organic remains of similar age were found in Wales (Edwards 1992) but their plant structure is not clear.

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Ontogeny and morphology of the eocrinoid genus *Akadocrinus* from Cambrian of the Barrandian area, Czech Republic

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Eocrinoidea is an ancient echinoderm class, which ranges stratigraphically from early Cambrian to Silurian. Eocrinoids are commonly a dominant group of echinoderms in Cambrian (Sprinkle, 1973; Zamora et al., in press).

This study represents the first study of ontogenetic development eocrinoid echinoderms from the Czech Republic. Comparable eocrinoid material has been studied only from the Balang and Kaili formations of South China. *Akadocrinus jani* Prokop, 1962 has been established in Drumian of the Barrandian area. Material used for this study is deposited in the collections of the National Museum in Prague and in the

Czech Geological Survey in Prague. All studied specimens originate from several outcrops of the Jince Formation in the Příbram-Jince Basin, namely from the *Paradoxides* (*P.*) *paradoxissimus gracilis* Zone. Detailed morphology of seventeen specimens was studied and analyzed. A number of diverse morphological parameters were measured to understand the ontogeny of the type species *Akadocrinus jani*, 1962. It is possible to separate three ontogenetic stages based on thecal height (TH): (1) juvenile stage, (2) mature stage and (3) gerontic stage. Thecal height is a distance between the ambulacral area and the bottom of the basal ‘‘series’’ of thecal plates (see Parsley, 2012; Parsley and Zhao, 2006). Each ontogenetic stage shows typical characteristic. Some trends were observed during the ontogeny of *Akadocrinus jani*, Prokop 1962. There are two types of mechanism growing of theca.

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Application of morphometric techniques in describing allometry – a case study based on the Cambrian trilobite *Paradoxides polonicus* Orłowski, 1965 from the Holy Cross Mountains, Poland

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Application of morphometric techniques in describing growth trends of various organisms is considered to be the best way to provide trustworthy results. This study shows various methods that may be used in such analysis. Cranidia of the trilobite *Paradoxides polonicus* Orłowski, 1965 have been selected for the case study. *P. polonicus* was described from Cambrian Series 3 (former Middle Cambrian) of the Holy Cross Mountains, Poland (Orłowski 1965). Specimens used in the analysis derive from two collections: Museum of the Faculty of Geology and Museum of the Polish Geological Institute - National Research Institute; the total number of specimens studied is about 50. All specimens come from one locality – Słowiec Hill, located in the central part of the Holy Cross Mountains.

Generally, the applied methods can be subdivided into two groups. The first group consists techniques which are based on comparing measured parameters of the described objects (here: trilobite cranidia). The main method is simple comparison of log-transformed measurements in pairs and analysis of the equation parameters. An advanced technique – the multivariate allometry test – compares all measured parameters using the Principal Component Analysis (PCA), where the first principal component (PC1) is regarded to represent “size”. The result of this test on the measured cranidia is a collation of the measured parameters showing allometry. In this study both these methods were performed using PAST software (Hammer et al. 2001).

The second group consists of techniques that use geometric morphometrics to find changes in shape during growth. This method is based on positions of landmarks and semi-landmarks in specimens representing different stages of growth. Use of semi-landmarks is very gainful because it provides information about the outlines of parts of the cranidium (Sheets et al. 2004). This data can be analyzed in various ways, including thin-plate spline models, and as a result give much more accurate characteristics of the growth trends. The method was applied using TPS software series (Rohlf 2012) and IMP software (Sheets 2012).

The examined dataset clearly indicates allometry. Preliminary results show that the main parts of the cranidium, whose growth has shown to be allometric, are the palpebral lobes, where negative allometry has been evidenced by all methods. Additionally, allometry has been observed in the transverse width of the cranidium (negative), transverse width of the anterior border (positive) and, to a certain degree, in the dimensions (measured both transversely and sagittally) of the anterior glabellar lobe (positive). Negative allometry of the sagittal length of the preglabellar field has been demonstrated only by methods that use geometric morphometrics and, as presumed earlier, this technique seems to be the most accurate, describing the largest number of points that show allometry.

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The Palaeozoic Ctenostomata – are they true bryozoans?

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The lack of mineral skeleton is a diagnostic feature of the bryozoans order Ctenostomata.

Boring ctenostomate bryozoans have long geological record, having been identified from the Early Ordovician onward (e.g. Pohowsky 1978). Extant boring bryozoans most frequently infest the shells of living and dead molluscs. The soft anatomy of boring ctenostomates is known only in a few species (Soule and Soule 1969).

Colonies of boring ctenostome bryozoans occurying in the Early Devonian (Lochkovian) of Podolia, western Ukraine, have soft-tissue preserved by phospatization (Olempska 2012). Their soft- tissue, especially setigerous collar is a conserved feature which these fossils show to have existed at least 416 Ma.

The Family Ascodictyidae Miller, 1889 is a small group of extinct encrusters consisting of three genera. They first appeared in the late Mid Ordovician (Black River Formation, Minnesota) (Ulrich 1890), and became extinct by the latest Permian (Condra and Elias 1944). During the sessile phase of their life cycle, they were attached to the skeletons of rugose corals, the shells of brachiopods and the crinoid stems. These microorganisms developed a network of calcareous filaments with a hemispherical to more irregular vesicles at their tips.

They belong to the genera *Ascodictyon*, *Eliasopora*, and *Vinella*, and were originally described as ctenostome bryozoans. Well preserved ascodictyid specimens from the Early and Middle Devonian of

Poland allow to exclude such affinity due to the absence of any aperture in the ascodictyid vesicles for the protrusion or withdrawal of the lophophore during feeding.

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The significance of Cladocera remains in valley mire sediments

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The high sensitivity of valley mires to changes in humidity means that the analysis of sediment from abandoned palaeochannels and oxbow lakes (valley mires) is very useful in reconstructing and dating past humidity changes. Knowledge of Polish mires in river valleys is relatively sparse, despite most mires in central Poland being located in river valleys (Tobolski, 2003). However, valley mires can be used to recognize and date climate changes: their sediment may contain good climate indicators in the form of fossils—especially Cladocera remains. Cladocerans are the most abundant crustaceans preserved in lake sediments (Birks & Birks, 1980). Cladoceran species are useful for reconstructing palaeoenvironmental conditions (including trophic status and fluctuations in water and pH levels in lakes) because the ecological preferences of Cladocera are relatively well understood. Cladocera have been widely used as proxy data for reconstructing palaeoclimates (Korhola & Rautio, 2001). The response of this group to changes in temperature and humidity is significantly faster than that of other proxies, such as pollen. For this reason, sections of sediment from small oxbow-lake infillings located in river valleys (of the Grabia, Widawka, and Ner rivers) in central Poland were studied by cladoceran analysis in order to examine the response of aquatic ecosystems to climate changes. Because the hydrological regime of these lakes was slightly different from that of closed-lake depressions, local factors needed to be taken into consideration. There is a double relationship between rivers and valley mires: via floods (direct relationship) and via changing ground-water levels (indirect relationship). Numerous factors influence the hydrological regime of rivers, which is why the role of oxbow lakes is sometimes overestimated in palaeoenvironmental analyses (Mojski, 2005). Habitat modification, macrophyte abundance, eutrophication, nutrient concentrations, and fish abundance might all influence changes in Cladocera community composition and abundance. However, recognizing local factors, crustacean species diversity in oxbow lakes might be also subject to changing conditions due to climate fluctuations over many years.

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New palaeopteran insects from Upper Carboniferous of Ningxia in northern China allow assessment of intraspecific wing variability (Insecta: Megasecoptera)

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Discovery of two new megasecopterans mainly based on unique wing venation patterns will be described from Upper Carboniferous (Namurian) of Tupo Formation in northern China (Ningxia Hui Autonomous Region). Both new morphotypes are supported by large series specimens allowing assessment of intraspecific wing variability.

The first morhotype assigned to the monotypic family Brodiopteridae Carpenter, 1963 consists of 56 specimens varying in branches of radial posterior vein (3-5) and in the presence or absence of wing apex coloration. This taxon exhibits also body structures with excellent state of preservation such as elongated beak-like mouthparts, relatively long slender legs and elongated abdomen bearing pair of cerci. While females show serrated reinforced endophytic ovipositor males bear genitalia with gonocoxae and gonostyli both similar to known Permian Diaphanopterodea (e.g., *Uralia maculata* Kukalová-Peck & Sinichenkova, 1992) and recent Ephemeroptera (family Siphlonuridae).

