TWELFTH ROMANIAN SYMPOSIUM ON PALEONTOLOGY

Cluj-Napoca, 19-21 September 2019

Dedicated to the 100th Anniversary of Romanian University in Cluj-Napoca

ABSTRACTS AND FIELD TRIP GUIDE

Edited by:
Ioan I. Bucur, George Pleș, Emanoil Săsăran and Cristian Victor Mircescu

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Presa Universitară Clujeană
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Tel./fax: (+40)-264-597.401
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The tenth Romanian Symposium on Paleontology was organized by the Romanian Society of Paleontologists and Babeş-Bolyai University

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The 12th Romanian Symposium on Paleontology

Programme

September 18, 2019 – Registration (at the Symposium venue)

September 19, 2019
From 8.00 onwards – Registration (will be available all day at the symposium venue)

9.00 – Opening (E. Stoicovici room)
9.05-9.15 – 100 years of Romanian university in Cluj (Liana Sasaran)

9.15-10.45 – Plenary lectures (E. Stoicovici room)
9.15-9.45 – Riding, R. - Ocean acidification and the interglacial decline of coral reef stromatolites
9.45-10.15 – Granier, B. - Microfossil stratigraphy in carbonate platforms of the Tethys Ocean, in Urgonian facies and at the Jurassic-Cretaceous transition (methods and implications)
10.15-10.45 – Papazzoni, C.A. - Nummulite banks: a review

10.45-11.20 – Coffee break

11.20 – 13.00 – Oral presentations

E. Stoicovici room
11.20-11.40 – Grădinaru, M., Lazăr, I., Ducea, M.N. & Petrescu, L. - Geochemical and mineralogical evidence of microbial signatures related to genesis of the Middle Jurassic ferruginous stromatolites (Southern Carpathians, Romania)
11.40-12.00 – Lazăr, I., Pleș, G., Grădinaru, M., Bucur, I.I., Săsăran, E., Oprișa, A & Ungureanu, R. - Facies and depositional setting of the Upper Jurassic to Lower Cretaceous platform carbonates from eastern South Carpathians (Bucegi Mountains, Romania)
12.00-12.20 – Schlagintweit, F., Rashidi, K. & Thajbakhsh, G.R. - The Mount Chah Torsh section, Central Iran: a new K/T shallow marine sequence
12.20-12.40 - Popescu, G. & Crihan, I.M. - Paleogene Foraminifera from Micești (Cluj district, Romania)
12.40-13.00 - Ioniţă , C. & Singhel, C.-V. - Lithology and dating using microfauna analysis on Sarmatian cutting samples recovered by 2 wells in the Siliştea area

13.00-15.30 – Lunch Break

15.30-16.30 – Oral presentations

E. Stoicovici room

15.30-15.50 - Stoica, M. & Rausch. L. - Pliocene-Pleistocene ostracods from Caspian Basin

15.50-16.10 - Tîrlă, M.–L., Lazăr, I., Stoica M., Grădinaru M. & Mirea, I.–C. - Preliminary microfacies analyses on the Middle–Upper Jurassic transition in the Buila-Vânturarița Massif (Southern Carpathians, Romania)

16.10-16.30 - Belhadji A., Bartolini A., Belkebir L., Saint Martin J.-P. & Bessedik M. - Morphological variability in planktonic foraminifers from Messinian sediments (Eastern Dahra, Algeria)

16.30-17.00 – Coffee break

E. Stoicovici room

17.00-17.20 – Grădinaru, E. & Vašíček, Z. - Dating the final stage of the Eastern Getic Carbonate Platform, by ammonite fauna

17.20-17.40 - Głowniak, E., Wierzbowski, H. & Grabowski, J. - The Prososphinctes Bioevent (Ammonoidea, Perisphinctidae) in the Cordatum Zone (Lower Oxfordian) as a proxy for environmental changes in the marine ecosystem — Polish Jura Chain, central Poland

17.40-18.00 - Posmoșanu, E. - Analyses of bioerosion on Middle Miocene bivalve shells and corals from Tășad, Bihor, Romania

18.30-21 – Icebreaking party

September 19, 2019

11.20 – 13.00 – Oral presentations

I. Popescu-Voiteşti room

11.20-11.40 - Cavin, L., Ferrante, C. & Grădinaru, E. - European Triassic coelacanths: new occurrence and the impact on the evolutionary history of the group

11.40-12.00 - Choi, S., Csiki-Sava, Z., Moreno-Azanza, M., Prondvai, E. & Lee, Y.-N. - The lizard "pseudo-extinction" that was not - EBSD analysis reveals true affinities of a widespread Late Cretaceous eggshell type from Europe

12.00-12.20 - Csiki-Sava, Z., Vremir, M., Meng, J., Brusatte, S. L. & Norell, M. A. - Being (relatively) simpleminded – how does is work for you? A weird new multituberculate from the Upper Cretaceous of Romania adds to the list of peculiar island adaptations known in vertebrates

12.20-12.40 - Dyke, G., Laurent, C. & Lendvai, A. - The evolution of bird feathers: New and old evidence from the fossil record

12.40-13.00 - Laurent, C. & Dyke, G. - The rediscovery of Burmite and it's palaeontological significance for understanding the development of Avian flight in the mid-Cretaceous

13.00-15.30 – Lunch break

15.30-15.50 - Vasile, Ș., Drăgușin, V., Petculescu, A., Constantin, S., Sava, T.B. & Sava, G.O. - Preliminary data on the Late Pleistocene-Holocene herpetofaunal fossil assemblages from Stoieni Cave (Mehedinți Mountains, Romania)

15.50-16.10 - Țibuleac, P. - New data about the Early Jurassic nautiloids of Prașca Klippe (Rarău Syncline, Eastern Carpathians, Romania)

16.10-16.30 - Ionesi, V., Grădianu, I., Copilaș-Ciocianu, D., Loghin, S., Mare, S., Dumitriu, S.-D. & Matei, C. - New data on the fossil fauna from the Cryptomactra Formation reveals unexpected diversity

16.30-17.00 – Coffee break

17.00-17.20 – Iamandei, E. & Iamandei, S. - New identified trees in the late Cretaceous Petrified Forest from Mureș corridor, Apuseni Mts, Romania

17.20-17.40 – Iamandei, S., Iamandei, E., Velitzelos, D. & Velitzelos, E. - Palaeoxylotomical studies in the Cenozoic Petrified Forests of Greece. Part two-conifers

17.40-18.00 - Akkemik, Ü. & Çelik, H. - Petrified wood identifications from Turkey and their evaluations

18.30-21 – Icebreaking party

September 20, 2019

9.00-10.40 - Oral presentations

E. Stoicovici room

9.00-9.20 - Botka, D., Csoma, V., Tóth, E., Šujan, M., Braucher, R., Sant, K., Baranyi, V., Ćorić, S., Bartha, I. R., Magyar, I., & Silye, L. - Integrated stratigraphic results on the lower Pannonian (upper Miocene) sediments in the Transylvanian Basin (Romania)