The second morphotype attributed to the family Sphecopteridae Carpenter, 1951 with close relationships to genus *Cyclocelis* Brongniart, 1893 due to deeply forked medial posterior vein. This taxon is represented by 19 specimens varying in number of branches of radial posterior vein (3-5) and cubital posterior vein, positions of braces ma-rp and cua-m and wing size.

Moreover, the large series of both morphotypes provide data for assessment of their wing venation variability using methods of geometric morphometrics.

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Environmental changes at the Badenian/Sarmatian (Middle Miocene) Transition inferred from foraminifers in Central Paratethys (Zhabiak, W Ukraine)

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The Badenian/Sarmatian boundary in the Paratethys basin, that marks the transition from normal marine to restricted semi-marine conditions due to isolation of the basin from the world ocean at the onset of Sarmatian time, is still far away from full understanding. The Zhabiak section is located at the northeastern margin of the Carpathian foreland basin (Central Paratethys) in the Medobory Hills region, ca 20 km south to the town of Kremenets' (western Ukraine, Ternopil' province).

Qualitative and quantitative characteristics of foraminiferal assemblages from 52 samples in a 20-m-thick section comprising the Badenian/Sarmatian transition strata at Zhabiak indicate that this succession was deposited in variable environments.

A foraminiferal assemblage from sands of the basal part of the section yielded large-size specimens of benthic Badenian and reworked Cretaceous foraminifers with traces of abrasion; this assemblage suggests a high energy coastal environment. The second assemblage from grey clays is characterized by common spiny elphidiids indicating deepening of the sea and low hydrodynamic conditions. Rare occurrences of planktonic *Globigerina* spp. in the next assemblage with common *Elphidium*, *Asterigerinata* and hauerinids from muds and mudstones is interpreted as reflecting a continuing slight deepening of the sea. The disappearance of *Globigerina* and abundance of *Elphidium crispum* and hauerinids in the assemblage that follows suggest in turn a shallowing of the basin. The succeeding assemblage which is entirely composed of large-size specimens of Hauerinidae from limestone bed suggests a restricted hypersaline environment. Higher up in the section, the foraminiferal assemblage from marly limestones is characterized by common *Cibicidoides*, *Asterigerinata*, *Neoconorbina* and subordinate hauerinids; it suggests a normal marine inner shelf environment. The next assemblage, from clayey deposits, with very rare *Globigerina* spp. and common *Elphidium crispum* and hauerinids suggests a slight deepening of the sea and/or a presence of currents responsible for the transportation of planktonic forms from a deeper part of the basin. Sandy-clayey deposits and sands lying higher in the section yielded the assemblage with common *Ammonia* spp. and *Elphidium crispum* that suggest a decrease in salinity and brackish shallow shelf environment. Marly and sandy sediments from the topmost part of the studied section contain low diversity assemblage with *Lobatula lobatula* and *Elphidium* spp. and with traces of abrasion of foraminiferal tests; this assemblage indicates shallow shelf high energy environment.

In summary cold water, inner shelf depths with short-term depth and salinity changes sea was interpreted from changes in foraminiferal assemblages.

New data on age of oyster limestones – Wola Justowska outcrop (Miocene, Kraków area, Carpathian Foredeep, Poland)

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Miocene deposits are widely spread in the Carpathian Foredeep. In the vicinity of Kraków, those deposits are represented, among others, by informal lithostratigraphical unit named "oyster limestones", which age is under discussion for many years. The outcrop with sediments with the oysters in Wola Justowska is located in old quarry in Panieńskie Skały Reserve. The profile of Miocene deposits is 170cm thick (Olejniczak 2010). It starts with mud containing both fragmented and intact flint nodules. Above the flint the layer of quartz conglomerate occurs. In the upper part of the profile the content of calcium carbonate increase within the mud. In this part occurs the small amount of oysters. Towards the upper part of profile, is the smooth transition of sediments character, which is ended by tough nodular limestones layer with a high content of large oysters shells. The profile is ending by re-occurrence of calcareous mud deposited on marly-nodular limestone.

The microfossils were studied from the sample of calcareous mud collected from the middle part of the profile. The quite a number of foraminifera, remains of sponge, single: spine of echinoids, ostracods, bryozoans and algae was detected within residuum. There are two mixed assemblages of foraminifera. First assemblage is composed of recycled Cretaceous foraminifera (mainly *Hedbergella* sp. and *Heterohelix* sp.) and second consists of Miocene foraminiferal taxa (Pilarz 2012). Miocene foraminifera are represented by mostly shallow water species, dominated by small amount specimens of genus *Elphidium*, mainly *E. macellum* (Fichtel et Moll), *E. flexuosum* (d'Orbigny) and *E. fichtelianum* (d'Orbigny). This *Elphidium* assemblage is an analogical as described within sample from Wielkanoc Hill outcrop in Tyniec (Czepiec et al. 2004). Additionally the rare specimens of *Ammonia beccari* (Linné), *Lobatula lobatula* (Walker et Jacob), *Cibicidoides ungerianus* (d'Orbigny), *Hansenisca soldanii* (d'Orbigny), *Lenticulina inornata* (d'Orbigny), *Oridosalis umbonatus* (Reuss), *Uvigerina macrocarinata* Papp et Turnovsky, *Globigerina* sp. and *Pullenia bulloides* (d'Orbigny) have been identified.

On the basis of index fossil – *Uvigerina macrocarinata* Papp et Turnovsky, it was possible to determine the age of studied deposits as Early Badenian. The occurrence of *Cibicidoides ungerianus*, *Hansenisca soldanii*, *Lenticulina inornata*, *Oridosalis umbonatus*, *Pullenia bulloides* and *Uvigerina macrocarinata* is very typical for IIAB assemblage zone (Alexandrowicz 1963) which corresponds to *Orbulina suturalis* Zone (Cicha et al. 1975). The obtained data are the first undoubtful, biostratigraphic evidence for the Early Badenian age of oyster limestones in Kraków area.

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Sedimentology and faunal succession of the Upper Turonian – Lower Coniacian in occasional outcrops at Opatov near Svitavy (Bohemian Cretaceous Basin)

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During years 2008–2011 ground works exposed a succession of the Upper Turonian-Lower Coniacian strata in two occasional outcrops at Opatov near Svitavy in the eastern part of the Bohemian Cretaceous Basin. Glauconitic calcareous fine-grained sandstone of the Jizera Formation at the base of the sections contains rare fossils represented mainly by claws of *Protocallianassa antiqua* (Roemer) and burrows *Thalassinoides* isp.

The lowermost layer of the Teplice Formation is 0–30 cm thick and consists of glauconitic marly sandstone with fragments of glauconitic calcareous fine-grained sandstone and sandy limestone with coquinas of *Turritella* sp. and bivalves. Remains of *Protocallianassa antiqua* were found in all rock types of this layer and some of them show signs of reworking. Overlying layer of glauconitic marly sandstone to sandy marlstone is about 0.5 m thick and contains autochthonous and redeposited fauna. Redeposited fauna is represented mainly by internal moulds of gastropods and bivalves, sponges, brachiopods and other groups. Fossils are phosphatised and consist of marlstone to glauconitic sandy marlstone. Autochthonous fauna comprises oysters, *Spondylus latus* (Sowerby), inoceramid bivalves and bivalves of the genus *Lima*. These two layers are believed to reflect transgression during the Late Turonian (Soukup, 1952; Dvořák 1956; Valečka & Skoček, 1990). Higher in the section, layer of soft grey marlstone, up to 0.6 m thick, does not contain any macrofossils, but rich microfauna of planktonic and benthic foraminifers was obtained together with rare ostracods and shark teeth and scales from washing residues.

The Rohatce Member of the Teplice Formation is represented by about 1 m thick layer of siliceous claystone to marlstone with rich fauna of irregular echinoid *Micraster* sp., *Cremnoceramus crassus* (Petrascheck) and ichnofossils and by grey clay to marl which forms the highest exposed layer.

It seems probable that the upper part of the Jizera Formation containing sandy limestone with abundant bivalves and *Turritella* sp. was eroded and an intraformational conglomerate with rock fragments was formed during transgression. Later the pelitic sedimentation prevailed. Rich fauna of Lychniscosid and Hexactinellid sponges indicates relatively deep-water environment (Finks & Rigby, 2004). Probably condensed sedimentation, prefossilization and phosphatization took a place during maximum flooding. The pelitic layer was eroded, fossils were redeposited into glauconitic marly sand to sandy marl and colonised by bivalves. Foraminifers from the overlying soft grey marlstone do not allow decide whether they are Upper Turonian or Lower Coniacian in age.

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“Non-adult” fish fauna of the Hermanowa locality (Oligocene; Outer Carpathian; Poland) – preliminary review

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Systematic position of each organism is determinable on the basis of shape, size and quantity of selected morphological features. However, morphological features are changing during ontogeny and for that reason it is necessary to understand them as dynamic complexes rather than static entities. Moreover, the value of distinct morphological features depends on the individual age of the studied specimen. Such approach should be applied also to fossil specimens. It is obvious that determination of ontogenetic stage in fossil record is not always easy and can be complicated by many things, starting with incompleteness of specimens and ending with automatically assumed adulthood of studied material. In some cases ontogenetic status of studied specimens is not commented at all and results can lead to incorrect taxonomical classification and consequent palaeobiological misinterpretation.
"Non-adult" specimens of fish assemblage from the Hermanowa locality (Oligocene) in the Eastern Poland (Outer Carpathian) belonging to following groups: trachinids, ophidiids, gadids, trichiurids, two types of syngnathids and probably argentinids. Larvae, juveniles and sub-adults specimens have been recognized among these taxonomical groups.

Analysis of carbonate nannoplankton from the Cergowa Beds (Oligocene), Polish and Slovak Flysch Carpathians

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Twenty five samples of calcareous argillites from seven sections of the Cergowa Beds turbidite succession in the Dukla and Fore-Dukla tectonic units of the Eastern Flysch Carpathians were analysed for calcareous nannoplankton. Their locations and sample numbers per location are as follows: in Slovakia - Ruska Volova (1 sample), Medzilaborce (5), Habura (3); in Poland – Wernejówka (1), Rudawka Rymanowska (4), Tylawa (4), Lipowica quarry (4), Iwla (4).
Out of 25 samples 3 did not contain nannofosils, i.e. one sample from each of the following localities: Habura, Medzilaborce and Wernejówka. The preservation of fossils in the prevailing assemblages was not very good. The nannofossils were studied with polarizing microscope Carl Zeiss Axioskop 40 at magnification 1000x. The standard zonation by Martini (1971) and Berggren et al. (1995) was used for stratigraphic classification of individual assemblages.
The youngest strata of the analysed Cergowa Beds were assigned to the zone NP 24 (Upper Kiscellian) on the basis of the following diagnostic species: *Cyclicargolithus abisectus*, *Helicosphaera cf. recta*, *Reticulofenestra lockeri*, *Dictyococcites bisectus*, *Coccolithus eopelagicus*, *Coccolithus pelagicus* and *Zygrhablithus bijugatus.* In sections at Habura and Medzilaborce, which include allodapic limestone samples next to terrigenous turbidites, all calcareous nanoplanktonu assemblages indicate zone NP 24. At Iwla, zone NP24 was recognised in the middle part of the succession, which is characterised by fine-grained turbidites with thin sandstone beds and high proportion of mudstone and shale.
Zone NP 23 (Lower Kiscellian) was identified at Rudawka Rymanowska, Tylawa and Iwla based upon the following species: *Reticulofenestra lockeri*, *Reticulofenestra cf. ornata* and *Transversopontis fibula.* In all these sections the assemblages representing zone NP 23 occur within the oldest part of the succession.

In the youngest part of the succession at Tylawa, zones NP 16-22 (Upper Lutenian – Lower Kiscellian) were recognised on the basis of *Dictyococcites bisectus*. However, stratigraphically below in the succession, there occurs and assemblage of NP 23 zone. Therefore, the assemblages indicative for the zones NP 16-22 that follow stratigraphically above NP 23 are redeposited.
In the upper part of the succession at Rudawka Rymanowska and Iwla, zone NP 21 (Upper Priabonian – Lower Kiscellian) is recorded by *Reticulofenestra lockeri*. Similarly to the Tylawa section these are redeposited because they occur above the strata that contain NP 23 and NP 24 assemblages.
Cyclicargolithus floridanus and *Helicosphaera compacta* identify zone NP 16 (Upper Lutenian) in the middle part of the succession at Lipowica. However, zone NP 21 is indicated in the stratigraphically youngest part of this sequence based upon *Reticulofenestra lockeri*. Most probably, the species that represent zone NP 16 are redeposited because the modest thickness of the intervening strata does not seem to justify such a long time span recorded between the positions of samples dated at NP 16 and NP 21 above. Otherwise, such relation would imply either: (i) paraconformity with a considerable erosional hiatus, indications of which were not observed, or (ii) stratigraphic condensation. Two options should be taken into account as regards NP 21 zone at Lipowica: either this diagnostic assemblage is: (i) redeposited and the succession may be of the same age as other occurrences of the Cergowa Beds, i.e. NP 23 and/or NP 24, or (ii) the age of the strata at Lipowica is NP 21, therefore older than at other localities.
Summary: (i) the age of most of the analysed strata of the Cergowa beds is Lower Kiscellian – NP23 and Upper Kiscellian – NP 24; (ii) it cannot be ruled out that the oldest sandstones of the Cergowa lithotype occur at Lipowica and represent zone NP 21 – Lowermost Kiscelian; (iii) quite common occurrences of redeposition of nannofossils older than the Cergowa Beds into the uppermost parts of the analysed sections, which are composed of mudstone-rich facies, may be related to remobilisation and redeposition of older, mostly fine-grained deposits of the basin slope affected by tectonic movements at the basin margin.

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Middle Badenian (Miocene) shallow water agglutinated foraminifera.

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Agglutinated foraminifera are relatively well known and often studied group of organisms of both modern environments and fossil geological record. In most cases, due to ecological preferences or taphonomic bias, these assemblages come from deep sea sediments.
In our study, we are presenting assemblages of agglutinated foraminifers derived from Middle Badenian shallow water siliciclastic sediments. Material was obtained during evaluation of well cores drilled in the vicinity of Poddvorov village in Moravian part of Vienna basin (Czech Republic). This area is situated on the western margin of the northern part of Moravian Central Depression (Central Paratethys). Middle

Badenian sediments are in the lower part represented by Žižkov member, in the upper part by Agglutinated Foraminifera zone.
From rich assemblages of benthic foraminifera, along calcareous forms most abundant belongs to genera *Ammonia*, *Elphidium*, *Aubignyna*. Most abundant agglutinated foraminifera recorded from the studied samples belong to genera *Saccammina*, *Lagenammina*, *Ammobaculites* and *Karreriella*.
Comparison of our statistical results with modern and fossil assemblages from analogue environments was made.
Horizontal zone model was designed on the basis of the proportional presence of foraminifers. On the basis of micropaleontological and sedimentological analysis was concluded, that sedimentation proceeds in shallow zones in lagoonal to mangal environments (lagoon, mangrove swamp, mangal marsh) in the area around subaerial aggradation bar (chenier ridge) which detach lagoon from the open shelf.
In some studied horizons with high increase of amount of agglutinated forms, influence of taphonomic alteration due to rapid accumulation rates and consequent increase of the redox conditions in the sediment (Murray-Alve, 2011) against influence of paleoecological claims of the foraminifers.

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Comparison of the deep-water and shallow-water Middle Badenian (Miocene) foraminiferal associations – taphonomic analysis

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In the samples derived from Middle Badenian shallow water siliciclastic sediments, obtained during evaluation of well cores drilled in the vicinity of Poddvorov village in Moravian part of Vienna basin (Czech Republic) the extraordinary amount of agglutinated foraminiferal taxa were obtained. Middle Badenian sediments are in the lower part represented by Žižkov member, in the upper part by Agglutinated Foraminifera zone. This area is situated on the western margin of the northern part of Moravian Central Depression (Central Paratethys). Attempt of the study is to explain influence of environmental conditions on composition of the foraminiferal assemblages and their preservation potential as well as for the correlation level.
During syndeposition and postdeposition process, taphonomic loss of calcareous and agglutinated tests of foraminifers plays role in wide spectrum of environments (marsh, shallow-water sea, fjord, shelf, closed marine basin, deep-water sea below lysocline) what could be expressed in absolute decrease of abundance, relative change of abundance of some types of tests or in change of ratio of agglutinated and calcareous forms. Different environments display different types and characters of alteration. In shallow costal settings with rapid sediment accumulation, preservation of agglutinated forms is better than calcareous forms due to slower degradation (oxidation) of organic matter in the subsurface redox layer. In

settings with slower sedimentation rate, calcareous tests are corroded and dissolute by pore water or bacterial activity. In mangal environments influence of dissolution is bigger than mechanical breakdown (Berkeley et al., 2007; Belanger, 2011)

Assemblages were compared on the basis of diversity (α Fisher, Simpson) and dominance. Multivariate statistical methods as cluster analysis using Ward method of clustering and NMDS analysis using Bray-Curtis dissimilarity) were applied. Inter-sample taphonomic gradings were assessed by descriptive and comparative process.