9.20-9.40 - Filipescu S., Szekely F. S., Bindiu Haitonic R. & Pașcalău P. - Discussion on the stratigraphic position of the upper Oligocene to middle Miocene shallow marine sediments in the noth-western Transylvanian Basin, based on fossil foraminifera

9.40-10.00 - Cociuba I. & Papp D. - Preliminary note on the post- Middle Miocene evolution and structural model of the NW part of the Transylvanian Basin

10.00-10.20 – Cociuba, I. - Pre-Middle Miocene in the Cluj-Napoca area

10.20-10.40 – Silye, L., Kövecsi, Sz.-A., Less, Gy., Bindiu Haitonic, R., Pleș, G., Zágoršek, K., Bălc, R., Filipescu, S., Barabás, E. & Jakab, A. - New insights on the middle Eocene nummulitic accumulations from the Transylvanian Basin

10.40-11.20 - Coffee break

11.20-12.40 – Oral presentations

E. Stoicovici room

11.20-11.40 - Ilieș, I. A., Oltean, G., Bindiu Haitonic, R. & Filipescu, S. - Reconstructing the palaeoambiental parameters of the Middle Miocene of the Hațeg Basin with the use of fossil foraminifera assemblages and statistical methods

11.40-12.00 - Ruskal, A., Diaconu, A., Grindean, R., Panait, A. & Tanțău, I. - Quantitative hydroclimate reconstruction between 12,7-6,2 ka BP from the Apuseni Mountains

12.00-12.20 - Mircescu, C.V., Bucur, I.I., Ghionea, Ș & Popa, G.L. - Facies associations and microfossils from the Middle-Upper Triassic limestones of Perșani Mountains (Eastern Carpathians, Romania)

12.20-12.40 – Pleş, G., Schlagintweit, F., Lazăr, I., Bucur, I.I., Săsăran, E. & Grădinaru, M. - Calcified sponge assemblage in Upper Jurassic carbonates of the eastern Getic Carbonate Platform (Southern Carpathians, Romania). Palaeoecology, microfacies analysis and reef zonation

12.40-13.00 - Bucur, I.I., Sudar, M.N., Schlagintweit, F., Polavder, S., Săsăran, E., Jovanovic, D. & Pleş, G. - The lowermost Cretaceous from the western part of Carpatho-Balkanides (Eastern Serbia): the Kamenica section

12.40-15.00 – Lunch break

15.00-16.00 – Poster presentations (1 to 16)

1. Anton, M.E. & Melinte-Dobrinescu, M.C. - Black Sea Pleistocene to Holocene palaeoenvironmental changes based on calcareous nannoplankton fluctuation pattern
2. Antoniade C., Crusoveanu (Rusu) S. & Stoica M. - Senonian microfauna from South Dobrogea
3. Bălc R., Bercea R.-I. & Tămaș A. - Integrated biostratigraphy, sedimentology and structural geology of the internal Pucioasa-Fusaru lithofacies (Pucioasa, Carpathian Bend Zone, Romania)
4. Bindiu Haitonic, R., Kövecsi, S-A., Pleș, G., Bălc, R., Barabás, E., Jakab., A., Veciunca , A., Filipescu, S. & Silye, L. - Assemblages of smaller foraminifera associated with the nummulites banks of the Transylvanian Basin (Romania): palaeoecological remarks
5. Bozukov, V. & Ivanov, D. - New palaeobotanical data from the Pernik Coal Basin (W Bulgaria)
6. Chira, C. M., Aroldi., C., Bindiu Haitonic, R., Popa, M.V., Juravle, D.T. & Dromereschi, P. - The Oligocene – Miocene micropaleontological assemblages and sedimentological data from Moldoviţa Basin (Bucovina)
7. Diaconu, A.-C., Gałka, M., Feurdean, A., Panait, A., Ruskal, A. & Tanţău, I. - Last millennium hydroclimate evolution in Eastern Carpathians, Romania
8. Diaconu, A.-C., Tanţău, I., Grindean, R., Ruskal, A. & Feurdean, A. - South-eastern Europe (Romania) fire patterns of a grassland ecosystem during the Holocene
9. Dragoş, A.-G. - A review of the flight adaptations in the paravian group of dinosaurs and the ambiguous transition between birds (Aves) and theropods
10. Haiduc, B.-S., Brânzilă, M., Răţoi, B.G. & Păun, E.-I. - Dental microwear texture analysis - "New Data from Old Fosils"
11. Hoan, D.T., Săsăran, E., Bucur, I.I., Bia, T. & Oprișa, A. - Upper Jurassic – Lower Cretaceous limestone from Mănăstirii valley – Întregalde Gorge zone (Trascău mountains): microfacies and depositional environments
12. Juravle, D.-T., Ursu, A., Chelariu, C., Juravle, V. - Lithofacial and tectono-structural reflex in post-Moldavian morphogenesis from Obcina Mare (Eastern Carpathians)

13. Kövecsi, S.-A., Pleș, G., Bindiu Haitonic, R., Less, G. & Silye, L. - Eocene larger benthic foraminiferal accumulations from Albești Limestone: microfacies analysis and paleoecological implications
14. Lázár, B. & Silye, L. - Lower Sarmatian foraminiferal assemblages from the NW border of the Transylvanian Basin
15. Loghin, S., Dumitriu, S.D., Seserman, A. & Brânzilă, M. - Biostratigraphy and paleoecology of the Sarmatian deposits (Middle Miocene) from Ciofoaia section
16. Oprișa, A., Pleș, G., Bucur, I.I., Săsăran, E. & Mircescu, C.V. - Microfacies and micropaleontological assemblages in Upper Jurassic limestones from Fundătura Ponorului (Hațeg-Pui Zone, Romania)

16.00-16.30 – Coffee break

16.30 – 17.00 – Poster presentations (17 to 24)

17. Pașcalău, P., Bindiu Haitonic, R., Filipescu, S. & Szekely, F.S. - Palaeoecological interpretations on the Racăș section (Transylvanian Basin, Romania), based on fossil foraminifera assemblages
18. Păun, E.-I., Ursachi, L., Rățoi, B.G., Brânzilă, M., Haiduc, B.-S., Guy, F., Daver, G. & Badea, D.-D. - Equidae (Mammalia, Perissodactyla) from the late Miocene of Pogana (Scythian Platform, Romania)
19. Pleș, G. & Gawlick, H.-J. - Strâmtura Valley section of the Codru Nappe System revisited. An example of the mid-Carnian drowning of the Wetterstein Carbonate Platform (Apuseni Mts., Romania)
20. Popescu, A. - Scapula and coxal of Mammuthus meridionalis (Nesti, 1825) from Leu, SW of Romania
21. Rățoi, B.G., Ursachi, L., Brânzilă, M., Haiduc, B.S., Păun, E.I., Badea, D., Guy, F. & Daver, G. - Rhinocerotidae and Chalicotheriidae (Perissodactyla, Tapiromorpha) from the Late Miocene of Pogana (Scythian Platform, Romania)
22. Săsăran, L., Bălc, R., Săsăran, E. & Țuțuianu, M. - Biostratigraphy of the Late Cretaceous shallow-marine deposits from Misea Hill, Roşia basin, Apuseni Mountains, Romania
23. Schlagintweit, F. & Bucur, I.I. - *Cantabriconus*? *meridionalis* n. sp., a new orbitoliniform benthic foraminifera from the Barremian of the Reşita–Moldova Nouă zone, Romania
24. Ţabără, D., Tudor, E. & Chelariu, C. - Palynology and palynofacies of Devonian – Carboniferous deposits from the Eastern part of the Moesian Platform (Romania)