On the basis of obtained data from preservation state of foraminiferal tests major taphonomic mechanisms (dissolution, abrasion and bioerosion) and taphofacies were observed, which gave us insight into character of paleoenvironment and sedimentary settings.

We would like to thank Slovak Research and Development Agency (APVV-LPP 0120-06, PVV-0099-11 DANUBE) for funding and to SPP Storage, s.r.o. for supporting studying material for this work.

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Biostratigraphy of the Late Cretaceous shallow-marine deposits based on the rudists and calcareous nannofossils from Misea Hill (Roşia basin), Apuseni Mountains, Romania

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The Late Cretaceous shallow-marine mixed (siliciclastic-carbonatic) deposits from Roşia basin is located on the western part of the Apuseni Mountains. The investigated stratigraphic succession is located on the northern border of Roşia Basin, in outcrops on Misea Hill and overlie the Permo-Mesozoic and crystalline rocks of the Bihor Autochthounos unit. The shallow marine sequences are represented by the basal conglomerates, sandstone, marls and limestone rich in rudist bivalves, corals and small ostreidae. The stratigraphic distribution of some of the identified rudist taxa (e.g., Vaccinites gosaviensis, V. archiaci, Hippurites nabresinensis, Plagioptychus aguilloni, Radiolites subsquamosus, Radiolites angeiodes, Praeradiolites subtoucasi Colveraia variabilis) suggests a Late Santonian-Early Campanian age for these stratigraphic succession. Concerning the palaeoenvironmental setting of rudists, a spatial distribution can be evidenced according to the depositional environments: Vaccinites sp. preferred shallower environments with higher energy and input of siliciclastic, while the presence of radiolitids was favoured by deeper, lower energy ones. The rudists belonging to plagioptychids (Plagioptychus aguilloni) occur as isolated individuals like attached clingers acting as substrate stabilizers.

The calcareous nannofossils assemblages sustain a Late Santonian – Early Campanian age of the deposits. The presence of Calculites obscurus (which defines the base of CC17 Biozone) and Arkhangelskiella cymbiformis (which defines the base of UC13 Biozone) and the absence of Broinsonia parca parca (marking the top of CC17 and UC13 respectively) pointed out the above mentioned interval. Late

Santonian is confirmed also by the presence of Lucianorhabdus cayeuxii B (with curve rod) together with Corrolithion signum. Watznaueria barnesiae is the most abundant species in the assemblages (up to 22%) followed by Eiffelithus eximius (up to 12%), E. turriseiffelli (10%), E. gorkae (up to 9,5%), Tranolithus orionatus (up to 12%), Retecapsa crenulata (up to11,5%), Prediscosphaera cretacea (up to 5,8%), Broinsonia signata (up to 6,5%) Cribrosphaerella ehrenbergii (up to 5,8%) and Russelia bukryi (up to 5,8%). The shallow marine deposits are confirmed by the presence of Braarudosphaera bigelowii and Nannoconus spp. Some cold-water taxa have been identified (Biscutum constans, Zeugrhabdotus erectus, Gartnerago segmentatum) but their abundance is not high.

The Late Cretaceous stratigraphic succession cropping in Misea Hill (Roşia basin) consists of both carbonate and siliciclastic deposits indicating a depositional environment developed along a shelf margin with shallow marine water with submarine fan deltas accumulated in the marginal area of the basin.

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Interactions of organisms in fossil resins

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In the Eocene (56 -39 Ma) Europe did not resemble its present shape: it was not a uniform continent but a network of islands. What is now Scandinavia and the Baltic Sea, known as Fennoscandia, was covered with amber-bearing forests which were more like the subtropical forests of today (Szczepaniak, 2013). Amber is fossilized resin secreted by a wide range of plant families, mainly conifers. The oldest fossil resin has 230 million years, the youngest has approximately 5 million years.

When organisms become trapped in sticky resin they usually die so quickly that they could fossilize. Organisms embedded in a resin called an inclusion, when two organisms are preserved in the same piece of amber we call it a syninclusion (Koteja, 1986). Today, the resin has hardened to amber and these are visible like a window to the past.

The different animals are preserved together in the amber in the relationship to one another which they held in life, called symbiosis. Baltic amber are three forms of symbiosis: commensalism, parasitism, predation. The symbiosis between organisms that happened over 50 million years ago, e.g. mating couples fell into the resin, egg-laying by various flies, brood care, social behaviour, hunting and feeding and other types of behaviour. Some inclusions may have ended up together by accident, others because of their behaviour. Parasites or predators were trapped together with their victims.

Commensalism is a class of relationship between two organisms where one organism benefits without affecting the other. This includes the commonest form on symbiotic relationship called phoresy. This is kind of behaviour in which small animal is carried by langer carrier animal to a new habitant e.g. Pseudoscorpion (the oldest fossil known only in Baltic amber) attached to Diptera (Brachycera), Acari attached to Coleoptera.

Mutualism is the way two organisms of different species exist in a relationship in which each individual benefits. Examples of mutualism in amber are difficult to find. Many of the worker termites (rare fossils in Baltic amber) are associated with air bubbles.

Parasitism is a non-mutual relationship between organisms of different species where one organism, the parasite, benefits at the expense of the other, the host. Examples of ectoparasites in Baltic amber are: parasitic larvae Acari stick to abdomen of Diptera (Brachycera), stick to the head, thorax, segment membranes of their host. Examples of the endoparasitic are much rare than ectoparasitic. In Baltic Amber known a few nematodes (two specimens are known from collection in Museum of Earth in Warsaw.). The larvae of the Namatodes affect larvae of aquatic insect like Chironomidae (Diptera). They matured in the body of the freshly moulted mosquilto and landed with them in the sticky resin traps.

Predation describes a biological interaction where a predator feeds on its prey. In amber are insect such as termites, spiders and caddies files with large " feeding holes" in the body (Weitschat, 2012). Examples of the hunters and their hunted are e.g. spider and ant worker (Formicidae). Hole in the pronotom of a caddisfly (Trichoptera).

Some samples of these behaviours from the past are perfectly preserved in three dimensions. Life and behaviour in these 25-40 million year old amber pieces show that these insects were very similar to today's.

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New perspectives in preventive and remedial conservation of fossils containing Fe disulphides

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Preservation of fossils containing iron disulphides, particularly pyrite and marcasite, presents long-term difficulty in the care of palaeontological material. In case of improper treatment, changes associated with disulphide degradation commence quickly, in chemistry, structure and volume. These often result in loss of the specimens and their associated documentation.

In essence, disulphide degradation is an oxidation process inducing successive reactions, whose products both further react with the fossil and its surroundings (i.e. sulphuric acid), and cause mechanical disintegration due to spatial expansion of secondary products (hydrated Fe- or Ca-sulphates). The latter process sometimes produces volumes of hundreds of per cent of the original. The hygroscopic products, moreover, introduce water from the environment, thus accelerating the whole process. The final degradation is a consequence of complex and interconnected chemical, physico-chemical and electrochemical processes, controlled by multiple factors, of which oxygen concentration and humidity are pivotal agents (e.g. Newman 1998).

Currently employed conservation techniques that attempt to minimize the above processes focus on storage, and preventive as well as remedial chemical treatment. The storage techniques aim at reduction of humidity and oxygen content. Humidity control on the depository-room scale is simple, although extremely low levels can be expensive. Reduced oxygen content on the same scale is impossibly expensive, so many institutions use enclosed micro-environments on the specimen scale. Specimens are sealed in vapour- and oxygen-proof special barrier films, together with moisture and oxygen scavengers (Day 2005). It is noteworthy this procedure is so labour intensive and expensive that there are few institutions in the world able to bear the costs. Two effective methods of chemical treatment have been developed, whose main aim is to stop or reduce degradation by removing or passivation of oxidation products. One employs an ethanolamine thioglycollate solution (Cornish & Doyle 1984), the other is based on oxidation of the reaction products using ammonia gas or vapour of an ammonia water solution with humectant (*sensu* Waller 1987).

Research on this topic has been pursued chiefly by conservators, so almost no attention has been paid to field conditions or field work practices. However, this is one of the most important factors in initiation of the degradation process, and its prevention shall fundamentally determine the likely success of subsequent preventive conservation procedures. Hence, this is one of the main topics of the project being tackled by National Museum (NM) and the Institute of Chemical Technology, Prague (ICT). Especially, initial prevention of oxygen input as well as drying control is critical at this stage. Also, participation of iron-oxidizing bacteria (*Thiobacillus* sp.) in this initial stage is being investigated during the research.

The research team of NM and ICT is presently focused on the degradation-controlling factors and determination of their limit values. Considerable attention is paid to oxygen influence on the initial phase of Fe-disulphide degradation. Subsequent hydration associated with volumetric change and consequent destruction are observed using a system of chambers with monitored temperature, controlled relative humidity (RH) and ablation of gaseous products. Various RH-conditions shall simulate common as well as extreme depository conditions.

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Hi-res correlation and dating of Mid-Palaeozoic sedimentary sequences of Peri-Gondwana using integrated biostratigraphy and chemo-physical methods - an insight to the Lochkovian

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The basis of the international project "Hi-Res correlation and dating of Mid-Palaeozoic sedimentary sequences of Peri-Gondwana using integrated biostratigraphy and chemo-physical methods" is a detailed correlation of selected sedimentary successions of the late Silurian and early Devonian in Prague Synform, Spanish Central Pyrenees and Carnic Alps. The correlation is based on application of several methods in the sections: the detailed biostratigraphical framework is supplemented by multiple chemo-physical measurements (i.e. gamma-ray spectrometry and magnetic susceptibility) in order to avoid discrepancy in correlation of the peri-gondwanan successions.

The substantial part of the project is focused on conodont biostratigraphy that is fundamental for time correlation. The highest precision has been attained in the Lochkovian where numerous cosmopolitan conodont time-marks occur. These are mostly represented by taxa belonging to the genera *Ancyrodelloides* and *Lanea* with minor widespread of other relevant taxa as *Flajsella*, *Masaraella*, *Pedavis* and *Kimognathus* (Valenzuela-Ríos & Murphy, 1997; Murphy & Valenzuela-Ríos, 1999). In three key areas of European peri-Gondwanan sections (Spain; Czech Republic and Carnic Alps) the *Icriodus* and *Pelekysgnathus* record is also remarkable and can help in increasing the detail of correlations (Schönlaub, 1980, Valenzuela-Ríos, 1994; Slavík et al., 2012; Corradini & Corriga, 2012).

The purpose of this part of the project is to establish a refined biostratigraphical subdivision for the key areas that can serve as a basis for a refined conodont-based correlation in the peri-gondwanan areas of Europe and North Africa.

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Debrites of the Istebna Beds with exotic limestones from the Beskid Mały Mountains (Polish Outer Carpathians)

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In the Western Beskidy Mountains, exotic limestones occur relatively rarely in the Upper Cretaceous-Lower Palaeogene deposits of the Silesian Nappe. For example, their occurrence is associated with siliciclastic debrites of the Istebna Beds (e.g., Strzeboński, 2005, 2013). Limestone exotic clasts can constitute components of both mudstone and sandstone-conglomerate debrites. The mudstone debrite represents deposit of muddy debris flow (mass flow of sediment-water slurry consisting of gravels randomly scattered in muddy-sandy matrix), whereas the sandy-conglomerate association originated from sandy-gravelly debris flows (mass flows of sand and gravels with low content of mud matrix). The debris flows belong to the category of gravity-driven processes of mass flow type connected with deep-water sedimentary environment: shelf edge, slope and rise (e.g., Shanmugam, 2006). The deposits are typical for the apron depositional system (e.g., Reading and Richards, 1994).

Exotic limestones were collected in Mucharz and Targoszów. Among exotic limestones coming from more eastern area of the Silesian and Sub-Silesian Nappe, Tithonian-Berriasian carbonate platform deposits predominate, whereas described exotics represent the Upper Oxfordian-Lower Kimmeridgian outer shelf as well as Tithonian carbonate platform to deeper shelf facies. Oxfordian and Kimmeridgian exotics belong to bioclastic wackstones, often with numerous sponge spicules and thin-shelled bivalves. Typical microfossils are foraminifera of the genera *Cornuspira, Globuligerina, Rumanolina, Spirillina, Ophthalmidium* and calcareous dinoflagellates: *Cadosina parvula, Colomisphaera carpathica, Colomisphaera fibrata, Colomisphaera lapidosa, Committosphaera czestochowiensis, Crustocadosina semiradiata, Orthopithonella gustafsonii, Schizosphaerella minutissima.* Tithonian deposits are represented by bioclastic and onkoidal-bioclastic wackstones often with numerous sponge spicules and thin-shelled bivalves (deeper facies) and coated packstones, bioclastic packstones with peri-reefal components, bioclastic-intraclastic grainstones (platform and slope facies). Important microfossils occurring in these limestones: *Carpistomiosphaera tithonica, Colomisphaera tenuis, Committosphaera pulla, Andersenolina* div. sp., *Mohlerina basiliensis, Protomarssonella kummi, Protopeneroplis ultragranulata, Siphovalvulina variabilis, Trocholina odukpaniensis, Uvigerinammina uvigeriniformis, Crassicollaria* sp.

The paleotransport directions observed in the exotic deposits indicate that during the Palaeocene the Silesian Ridge constitute the primary source area for the southern facial zone in the western part of the Silesian Basin (e.g., Książkiewicz, 1962).

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Calcareous nanofossils of the Jurassic-Cretaceous boundary interval in the St. Bertrand (south-eastern France)

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The Jurassic-Cretaceous (J/K) boundary interval is currently one of the most studied period, because despite the existing studies (Michalík *et al.* 2009, Pruner *et al.* 2010, Wimbledon *et al.* 2011 etc.), the appropriate stratotype for the base of the Cretaceous still has not been defined. Globally, in this period, specific plankton-assemblages with rock-forming potential have developed. The radiation of the most important groups (Nannoconids, Calpionellids) significantly increases their biostratigraphical value.
For the purposes of the J/K boundary interval study, material from St. Bertrand (south-eastern France), has been obtained. Samples have been studied for calcareous nanofossils detecting, but the profile will be processed through multi-proxy study: calcareous nanofossils will stratigraphically be calibrated using calpionellids, macrofauna and magnetostratigraphy.
Previous results pointed to Upper Jurassic/Lower Cretaceous boundary interval age of the sediments. Following taxa of the families Nannoconaceae: e.g. *Nannoconus compressus*, *N. steinmannii* subsp. *minor*, *N. steinmannii* subsp. *steinmannii*, *N. kamptneri* subsp. *minor*, *N. kamptneri* subsp. *kamptneri*, *N. wintereri*, *N. globulus* subsp. *minor*, *N. globulus* subsp. *globulus* etc., Eoconusphaeraceae: *Conusphaera mexicana* subsp. *mexicana*, *C. mexicana* subsp. *minor* and Polycyclolithaceae: *Polycostella beckmanii*, *Hexalithus noeliae* have been recorded.
There were also identified e.g. members of the family Chiastozygaceae (*Zeugrhabdotus embergeri, Z. erectus, Z. cooperi*) and Watznaueriaceae (e.g. *Watznaueria barnesae, W. fossacincta, W. manivitiae, Cyclagelosphaera margerelii, C. deflandrei*).