17.00-19.00 –S.P.R. General Assembly

19.30-22 – Symposium dinner

Abstracts

ORAL

Petrified wood identifications from Turkey and their evaluations

Akkemik, Ü.[1] & Çelik, H.[1]

[1] *Istanbul University-Cerrahpasa, Forestry Faculty, Forest Botany Department, 34473 Bahceköy – Sarıyer, Istanbul, Turkey. uakkemik@istanbul.edu.tr*

Keywords: fossil wood, fossil forest, Miocene, Turkey

Introduction

Petrified wood identifications revealed valuable information about the forest compositions in Neogene of Turkey. The purpose of the present paper is to summarize the identified forest trees, forest compositions and forest types in Neogene of Turkey.

Methodology

The studies on petrified wood identifications (Sayadi, 1973; Selmeier, 1990, 2001; Özgüven-Ertan 1971, 1981 (1983), Eroskay & Aytug 1982, Akkemik et al., 2005, 2009, 2017, 2018, 2019a,b; Akkemik and Sakınç, 2013; Iamandei et al., 2018; Bayam et al., 2018; Güngör et al., 2019; Polat et al., 2019) (Figure 1) were summarized and evaluated.

Results and discussion

Forest trees during late Oligocene to Pliocene:

- *Late Oligocene-very early Miocene trees:* During late Oligocene to early Miocene, mostly taxodioid type woods were identified in Thrace. In very early Miocene of central Anatolia, *Quercus* sect. *Ilex*, *Pistacioxylon* and *Zelkovoxylon* species were identified.
- *Early to Early-Middle Miocene*: The most common wood collections were identified from this time interval. Conifers such as *Taxodioxylon, Glyptostroboxylon, Sequoioxylon, Juniperus, Pinus, Cedrus, Picea,* and angiosperms such as *Salix, Populus, Liquidambar, Acer, Laurinoxylon, Pterocaryoxylon, Zelkovoxylon, Ulmus, Palmoxylon, Fraxinus, Fagoxylon, Platanoxylon, Carpinoxylon, Ostryoxylon*, *Prunoidoxylon* were identified through central-west Turkey.
- *Late Miocene*: *Taxodioxylon* and *Glyptostroboxylon* woods from central Anatolia were identified.
- *Pliocene*: *Carya, Juglans, Alnus*, *Pterocaryoxylon, Cercioxylon*, *Cupressinoxylon* and *Sequoioxylon* were identified from Pliocene.

Forest types: Petrified trees were composed of different types of forests as follows.

- *Riparian forests:* This type of forest composed of taxodioid woods was common in Neogene of Turkey. *Palmoxylon*, *Alnoxylon*, *Pterocaryoxylon, Salix/Populus* and *Liquidambar* trees showed another composition of a riparian forest.
- *Swamp forests:* Mainly *Glyptostroboxylon* and *Taxodioxylon* samples may reveal the presence of swamp forests.
- *Well-drained forests:* Huge amount of petrified wood identifications such as *Acer, Laurinoxylon, Pterocaryoxylon, Fraxinus, Quercus* sect. *Ilex*, *Ulmus, Zelkovoxylon, Cercioxylon, Fagoxylon, Carpinoxylon, Ostryoxylon, Fraxinus* and *Prunoidoxylon* reflected the well-drained forest composition in Thrace and west-central Anatolia.
- *Conifer forests:* From lowlands to upland different conifer genera composed of conifer forests. In lowlands, *Juniperus, Cupressinoxylon, Sequoioxylon* and *Pinuxylon* constituted forests, when *Cedrus, Pinus* and *Picea* were the trees of upland conifer forests in Neogene.

Climate: The results of petrified wood identifications showed that climate was drier in very early Miocene of central Anatolia. It was warm and rainy subtropical climate in early and early-middle Miocene. In Pliocene the Mediterranean climate occurred in central Anatolia.

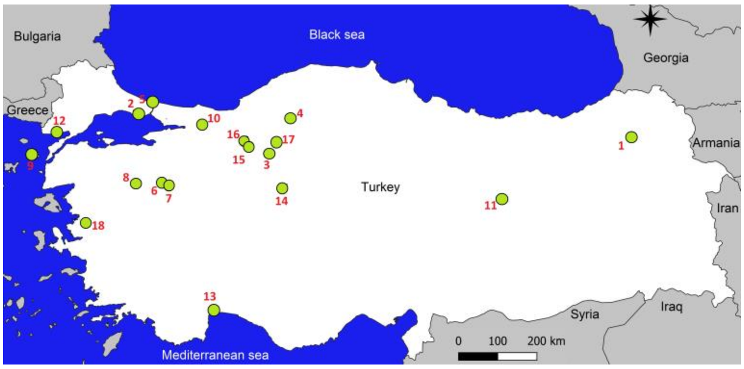

Figure 1. The fossil-wood sites in Turkey. 1 (Kutluk et al., 2012), 2 (Selmeier, 1990), 3 (Akkemik et al., 2017), 4 (Akkemik, 2019), 5 (Akkemik et al., 2019b), 6 and 7 (Akkemik et al., 2019a), 8 (Akkemik et al., 2019), 9 (Güngör et al., 2019), 10 (Polat et al., 2019), 11 (Selmeier, 2001), 12 (Iamandei et al., 2018), 13 (Sayadi, 1973), 14 (Akkemik et al., 2018), 15 and 16 (Akkemik et al., 2016), S17 (Akkemik et al., 2009), S18 (Akkemik, 2017).

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POSTER

Black Sea Pleistocene to Holocene palaeoenvironmental changes based on calcareous nannoplankton fluctuation pattern

Anton, M.E.[1] & Melinte-Dobrinescu, M.C.[1]

[1] *National Institute of Marine Geology and Geo-ecology, 23-25 Dimitrie Onciul Street, RO-024053 Bucharest, Romania; e-mail: antoneliza@geoecomar.ro; melinte@geoecomar.ro*

Keywords: calcareous nannoplankton; diversity and abundance; salinity; Romanian shelf.

Introduction

The calcareous nannoplankton are unicellular algae, mostly marine, occurring since the Triassic (Tappan & Loeblich, 1973; Bolli et al., 1984; Bown, 1998). The calcareous nannoplankton (described in past geological record as calcareous nannofossils) do not show in general nearshore-offshore differentiation, though, members of the *Braarudosphaeraceae* are found exclusively in the inshore setting (Perch-Nielsen, 1985). Presently, significant variation occurs in the abundance of some species including *Emiliania huxleyi*, the most widespread and cosmopolitan species since the Pleistocene (Young, 1998). Nowadays, *Emiliania huxleyi* is present, in the surface-waters of the Sea of Azov, at 11‰, but also in the Red Sea, at salinity up to 41‰, while *Braarudosphaera bigelowii* is also present in the Red Sea, but not in the Sea of Azov; the minimum salinity where *Braarudosphaera bigelowii* is found presently is around 17‰, in the Black Sea (Bukry, 1974; Giunta et al., 2007). Nowadays, in the NW Black Sea, the calcareous nannoplankton assemblages are only made by *Emiliania huxleyi* and *Braarudosphaera bigelowii* (Giunta et al., 2007; Oaie & Melinte-Dobrinescu, 2012; Melinte-Dobrinescu & Ion, 2013), while in the SW Black Sea, nearby the Bosphorus Strait, calcareous nannoplankton species living at surface-water salinity over 25-30 ppm, such as *Helicosphaera carteri, Coccolithus pelagicus*, *Calcidiscus leptoporus* and *Syracosphaera* spp. are reported (Cokacar et al., 2001). We present herein results of our investigation carried out on calcareous nannoplankton diversity and abundance, made on cores situated in the NW Black Sea region. Palaeoecological issues are also addressed.

Methodology

Several cores, up to 4 m length, have been collected from Romanian inner and outer shelves. For calcareous nannofossil investigations, smear-slides were prepared directly from the untreated sediments, the sampling interval being 5 cm. Qualitative and quantitative studies were performed, by using an Olympus light microscope, with 1600 x magnification. For qualitative investigations, counting in a fixed area that corresponds to 75.5 fields of view was performed. The results were converted by using the formula given by Giunta et al. (2007) for calcareous nannoplankton of the Black Sea. The counts were converted into population density (number/ mm2) using the following formula: Class = number of individuals observed/field of view number * field of view area.

Results

The calcareous nannoplankton assemblages of Unit 1 (= the Coccolith Mud, the youngest Holocene lithological unit) contain only 2 species *in situ*: *Emiliania huxleyi* and *Braarudosphaera bigelowii* and many reworking, especially from Upper Cretaceous and Eocene deposits, but also from Jurassic, Lower Cretaceous, Oligocene, Miocene and Pliocene ones. The percentage of reworked taxa does not exceed 20 % in Unit 1. *Emiliania huxleyi* abundance is around 90% of the encountered assemblages, but some samples contain monospecific assemblages of this species.

In the underlaying Unit 2 (= Sapropel Mud), deposited below the Coccolith Mud, *Emiliania huxleyi* sharply decreased, while some intervals of this units contain no nannofloras *in situ*. Generally, the fluctuation pattern of *Braarudosphaera bigelowii* is negatively correlated with *Emiliania huxleyi* one.

Some intervals of Unit 2 yielded a significant increase in *Braarudosphaera bigelowii* abundance, up to 20 specimens/mm^2. In all samples containing *Emiliania huxleyi* and *Braarudosphaera bigelowii*, the abundance of the first species is at least 1,000 times higher than the later.
In the oldest drilled unit (Unit 3 – the Lacustrine lutite), no calcareous nannoplankton *in situ* is present, the assemblages being composed exclusively by reworked taxa from older deposits. To note that in all studied cores, the Unit 3 is composed of several distinct lithological intervals (younger first): (i) grey-greenish clays with numerous organic matter lenses; (ii) a mainly greenish clay interval; (iii) reddish-brown clays that also contain organic matter lenses and cm-thick grey to greenish clays; (v) grey-greenish clays, similar with the top of this unit.
In some cores, towards the top of Unit 3, cm-thick intervals yield a bloom of fresh-water diatoms; the identified assemblages mainly contain centric species of *Cyclotella*, *Coscinodiscus* and *Stephanodiscus* genera. Previous published data (Briceag et al., 2019) pointed out an increase in abundance and diversity of fresh-water ostracod taxa, towards the top of Unit 3.

Conclusions

The calcareous nannoplankton fluctuation observed in the studied cores offer information on the paleoenvironmental changes during the Late Pleistocene to Holocene interval. As expected, we found that Unit 3 sedimentation took place within a fresh water environment, overlapping the lake phase of the Black Sea (Ryan et al., 1997). The salinity in the Black Sea during the depositional interval of Unit 3 was lower than 11 ppm, the minimum salinity allowing the survival of *Emiliania huxleyi* (Giunta et al., 2007; Melinte-Dobrinescu & Ion, 2013). The continuous and persistent occurrence of both *Emiliania huxleyi* and *Braarudosphaera bigelowii* over the whole Unit 2 indicates a sharp increase of the salinity, above 17 ppm in deeper parts of the Black Sea. This hypothesis contradicts previous published data (Bukry, 1974; Giunta et al., 2007) reporting only a sporadic occurrence of nannoplankton in Unit 2. We assume that for Unit 2, as for the youngest Holocene Unit 1, stable marine regime settled in deeper parts of the Black Sea basin.

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POSTER

Senonian microfauna from South Dobrogea

Antoniade C.[1], Crusoveanu (Rusu) S.[2, 3] & Stoica M. [2]

[1] *OMV Petrom S.A. – ICPT Câmpina, Formation Characterization and Geochemistry Laboratory, 29 Culturii Blvd., Câmpina, Romania, e-mail: claudia.antoniade@gmail.com; gheorghitaclaudia.antoniade@petrom.com*
[2] *University of Bucharest, Department of Geology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania, e-mail: marius.stoica@g.unibuc.ro*
[3] *IGR-National Geological Museum, 2 Bl. Kiseleff, sector 1, Bucharest, e-mail: rusu.mona82@gmail.com*