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Early ontogeny of the Silurian tarphycerid *Ophioceras* (Nautiloidea)

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Macroevolutionary trends in changes in hatching/egg size in past nautiloids and their implications to dispersion and biodiversity trends of nautiloids is currently one of crucial problems of cephalopod evolution pattern. Study of early ontogeny is focused on determination of a boundary between hatching/post hatching growth stages of shell in youngest known tarphycerid *Ophioceras* Barrande, 1865. As the nepionic constriction did not occur in Early Palaeozoic nautiloids (Turek 2010), some other features characterising beginning of the postembryonic stage (Stenzel 1964) have to be used. One of them — first marked change in septal spacing occurring also in the recent *Nautilus* (Arnold 1987) — was selected by some authors as favourable for determination of boundary between embryonic and postembryonic stages in some Late Ordovician tarphycerids (Stumbur 1959, Shimanski and Zhuravleva 1961). As exact length of the body chamber in this growth stage is not known, the size of embryonic shell is only estimated. According to this interpretation embryonic shell of tarphycerids, beyond body chamber, had either one, two, eventually three phragmocone chambers or five to eight phragmocone chambers. Hatched animal so either differed substantially from the adult or not (Shimanski and Zhuravleva1961). Regrettably, changes in sculpture during early shell growth in tarphycerids are yet poorly documented and therefore were not properly used for indication of boundary between embryonic and postembryonic stages.

A detail study of early ontogeny of *Ophioceras* based on rich and well preserved material shows that a marked shortening of 7th or 8th phragmocone chamber appearing frequently at the end of the first whorl probably has now value for indication of discussed boundary. Regularity in appearance of this feature in *Ophioceras* is explained as a result of change in shell shape (i.e. fabrication noise). Owing to tight coiling, an imprint zone developed at the beginning of the second whorl. Geometry of shell shape changed and frequent reaction of the animal was a formation of markedly densely spaced septa. Owing to good preservation of shell surface, outer morphology could be used for determination of the embryonic/postembryonic growth stage. Based on changes in morphology and especially on appearance of the first conspicuous anomalies in growth, it is highly probable, that embryonic shell of *Ophioceras* has besides the body chamber only one or occasionally two phragmocone chambers. A similar situation is supposed also in many other tarphycerids although previously studies suggested rather larger hatching size with early post-hatched specimens similar in mode of life with adults. First indication of annuli – the most striking feature of "definite" shell sculpture – appeared soon after supposed hatching phase, at about a ½ of the whorl.

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Application of thin sections of tooth roots in domestic animals

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In both foreign and Czech literature the method of thin sections of tooth root is described to be primarily applied to teeth of wild animals (Ábelová 2005; Debeljak 1996; Gužvica 1991; Nývltová Fišáková 2007; Sauer et al. 1966; Stoneberg, Jonkel 1966; etc).

With the help of a polarizing microscope we can observe bright "summer" and dark "winter" lines on the thin sections of the tooth root. Together, these lines correspond with one year in life of an individual. The "winter" lines grow from November to April and "summer" lines from May to September. Any kind of a tooth can be used for this analysis. In case of canine teeth it is necessary to add up a half up to one year, in case of the last two molars 3 and half years to determine the age, depending on the species and time of eruption.

A cross cut in the first third of the tooth root is prepared, then it is poured into plastic resin and covered with a protective glass.

This methodology was applied to teeth from Pohansko – Southern Bailey and Kostice – Zadní hrúd in order to verify the time of slaughtering domestic animals.

When applying a higher magnification of microscope we found a higher number of concentrically arranged incremental lines on some thin sections. These incremental lines were most apparent on the thin section of the third upper molar of a sheep/goat from the locality of Kostice – Zadní hrúd. In accordance with the methodology of Renz and Radlanski (2006), who examined thin sections of human teeth, we divided the thin section into 4 quadrants – buccal, lingual, mesial and distal. In each quadrant visible incremental lines were counted.

On the thin section of a tooth of a sheep/goat from Kostice – Zadní hrúd (S2_8) more than 25 complete lines (summer + winter increment) were recorded in one of the examined quadrants. This figure measured in case of M3 sheep/goat greatly exceeds the actual age of the individual at the time of its death. The number of increments in all quadrats was plotter in the box-plot. We came to the result that the sheep/goat from Kostice – Zadni hrud was agend 10 years at the time of its death. This cannot be ruled out as the living expactancy of goats is about 15 years, in case of sheeps about 12 years. Yet, according to the abrasion on the dental crown we can be sure that the sheep/goat was not older than 3 years.

In order to find out when the incremental lines begin to appear during the ontogenic development we tried to prepare thin sections from the root of the fourth milk premolar of a recent goat. No increments were found by using a stereomicroscope. The EDS-analysis performed by the scanning electron microscopy/energy dispersive spectroscopy (SEM/EDS) by Jeol JSM-6490LV equipped with energy dispersive analyser EDAX (Oxford Instruments) showed no substantial differences in the bioapatite matrice elements (O, Ca, P) compositions in different parts of the tooth root. The analysed sample showed relatively stable Ca/P ratios (1.78–1.99) although large pores situated in cementum close to the cementum dentine boundary are typical by the strongly decreased content of Ca (2.66 wt%) and P (1.34 wt%) and increased content of organic C (24.5 wt%). No S was detected in cementum.

In case of domestic species this may be more complicated, similarly to the situation of modern man (Renz, Radlanski, 2006). One possible explanation of the higher number of incremental lines might be different living conditions of domestic animals in comparison with their wild counterparts.

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New findings on Lower Cretaceous ribbed ammonites of Štramberk Limestone from the Kotouč Quarry near Štramberk (Silesian Unit, Outer Western Carpathians)

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In the year 2012 I informed about preliminary results of a study of ribbed ammonites from the Štramberk Limestone, coming from the type area of Štramberk. The studied material largely came from rather old collections from the depository of Silesian Museum in Opava with the assumed localization of Kotouč Quarry.

After submitting the mentioned information (Vašíček, 2012) we together with P. Skupien found a new ammonite layer in the section with bedded Štramberk limestones in the side of exit road from Level 4 to Level 3 in August 2012. We obtained about a hundred Lower Berriasian ammonites preserved to various extents (usually fragmentarily) from it. The majority of the ammonites had been known neither from the Kotouč Quarry nor from other quarries at Štramberk by that time.

The species composition of the mentioned ammonites is as follows: *Spiticeras blancheti* Djanélidzé, *Berriasella jacobi* Mazenot, *B. oppeli* (Kilian), *Tirnovella allobrogensis* (Mazenot), *Delphinella consanguinea* (Retowski), *Pseudosubplanites grandis* (Mazenot) and *Malbosiceras* cf. *asper* (Mazenot).

To the stratigraphically most significant species, *Berriasella jacobi* and *Pseudosubplanites grandis* belong. The former is a zone species for the Lower Berriasian (see e.g. Reboulet et al., 2011), the latter is usually considered to be a subzone species for the upper part of the Lower Berriasian.

The above-mentioned association of Lower Berriasian ammonites includes some other species that are deposited in the Silesian Museum in Opava, Nový Jičín Regional Museum, and Ostrava Museum. They are as follows: *Proniceras jacobi* Djanélidzé, *Pseudargentiniceras abscissum* (Oppel), *Berriasella oppeli* (Kilian), *Pseudosubplanites grandis* (Mazenot), *Riasanites swistowianus* (Nikitin) and *Neocosmoceras* ?sp. nov. Two of the mentioned species (*B. oppeli* and *Ps. grandis*) were also found in the above-mentioned section; the remaining species complete the species composition.

In addition to the predominance of Tethydian species, a unique occurrence of a representative of the genus *Riasanites* is interesting. This indicates a possible communication between the Silesian Unit and the Danish-Polish Depression in Poland (Marek and Shulgina, 1996) and the East-European Platform in Central Russia (Mitta, 2007).