Keywords: planktonic and benthonic foraminifera, chalk, Santonian, Campanian

This study presents the biostratigraphic and paleoenvironment settings of the Senonian deposits from South Dobrogea. Several outcrops from the cliffs of Sutghiol Lake, in Ovidiu – Palazu area have been investigated. In this area, the Senonian deposits represented by white chalks without flints are transgressivelly and unconformably overlaid by Sarmatian limestones.
The microfauna identified within the analyzed samples is very rich and well preserved, represented by both planktonic and benthonic foraminifera and assigned to Middle Santonian-Lower Campanian time interval.
The microfossil assemblages are dominated by the planktonic foraminifera, represented by species such as *Dicarinella asymetrica* (Sigal), *Globotruncanita elevata* (Brotz), *Marginotruncana angusticarinata* (Gandolfi), *M. marginata* (Reuss), *M. pseudolinneiana* Pessagno, *Globotruncana linneiana* (d'Orbigny), *G. bulloides* Vogler, *Contusotruncana fornicata* (Plummer), *Rugoglobigerina pilula* Belford, *Globigerinelloides ehrenbergi* (Barr.), *Heterohelix globulosa* (Ehrenberg) and *H. pulchra* Brotz. Numerous benthonic calcareous and agglutinated foraminifera species from *Gaudryina, Heterostomella, Tritaxia, Arenobulimina, Eggerellina, Ataxophragmium, Dorothia, Spiroplectammina, Orbignyna, Lenticulina, Dentalina, Nodosaria, Neoflabelina, Ramulina, Globorotalites, Bolivinoides, Stensioeina, Pullenia and Gyroidinoides* genera were identified.
Beside the foraminifera, some rare deep marine ostracod species (*Bythoceratina umbonatoides* (Kaye), *Pterygocythere laticristata* (Bosquet), *Trachyleberidea geinitzi* (Reuss), *Cytherella parallela* (Reuss), *C. ovata* (Roemer), *Bairdia sp.,* and *Bythocypris sp.),* many echinoids fragments, Inoceramus prisms and fish remains, were also found. Based on the foraminifera assemblages, the planktonic foraminifera zones, Dicarinella asymetrica Zone and Globotrucanita elevata Zone, characteristic for Middle Santonian-Lower Campanian time interval have been recognized.
The microfaunistic assemblages identified within these chalk deposits indicated a marine environment with clear and well oxygenated waters.
The predominance of globotruncanids (keeled) within the microfossil assemblages, together with the presence of deep marine ostracods, suggest that the outcropping chalk deposits from Sutghiol Lake cliffs were generally deposited under a thick water column, up to 200 m depth. Presence of *Bythoceratina* and *Trachyleberidea* ostracods indicated open marine with deep neritic (outer shelf, 220 m) conditions.

POSTER

Integrated biostratigraphy, sedimentology and structural geology of the internal Pucioasa-Fusaru lithofacies (Pucioasa, Carpathian Bend Zone, Romania)

Bălc R.[1,2], Bercea R.-I.[3] & Tămaş A.[4]

[1] *Faculty of Environmental Science and Engineering, Babeş-Bolyai University, Fântânele 30, 400294 Cluj-Napoca, Romania*
[2] *Interdisciplinary Research Institute on Bio-Nano-Sciences, Babeş-Bolyai University, Treboniu Laurian 42, 400271 Cluj Napoca, Romania*
[3] *SNGN ROMGAZ, C.I. Motas 4, Mediaş, Romania, e-mail: razvan_ionut_bercea@yahoo.com*
[4] *Department of Earth Sciences, Durham University, Durham, United Kingdom, e-mail: alexandra.tamas@durham.ac.uk*

Keywords: Miocene, calcareous nannoplankton, fold and thrust belt, deep marine

In the Eastern Carpathians Bend Zone (part of the thin-skinned Carpathians fold and thrust belt) the relative age of the upper part of the 'Pucioasa-Fusaru' lithofacies is poorly constrained due to paleoecological conditions (Tămaş, 2019), reworking of fossils due to sedimentary conditions and structural complexity.
In this study, a 5.5 km profile has been investigated in order to revise the relative age of 'Pucioasa-Fusaru' lithofacies by integrating calcareous nannoplankton biostratigraphy with sedimentological and structural observations.
The investigated outcrop is located along the Bizdidel River, east of Pucioasa town. It lies between Cretaceous/Paleogene related thrust sheets and Valea Lungă Miocene wedge top piggy back basin (Ştefănescu et al., 1985, Bercea et al., 2016). The investigated area is highly deformed and consists of folded and thrusted Oligo-Miocene, belonging to the Tarcău nappe (Pucioasa antiform) stacked during Middle Miocene and reactivated throughout Quaternary times (Schleder et al., 2019).
From a litostratigraphical point of view, several formations have been analysed, part of the internal Pucioasa-Fusaru lithofacies of the Tarcău nappe (Săndulescu et al., 1995): a) upper part of Pucioasa-Fusaru (originally described in this area), b) Vineţişu, c) Starchiojd (Upper Dysodiles beds) and d) Slon Formations.
For the qualitative study of the calcareous nannoplankton, 43 rock samples were collected and analyzed. Sample preparations for the calcareous nannoplankton analysis were made using standard methods. Sedimentological studies included grain size analysis, sedimentary structure descriptions, and nature of bed contact analysis, measured on a cm – dm scale. The structural interpretation used surface interpreted relative age, bed dip/azimuth information plus subsurface data from Ştefănescu et al., (1985), Bercea et al., (2016), Tămaş (2019) and Schleder et al., (2019).
The calcareous nannoplankton assemblages from the Pucioasa antiform are characterized by low diversity, fluctuating abundance, and poor to moderate preservation. The oldest age (Pucioasa-Fusaru Formation) is Early Burdigalian (NN2b biozone), while Vineţişu Formation is Early to Late Burdigalian (NN3 to NN4 biozone). The Starchiojd Formation samples were barren from calcareous nannoplankton point of view, even though Ştefănescu et al., (1985) found NN4 calcareous nannoplankton (i.e.: *Sphenolithus heteromorphus*). The Slon Formation contains only reworked Paleogene calcareous nannoplankton, but Szekely (2011) found Badenian foraminifera. Bercea et al. (2016) found Early Badenian foraminifera beneath the Valea Lungă Syncline, in a Pucioasa dark grey mudstones type lithofacies.
The Pucioasa beds consist of a dominant dark grey mudstones background with cm thick, very fine to fine sandstones and siltstones with asymmetric ripples and clay drapes. Some dm thick rippled to convolute sandstones (very fine to fine) with clay drapes and sandstones injectites (fault related) were observed as well. The Fusaru sandstones beds consist of fine to coarse sandstones and con-

glomerates with dark grey mudstones intercalations. The sandstones can be structureless (and amalgamated), or it can have parallel, ripple cross and convolute lamination. Coal clasts can appear in sandstones. Dm thick cross stratification was observed at the base of fine conglomerates beds. A particular feature is the presence of lateral offset cut and fills architecture. Collapsed (slumps) mudstones/sandstones couplets appear being interpreted as a collapsed internal channel levee. The Fusaru sandstones were part of a foredeep axial channel belt with a west to east transport direction (present configuration). Most likely it developed in front of the foreland propagating nappes. The Pucioasa beds genetically relate to the Fusaru sandstones beds and can be interpreted as distal levees with some crevasse or distal frontal splays. A particular feature for the Vinețisu Formation are the constant presence of cm/dm thick, fine sandstones with convolute lamination (+carbonaceous clay drapes) that grade upwards in facies similar to the Pucioasa one. The depositional environment is that of a levee with distal splay lobes. The constant presence of convolute structures can also be related to tectonic influences (i.e.: earthquakes shocks).The organic rich shalestones (Strachiojd Formation) relates to basin isolation. The Slon Formation consists of cm to dm clasts of Paleogene/Cretaceous red/green mudstones, Miocene organic rich shalestones in a mudstone fabric. The depositional environment is that of deep marine mass transport deposit (MTD) in relation to a gravitational collapse of Cretaceous/Paleogene/Miocene hinterland trust sheets.