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Chitinozoa across the latest Ludlow kozlowskii/Lau events in the Prague Basin, Czech Republic

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Chitinozoa are organic-walled, marine microfossils supposedly representing eggs of unknown soft-body metazoans "chitinozoophorans" (Paris and Nolvak 1999). The group has been recorded worldwide, in rocks of Cambrian to Devonian age. Chitinozoans are important biostratigraphical markers especially because of their relatively high facial independence in comparison with two of the other groups used for Silurian biostratigraphy graptolites and conodonts. In the Prague Basin (Czech Republic) chitinozoan assemblages were studied through the so-called *kozlowskii* or Lau Event to provide additional information of, one of the most striking Silurian extinction events (Calner et al. 2008) which is associated with the most prominent δ^{13} Carbon Section Isotope Excursion (CIE) in the whole Phanerozoic (Munnecke et al. 2003). Two sections bearing Chitinozoa, the Všeradice section and the Kosov section (Vodička 2011), both well-correlated by graptolites and chemostratigraphy (δ^{13} carbon isotope record) and also roughly by conodonts, were sampled. The extinction level is marked by the LAD of the graptolite *N. kozlowskii* and coincides with the onset of the CIE (Lehnert et al. 2007, Manda et al. 2011, Frýda and Manda 2013).
Chitinozoans were preferably sampled from limestone beds and then treated with the HCl and HF acids, sieving on the 50µm sieve and finally examined and photographed using SEM. Both sections contain a rich chitinozoan assemblage which was clearly influenced by the Event. Three intervals, the pre-extinctions, post-extinction and the recovery intervals can be distinguished. During the pre-extinction interval, the assemblage contains mainly members of the family Conochitinidae, while the non-productive samples characterized the post extinction interval in both sections. The recovery interval is represented in the Všeradice section by the remarkably diversified assemblages, mainly with genus *Eisenackitina* and in the Kosov section by the only productive sample bearing almost exlusively the *Ancyrochitina*genus. In the Kosov section chitinozoa disappear under the LAD of last graptolite and in the Všeradice section in the same bed as the last conodont, also under the graptolite LAD. Based on the most recent chemostrataigraphical data (Manda and Frýda 2013) in Všeradice section hiatus caused by the supposed sea-level fall was probably much longer than previously assumed. This is fully supported by the chitinozoan data. In the Všeradice section, the post-extinction interval corresponds to the recovery graptolite fauna (Manda et al. 2012), which is delayed after the conodonts continual recovery (Slavík and Carls 2012). Meanwhile, in the Kosov section the only productive sample positioned in the upper part of the section can be interpreted as the very soon beginning of the recovery interval. In comparison with graptolites and conodonts, chitinozoa display a rather similar pattern of distribution with conodonts. To establish more precisely magnitude of the effect of the Event, several other sections of the Upper Ludlow age are studied. *Eisenackitina barrandei*, stratigraphically important species for the Upper Ludlow, was found in Všeradice section.

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Some results of palaeontological studies in the Cretaceous of the northern James Ross Island (Antarctica)

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Cretaceous deposits of the James Ross Island at the northeastern Antarctic Peninsula are known as one of the richest fossiliferous sites in the whole Antarctica. The present report is based on studies of Cretaceous material (project VaV No. SPII 1a9/23/07) gathered in the field works during 2005, 2009, 2010 and 2011 Austral summers in the Czech Antarctic field station Johann Gregor Mendel, situated in the northern coast of the James Ross Island.

Various Lower-Upper Cretaceous samples were gathered to test the presence of foraminifers. However, only samples from the Hidden Lake and Santa Marta formations provided foraminiferal assemblages with both agglutinated and calcareous types of tests that gave relevant information for biostratigraphical conclusions (Hradecká et al. 2012).

Švábenická tested calcareous nannofossils as a possible tool for stratigraphic evaluation of Cretaceous strata, but only few samples provided poor nannofossil content that gave relevant information for biostratigraphic conclusions (Švábenická et al. 2012).

Plant megafossils from the Coniacian Hidden Lake Formation are reported by Kvaček & Vodrážka (submitted). The new fossiliferous sites studied by authors yielded diversified assemblage of pteridophytes, conifers and angiosperms (Kvaček & Vodrážka submitted).

Sakala described a new species of *Antarctoxylon* from the Coniacian Hidden Lake Formation of James Ross Island. This finding provides further evidence of the earliest record of arboreal angiosperms in Antarctica (Sakala & Vodrážka, in print).

Laocoetis piserai Vodrážka & Crame (Hexactinellida, Porifera) was described as a first fossil sponge from Antarctica (Vodrážka & Crame 2011), but more studies on Upper Cretaceous sponges will follow, since new sponge faunas has been discovered by authors recently in the Turonian - Santonian of northern James Ross Island.

Although various groups of Upper Cretaceous fossils are studied recently by many specialists (e.g., Vodrážka et al., in preparation), hundreds of Upper Cretaceous fossils and rock samples are available for studies by any colleagues interested.

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A new agglutinated foraminifera of the genus *Bulbobaculites* from the Paleogene of Outer Carpathians (Silesian Nappe, Poland) – preliminary results

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The probably new foraminiferal taxon *Bulbobaculites“X”* (the species is still without a name and its taxonomical position is still not clear), is found indeep water Carpathian assemblages of Eocene age.
The species has the following characteristics: Test free, elongate, comprised of spherical chambers. The test usually consists of only 3,rarely 4 chambers. The initial chambers enlarge rapidly, each is several times larger than the previous. The initial part is coiled probably in a low trochospiral or streptospiral (the mode of coiling axis is difficult to diagnose on the basis of 3 rapidly growing chambers). The position of the 4th chamber indicates a terminally uniserial chamber arrangement. Aperture is terminal, around opening, either without a neck or with small neck on the top of youngest chamber. Wall is thick, made up of coarse quartz grains, with a rough surface. Test is relatively large; specimens are 0,6 – 1.2 mm in diameter. Chambers are often postdepositionally compressed. Specimens are fragile despite the coarse-grained test, the initial chamber is delicate and it is easily damaged.
Age: Middle – Late Eocene, with assemblages of Bartonian and Prabonian age, corresponds with the Ammodiscus latus and Reticulophragmium rotundidorsatum biozone (after Olszewska, 1997).
Occurrence: *Bulbobaculites “X”*is found within the Hieroglyphic Formation (Silesian Nappe, Outer Carpathians), only in the upper part of this division. It was record at three separate localities: in the Szczyrzyc area, at Rożnów Lake area and in the Gorlice section. It is found as single specimens (from one to several specimens per sample) in assemblages predominated by agglutinated taxa, representing deep water conditions deposited below the CCD. It occursonly in assemblages that display relatively high taxonomical diversity.
In general shape, size, and wall character *Bulbobaculites “X”* externally resembles *Saccamminoide scarpathicus* Geroch. However, differs by the lack of separate apertures from each chambers, which is typical of *Saccamminoides*. Four-chambered specimens are similar to *Reophax* in general outline, except for the position of the smallest initial chamber, located between chambers2 and 3. Destruction of this fragile chamber would make this species resemble *Reophax pilulifer* Brady.

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Foraminiferal assemblages of Beloveža Formation in Klimkówka Lake area (Magura Nappe, Outer Carpathians, Poland)

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The artificial reservoir - Klimkówka Lake (the Hańczowa Mts, Beskid Niski Range) - is located within Outer Carpathians where deposits belonging to Magura Nappe crop out. These deposits represent the youngest part (Upper Cretaceous - lower Paleogene) of the Rača Unit section. The present authors studied the Rača Unit, especially the Beloveža Formation. They conducted biostratigraphical research which were carried on the basis of foraminiferal assemblages.
The Beloveža Fm is represented by thin-bedded flysch with shales domination. Shales are gray, green-gray, green-blue olive green in color, with predominance of clay and with small amount of carbonates. In upper part the variegated shales or brown-dark shales are present. The thin- or medium bedded sandstones intercalated shales. Sandstones are gray and blue-gray, often laminated and siliceous with abundant hieroglyphs, mainly biogenic. The Beloveža Fm starts just above the last red shale complex of the Łabowa Shale Formation. The boundary of the Beloveža Fm with overlaying Magura Formation is marked by the first thick sandstone layer.
Foraminiferal assemblages from the Beloveža Fm. usually consist of taxonomically poor, cosmopolitan, long-life agglutinated forms. Generally the Bathysiphon, Recurvoides and Paratrochamminoides dominate. The monospecific assemblages are popular e.g. of Praesphaerammina subgaleata (Vašiček) (typical especially for the upper part of Beloveža Fm.) and of Recurvoides. Assemblages dominated by Bathysiphon-Recurvoides or Bathysiphon-Trochammina-Haplophragmoides are also common. Biostartigraphicaly important taxa occur irregularly within sections. The assemblages with numerous Reticulophragmium amplectens (Grzybowski) occur in the lower part of this formation, in the upper part single specimens of Ammodiscus latus Grzybowski are present. In Outer Carpathians, these taxa are biostratigraphical markers indicating Middle Eocene, adequately Lutetian and Bartonian. Eratidus gerochi Kaminski et Gradstein, Pseudonodosinella elongata (Grzybowski), Praesphaerammina subgaleata (Vašiček), Chilostomella chilostomelloides Vašiček and Haplophragmoides parvulus Blaicher represent typical Eocene foraminifera. Assemblages with Haplophragmoides parvulus Blaicher and Haplophragmoides nauticus Kender, Kaminski & Jones are relatively common.