Our findings revealed that the upper part of the Pucioasa-Fusaru Formation is Late Burdigalian, younger than previously considered (Oligocene, i.e.: Melinte & Brustur, 2008). The same for the Vinețișu and Starchiojd Formations which has an Early to Late Burdigalian age distribution versus Early Burdigalian. This highlights pointed out the need to revise the Oligo-Miocene sequence in other parts of the basin as it can have an impact on the current understanding of deformation history of the Carpathians.

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ORAL

Morphological variability in planktonic foraminifers from Messinian sediments (Eastern Dahra, Algeria)

Belhadji A.[1], Bartolini A.[2], Belkebir L.[1], Saint Martin J.-P.[2] & Bessedik M.[1]

1 Laboratoire de Paléontologie Stratigraphique et Paléoenvironnements, Université d'Oran 2 – BP 1015 Oran El Mnaouer, 31000 Oran, Algeria, ahmedbelhadji2010@gmail.com

2 Museum National d'Histoire Naturelle, Département Histoire de la Terre, UMR CNRS, 8 rue Buffon, Paris, France jpsmart@mnhn.fr

Keywords: **morphological variability, morphotypes, interspecific, *Globigerina bulloides, Globigerinoides ruber*.**

Detailed observations of planktonic foraminifera collected from infra-gypsum diatomitic marls (Ain Merane, Eastern Dahra) revealed evidence of significant morphological variability in most genera. In fact, it reflects the presence of various morphotypes corresponding to intraspecific forms and concomitant interspecific transitional forms.

In this study, we focused on quantitative variability analyses of *Globigerina* and *Globigerinoides* populations among others. This parameter allows us to:

-differentiate two morphotypes in *Gn bulloides*, characterized by the primary aperture square to sub-square shape for the first and triangular slit for the second;

-identify very close forms of *Gn bulloides* (*Globigerina quadrilatera*, *Gn concinna, Gn megastoma, Gn bermudezi, Gn cariacoensis* and *Gn riveroe*) which have been considered as species or subspecies by some authors (Galloway and Wisseler, 1927; Seigle, 1963; Bolli and Bermudez, 1965; Rögl and Bolli, 1973), even simple phenotypic variants for others (Bandy, 1972; Kennett and Srinivasan, 1983) ;

- distinguish two morphotypes groups within *Globigerinoides ruber*, related to the shape and size of the last chamber: the former is provided with tests very close to those of *Gs ruber s.s.* (Wang, 2000) and *Gs ruber* « type a, normal» (Numberger, 2009), the second with tests comparables to those of *Gs ruber s.l.* (Wang, 2000) and *Gs ruber* « types b, playts» (Numberger, 2009);

Moreover, several transition forms have been observed on the one hand, between *Gn bulloides* and *Gn apertura, Gn praecalida, Gn praedigitata, Globigerinella siphonefera*, and on the other hand, between *Gs ruber* and *Gs obliquus, Gs extremus, Gs bulloideus, Gs amplus, Gs conglobatus.*

This variability appears to be consistent with recent phylogenetic studies (Darling *et al.*, 2003 ; Darling and Wade, 2008 ; Kuroyanagi *et al.*, 2008 ; Aurahs *et al.*, 2009a ; 2011 ; Sadekov *et al.*,2016) where some minor intra-specific morphological differences could reflect genotypic discrimination ; It could be a valuable tool for a better paleoecological and palaeoenvironmental approach (Wang, 2000 ; Kucera and Darling, 2002 ; Aurahs *et al.*, 2009a, 2011 ; Numberger, 2009 ; Shrivastav *et al.*, 2016 ; Carter *et al*., 2017).

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POSTER

Assemblages of smaller foraminifera associated with the nummulites banks of the Transylvanian Basin (Romania): palaeoecological remarks

Bindiu Haitonic, R.[1], Kövecsi, S-A. [1], Pleş, G. [1], Bălc, R. [2,3], Barabás, E. [1], Jakab., A. [1], Veciunca , A. [1] , Filipescu, S.[1] & Silye, L. [1]

[1] *Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania, e-mails: raluca.bindiu@ubbcluj.ro, szabolcs.kovecsi@ubbcluj.ro, george.ples@ubbcluj.ro, bemese96@yahoo.com, bemese96@yahoo.com alynaa72@yahoo.com, sorin.filipescu@ubbcluj.ro, lorand.silye@ubbcluj.ro*

2 Babeş-Bolyai University, Faculty of Environmental Sciences and Engineering, 30 Fantanele Street, 400294 Cluj-Napoca, Romania, e-mail: ramona.balc@ubbcluj.ro

3Interdisciplinary Research Institute on Bio–Nano Sciences, Babeş–Bolyai University, 42 Treboniu Laurian Street, 400271 Cluj–Napoca, Romania

Keywords: Eocene, palaeoecology, biostratigraphy, diversity, microfossils

The palaeoenvironmental interpretation of the shallow marine, Eocene nummulite accumulation, part of the Căpuşu Formation (Popescu, 1978), from the Transylvanian Basin was so far based on the palaeoecological interpretation of the larger foraminifera (LF), especially *Nummulites*. As a result, only few studies focused on the assemblages of smaller foraminifera associated with the deposits bellow the nummulite bank (Rusu et al., 2004). Therefore, very little is known about the diversity of these particular palaeoenvironments, the palaeoenvironmental change which led to the formation of these accumulations, and there are almost no data about the smaller foraminifera which lived in the "shadow" of the LF communities.

In order to obtain relevant data and to further constrain the palaeoenvironment of the Eocene nummulite accumulations of the Transylvanian Basin all important outcrops were systematically sampled in order to recover smaller benthic foraminiferal specimens and calcareous nannoplankton. These included the Gilău section, Căpuşu section, Luna de Sus section, Mănăstireni Văleni section (Cluj county) and Rona section (Sălaj county). The collected samples were prepared using the standard micropaleontological methods, then the dried >63μm residue was split until an aliquot of ca. 300 specimens of smaller benthic foraminifera were obtained.

Our results show a clear difference between the smaller foraminiferal assemblages recovered from the south-eastern (Cluj county) and those from the north-western part (Sălaj county) of the nummulite accumulations. The first ones have low diversity and are composed mainly of *Pararotalia*, *Eponides*, *Lobatula* taxa (only calcareous benthics), while those from the norther part of the nummulite bank have a higher diversity and consist mainly of agglutinated (*Rhabdammina*, *Textularia*, *Clavulina*) and calcareous benthic (*Bolivina*, *Cibicidoides*, *Gyroidina*) taxa. Rare planktonic foraminifera specimens (*Globigerinoides*) also occur in this part of the nummulite accumulation.

The differences in taxonomical composition and in diversity suggest that there has been a progressive deepening of the depositional settings during the middle Eocene in the Transylvanian Basin from south-east to north-west. The palaeoenvironmental conditions were more favorable (higher organic matter flux) for the diversification of the smaller foraminiferal assemblages in the north-western part of the nummulite accumulations. The recovered calcareous nannofossils are characterized by a poor preservation and the assemblages have low diversity. The most important taxa are species of *Reticulofenestra* (*R. umbilicus, R. dictyoda, R. minuta, R. daviesii*) followed by taxa of the *Neococcolithes* genus (*N. dubius, N. purus*). The biostratigraphic marker species are rare, but based on the presence of *Reticulofenestra umbilicus* together with *Neococcolithes* spp. the calcareous nannofossil assemblages belong to the NP16-NP17 Biozones of Perch-Nielsen (1985) or CP14 *Reticulofenestra umbilicus* Zone of Okada and Bykry (1980). These results suggest a Bartonian age for the studied nummulite accumulation and are in accordance with the data on the LBF biozonation, respectively the SBZ 17 (sensu Serra-Kiel et al., 1998).

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ORAL

Integrated stratigraphic results on the lower Pannonian (upper Miocene) sediments in the Transylvanian Basin (Romania)

Botka, D.*[1], Csoma, V.[1], Tóth, E.[1], Šujan, M.[2], Braucher, R.[3], Sant, K.[4], Baranyi, V.[5], Ćorić, S.[6], Bartha, I. R.[7], Magyar, I.[8,9], & Silye, L.[10]

[1]*Eötvös Loránd University, Department of Palaeontology, Pázmány Péter sétány 1/C, 1117 Budapest, Hungary, e-mail: botkadani@gmail.com, csoma.vivien7@gmail.com, tothemoke.pal@gmail.com*
[2]*Comenius University, Department of Geology and Palaeontology, Ilkovičova 6, 842 15 Bratislava, Slovakia, e-mail: miso@equis.sk*
[3]*Aix-Marseille Univ., CNRS-IRD-Collège de France-INRA, CEREGE, 13545 Aix-en-Provence, France, e-mail: braucher@cerege.fr*
[4]*Utrecht University, Paleomagnetic Laboratory Fort Hoofddijk, Budapestlaan 17, 3584 CD Utrecht, the Netherlands, e-mail: karin.sant@gmail.com*
[5]*Croatian Geological Survey, Department of Geology, Sachsova 2, 10000 Zagreb, Croatia, e-mail: vbaranyi@hgi-cgs.hr*
[6]*Geological Survey of Austria, Department of Sedimentary Geology, Neulinggasse 38, 1030 Vienna, Austria, e-mail: stjepan.coric@geologie.ac.at*
[7]*Eötvös Loránd University, Department of Geology, Pázmány Péter sétány 1/C, 1117 Budapest, Hungary, e-mail: isti.bartha@gmail.com*
[8]*MOL Hungarian Oil and Gas Plc., Október huszonharmadika utca 18, 1117 Budapest, Hungary, e-mail: immagyar@mol.hu*
[9]*MTA-MTM-ELTE Research Group for Paleontology, Ludovika tér 2, 1083 Budapest, Hungary*
[10]*Babeş-Bolyai University, Department of Geology, Strada Mihail Kogălniceanu 1, 400084 Cluj-Napoca, Romania, e-mail: lorand.silye@ubbcluj.ro*

Keywords: biostratigraphy, magnetostratigraphy, authigenic ^{10}Be/^{9}Be dating, chronostratigraphy

Introduction

The Transylvanian Basin (TB) in Romania accommodates a several-hundred-meter thick upper Miocene (Pannonian) sedimentary sequence. Data on its fossils are sparse and scattered in the literature. Consequently, the biostratigraphic subdivision and chronostratigraphic assessment of this sequence, representing about 2.5 Ma, are relatively poorly developed with much uncertainty (Lubenescu 1981). The mollusc and ostracod biostratigraphy were largely based on the biozonations established for the shallow-water deposits of the Vienna Basin many decades ago (Papp 1953). The magnetostratigraphic correlation of some recent polarity measurements partly remained disputable (Vasiliev et al. 2010, de Leeuw et al. 2013). Radiometric age measurements have never been published from these formations. To improve the stratigraphic resolution and the reliability of correlations in the Pannonian of the TB, we investigated outcrops of mostly deep-water formations across the TB. Beside the thoroughly investigated Sarmatian/Pannonian section in Oarba de Mureş (Sütő & Szegő 2008, Vasiliev et al. 2010, Filipescu et al. 2011), we focused our research on the highly fossiliferous sequence of the Guşteriţa outcrop, representing younger Pannonian sediments.

Methodology

Different stratigraphic methods, such as biostratigraphy (molluscs, ostracods, organic-walled microplankton, and calcareous nannoplankton studies), magnetostratigraphy, and authigenic ^{10}Be/^{9}Be isotopic dating were applied to obtain reliable age data on the Pannonian sediments of the TB. Sedimentological field studies and palaeoenvironmental interpretations of 18 localities were carried out. The mollusc fauna of altogether 76 localities – including both collections of Hungarian institutes (Mining and Geological Survey of Hungary, Hungarian Natural History Museum, and collection of the Department of Palaeontology of the Eötvös Loránd University from 64 localities) and own field collections from 17 outcrops – have been investigated so far. A total of 21 micropalaeontological samples for ostracods have been studied from 11 localities and 25 palynological samples have been prepared from the uppermost 25 metres of the Guşteriţa quarry. From the same layers, calcareous nannoplankton studies were carried out. Authigenic ^{10}Be/^{9}Be isotopic dating method was applied on seven marl samples from four localities (Guşteriţa, Mihalţ, Oarba de Mureş, and Tău). Guşteriţa section was chosen and sampled for two magnetostratigraphic dating methods (thermal and alternating field demagnetization techniques), which meant the drilling of 25 oriented marl samples.

Results

In the Early Pannonian deep-water sediments of the TB, two clearly different mollusc assemblages are recorded. The older one is the *Lymnocardium praeponticum* assemblage, consisting of small-sized, probably pioneer mollusc species. This association corresponds to the fauna of the *L. praeponticum* zone (Hungary) or *Radix croatica* zone (Croatia & Serbia). Like in other parts of the Pannonian Basin System (PBS), this is a thin biozone in the TB as well, probably representing a short time interval (~11.62–11.45 Ma) and a relatively deep- (sublittoral or profundal) and brackish-water stressed environment. The younger assemblage is the *Congeria banatica* association, which indicates profundal water depth and a stable environment in the age interval of ~11.45–9.6 Ma (it can be found in the entire PBS as well). The new results from the TB suggest that this biozone can be divided into four further lineage subzones based on the evolution of lymnaeid snails. In the sublittoral sediments of the TB, presence of the *L. schedelianum* subzone of the *C. czjzeki* zone (~11.45–10.2 Ma) can be distinguished. In the littoral deposits, we were the first to demonstrate the presence of the oldest Pannonian *C. ornithopsis* zone (~11.62–11.45 Ma) in the TB, and presence of the *L. conjungens* zone (~11.0–9.6 Ma) is confirmed. Ostracod biozones are also defined but their correlation to mollusc biozones will be the aim of a future work. The Guşteriţa samples reveal a moderately diverse, but excellently preserved dinocyst assemblage and several other aquatic (acritarchs & green algae) and terrestrial palynomorph groups (spore & pollen). The majority of the dinocysts are endemic Pannonian taxa. This dinocyst assemblages resemble those of *Spiniferites bentorii oblongus* and *Pontiadinium pecsvaradense* biozones from the Hungarian and Croatian parts of the PBS. The biostratigraphic correlation suggests an age range between 11.0 and 10.6 Ma for these zones. This age assignment agrees with the magnetostratigraphy that placed the section into the C5n.2n long normal polarity magnetic chron (11.056–9.984 Ma, ATNTS2012). Similarly, the authigenic $^{10}Be/^{9}Be$ ratio provided an age of 10.84 ± 0.4 Ma. All samples from the Guşteriţa profiles contain endemic Pannonian calcareous nannofossils represented by the species of *Isolithus* and *Noelaerhabdus*. Blooms of ascidian spicules in some of the samples are observed. The large amount of terrestrial palynomorphs together with reworked older Miocene calcareous nannoplankton and dinocysts indicates intense erosion and runoff into the lake from the adjacent hinterland.