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Remarks on the *Annulata* events in the southern part of the Moravian Karst (middle Famennian, Czech Republic)

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The middle Famennian *Annulata* events are characterized by dark grey to black hypoxic to anoxic sediments. The event beds commonly contain a typical fauna of ammonoids (e.g. *Platyclymenia*, *Prionoceras*), bivalves and other groups. The event horizon might be overlain by richly fossiliferous layers of “Wagnerbank” marlstone and its equivalents (e.g. “*Annulata*” limestone). These stratigraphical levels were assigned to the Upper *Palmatolepis rugosa trachytera* conodont zone in the most recent work by Hartenfels (2011). Several stratigraphically important conodont taxa (e. g. *Palmatolepis glabra lepta*, *Palmatolepis rugosa trachytera*) reach the Lower *Annulata* event beds but disappear under the Upper *Annulata* event beds (see Hartenfels, 2011).

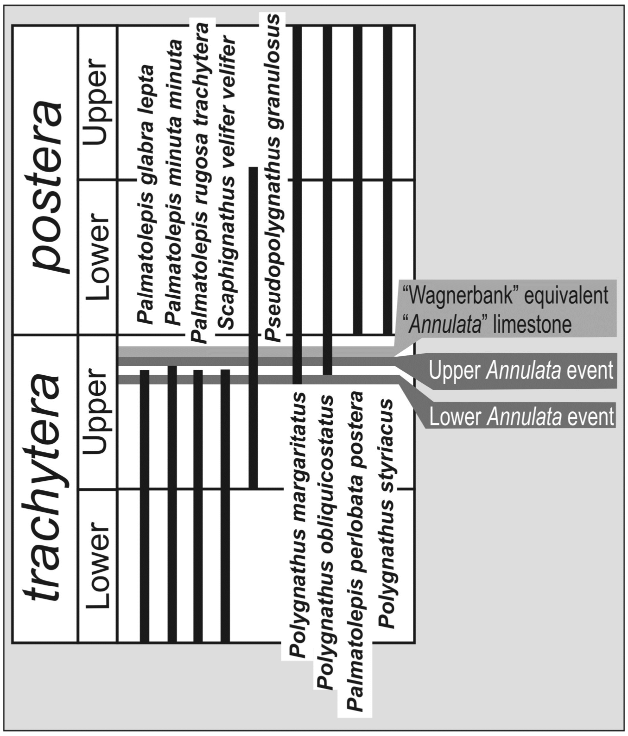

Fig. 1. Stratigraphical distribution of selected conodont taxa around the *Annulata* events within *Palmatolepis rugosa trachytera* („*trachytera*“) and *Palmatolepis perlobata postera* („*postera*“) conodont zones (middle Famennian). After Hartenfels (2011), modified.

Recently, four localities of the *Annulata* events in the southern part of the Moravian Karst were studied. All sampled sections represent highly condensed successions of the Líšeň Formation. The macrofossils are very abundant especially in the event horizons.

The event bed in the section Ochoz near Brno provided a rich conodont fauna including *Palmatolepis glabra lepta*, *Palmatolepis minuta minuta* and *Palmatolepis rugosa trachytera*. The presence of these taxa suggests the Lower *Annulata* event.

Two additional sections were studied near the village of Hostěnice. *Palmatolepis glabra lepta* and *Palmatolepis rugosa trachytera* were recorded only below the event beds. The event beds provided rather poor conodont fauna. Conodont taxa which indicate the Lower *Annulata* event were not recorded. However, the assignment to the Upper *Annulata* event seems to be equivocal because of rather small number of separed conodont elements.

The event bed in the western Mokrá quarry provided rather infrequent conodonts including *Palmatolepis glabra lepta* which indicates the Lower *Annulata* event.

The event beds in all studied sections can be correlated by gamma-ray spectrometry which is possible due to higher uranium. The results are in accord with the data from Kowala section in the Holy Cross

Mountains in southern Poland. The event beds in all localities are overlain by richly fossiliferous intervals. However, the correlation with "Wagnerbank" and its equivalents remains insufficiently biostratigraphically supported.

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New Miocene Bryozoa from Brazil - possible paleogeogrphical connection to Paratethys

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Miocene Brazilian bryozoans have been studied during two expeditions in 2011 and 2012 to Pirabas formation situated on the north part of the Amazonia (Pará state, Brazil). We examined four expressive exposures: Capanema B-17 Mine, Salinópolis Atalaia beach, Fortaleza island and Aricuru.

Among the rich bryozoan association (more than 120 species) we found mainly genus Metrarabdotos and species belonging to the family Jaculinidae.

Metrarabdotos is very distinctive genus characteristic for tropical environment. In Brazil we were able to distinguished more than 12 species belonging to this genus, however only one species is known to occur in Paratethys (M. malecki). Recently Metrarabdotos is not reported in the Mediterranean or any surrounding basins (Cheetham, 1968).

Bryozoans from Jaculinidae resembling the Paleozoic Fenestrata in development of the smooth calcareous bar (trabeculae) jointing neighbouring branches and arrangement of two rows of autozooecia on branch. Functionally and ecologically they suppose to live in the same environmental conditions as phidoloporids (mainly genus Retepora). However we do not find any phidoloporids among Miocene Brazilian fauna, while it is the commonest representatives in the bryozoan fauna in Paratethys (Zágoršek, 2010). Moreover, rich species belonging to Jaculinidae has been reported from Miocene sediments of Dominic republic (web: bryozoa.net). The Jaculinidae genera is first time reposted from Paratethys in Plio/pleistocene sediments of south Italy, and one report is given to the living species in Mediterranean (Jullien & Calvet, 1903).

This distribution of the fauna on both side of Atlantic suppose, that during the Miocene the evolutional centre for the bryozoans could be the Caribbean and adjacent areas (including north of Brazil), where new genera were evolved. Jaculinidae than slowly spread over the Atlantic and after Messinian crisis occupy the empty niches. Recently they could survives in those niches, where phidoloporids (for various reasons) do not occupy. Metrarabdotos however (due to the strong dependence of tropical climate) stay in the equatorial seas and do not spread over the Mediterranean area.

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New biostratigraphic results from the borehole VTO -14 Nová Vieska pri Bodrogu (Eastern Slovakia)

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The lithological and biostratigraphic research of the territory east of the Zemplínske vrchy Hills brought new classification data about Mesozoic sediments. This topic was solved by the project Update of geological setting of problematic areas in the Slovak Republic at a scale 1:50 000, and its topic Lithological-biostratigraphic reappraisal of Mesozoic and Neogene formations east of the Zemplínske vrchy Hills.

The Neogene formations were distinguished beneath the Quaternary sediments at the village of Nová Vieska pri Bodrogu in the southern part of studied territory, resulting from the biostratigraphic evaluation of sediments from the borehole VTO-14. They relate to Senné (Pliocene – Pannonian), Stretava (Lower Sarmatian) and Lastomírov fms. (Upper Badenian), deposited on the Upper to Middle Badenian volcanic complexes. The lithology consists of the rhyolite volcaniclastics of "Viničky" type (Upper Badenian), complex of andesite and dacite extrusives of "Brehov – Somotor" type (Upper – Middle Badenian) and complex of rhyodacite tuffs of "Luhyňa – Kašov – Cejkov" type (Upper Badenian – Middle Badenian), being discordantly deposited on Upper Cretaceous sediments.

In the depths 845-1020 m, the Upper Cretaceous calcareous assemblages were found, encompassing the species *Micula staurophora* (Gardet) Stradner, *Micula swastica* Stradner et Steinmetz, *Arkhangelskiella cymbiformis* Vekshina and *Microrhabdulus undosus* Perch-Nielsen.

Beneath, in the depths 1020-1145 m only assemblages with rare presence of calcareous nannoplankton were present. The species *Watznaueria barnesae* (Black) Perch-Nielsen, was found here, having a wide stratigraphic range from Middle Jurassic up to Upper Cretaceous. The presence of this species also points to the Mesozoic age of these sediments.

The presence of Upper Cretaceous sediments in the depth interval 840-1145 m has been demonstrated by the detail biostratigraphic investigation of calcareous nannoplankton assemblages, differing the age of sediments from those of Upper Carboniferous (Stephanian C-D) and Lower Permian, as stated in older works (Kobulský et al., 1989).

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