Conclusions

Altogether 77 Pannonian localities were studied across the TB. Most of them, 59 outcrops represent deep-water environment and contain two different mollusc assemblages. Profundal, sublittoral, and littoral assemblages could be correlated with biozones of the PBS. Based on integrated stratigraphic methods, Guşteriţa can be considered as a reference section for the *Congeria banatica* biozone.
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POSTER

New palaeobotanical data from the Pernik Coal Basin (W Bulgaria)

Bozukov, V[1]. & Ivanov, D[1].

[1] *Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Akad. G. Bonchev Str, bl. 23, 1113 Sofia, Bulgaria, e-mail: vladimir_bozukov@yahoo.com; dimiter@gbg.bg*

Keywords: graben, macrofossils, microfossils, palaeoflora, Upper Oligocene

Introduction

The Pernik Coal Basin is situated in W Bulgaria. It is a Graben-type freshwater basin surrounded by mountains. An intensive sedimentation of lake-marsh type took in it. Materials from the upper part of the Coal (productive) Formation in the outcrops in Bela Voda, Republica and Teva open-cast mines were investigated. The sediments of the productive horizon are represented by a continuous alternation between dark-gray / gray-green clays, argillites, marble clays and low to hard-sanded gray-green sandstones, thin sandy shale and coal strata. The so far known fossil macroflora of this Basin contains 37 species (Konjarov 1932).

Results

The study of the new macrofossil material identified 34 taxa. Only four of them are gymnosperms. *Glyptostrobus europaeus* (Brongn.) Ung., *Sequoia abietina* (Brongn.) Knobl., *Taxodium dubium* (Sternb.) Heer are found as leafed branches and all of them are characteristic of vegetation close to Palaeogene freshwater basins. *Pinus* sp. is found as a winged seed. Seventeen taxa are new for this basin. It should be mentioned that nearly half of them (8 species) have already been reported for the Bobov Dol Coal Basin (Konjarov 1932; Palamarev et al. 1998). This fact is another proof of the relationship between the two Basins. The taxon *Viburnum* aff. *rhytidophyllum* Hemsl. is new to the fossil flora of Bulgaria. His nearest living relative *V. rhytidophyllum* Hemsl. is an evergreen shrub that is spread in West and Central China. The taxon *Cyperus* aff. *glaber* L. is defined by a fossilized lower stem part with a rhizome. The same taxon is defined by leaf and inflorescence in the Oligocene flora of Erma River Gorge (Bozukov et al. 2017), which is geographically and stratigraphically close to the studied.

On the basis of well-preserved morphological features of the new fossil material, four revisions of the species published by Konjarov (1932) were made. Part of imprints such as *Cinnamoum polymorphum* A. Br. was revised to *Daphnogene cinnamomea* (Rossm.) Knobl., the species *Acer trilobatum* A. Br. to *A. tricuspidatum* A. Br. et Agass., *Populus mutabilis* Heer to *P. zaisanica* Iljinsk., and *Rhamnus gaudinii* Heer to *Alnus gaudinii* (Heer) Knobl. et Kvač.

Generally speaking, the species defined by the new fossil material are distinguished by a wide geographic and stratigraphic distribution. Most of these occur both in the Paleogene and in the Neogene. There is almost equal proportion between representatives of the paleotropical vegetation type to those of the arctotertiary one. These facts and the presence of ancient species such as *Chamaerops helvetica* Heer and *Eotrigonobalanus furcinervis* (Rossm.) Walth. & Kvač. in the new fossil material is in line with the supposed age of the Basin - the late Oligocene. The species *Celtis trachytica* Ett. is found in Europe through the Miocene only, but this could support the assumption for close connections to the Miocene palaeofloras.

As a result of the palynological analysis, 67 species of fossil spores and pollen were found. They are distributed as follows: moss spores - 1 species; spores of fern and club moss - 7 species; pollen from gymnosperms - 14 species; pollen from the angioperms - 45 species / subspecies. The most taxonomic diversity is found in families Juglandaceae, Fagaceae, Betulaceae, Pinaceae.

In the quantitative aspect, with the highest values is the pollen of the Taxodioideae (*Inaperturopollenites* sp. div.), followed by the pollen of *Alnus*, Myricaceae, Fagaceae, Juglandaceae, Pinaceae.

Spore plants are represented by low percentages, typically single spores, except for the *Laevigatosporites*, which are elements of local vegetation (facial elements).

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ORAL

The lowermost Cretaceous from the western part of Carpatho-Balkanides (Eastern Serbia): the Kamenica section.

Bucur, I.I.[1], Sudar, M.N.[2], Schlagintweit, F.[3], Polavder, S.[4], Săsăran, E.[1], Jovanovic, D.[5] & Pleş, G.[1]

[1] *Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, 1 M. Kogălniceanu str., 400084 Cluj-Napoca, Romania, e-mail: ioan.bucur@ubbcluj.ro; emanoil.sasaran@ubcluj.ro; George.ples@ubbcluj.ro*
[2] *Serbian Academy of Sciences and Arts, Knez-Mihailova 35, 11000 Beograde, Serbia, e-mail: milan.sudar1946@gmail.com*
[3] *Lerchenauerstr. 167, D-80935 München, Germany, e-mail: felix.schlagintweit@gmx.de*
[4] *Rudarski institut, Batajnički drum 2, 11080 Beograd-Zemun (Serbia), e-mail: svetlana.polavder@ribeograd.ac.rs*
[5] *Geological Survey of Serbia, Rovinjska 12, 11000 Beograd (Serbia), e-mail: djdivna@gmail.com*

Keywords: Foraminifera, Calcareous Algae, Lower Cretaceous, Eastern Serbia

Introduction

The investigated carbonate succession crops out north-north-east of Nis city, in the vicinity of Kamenica village. The limestones from this area belong to the Kurilovo fold structure (Krstić et al., 1978, 1980). The Kurilovo anticline is part of the Gornjak-Stuva Planina Unit, the westernmost part of the Carpatho-Balkanids of Eastern Serbia. On the geological map 1:100,000, sheet Aleksinac (Krstić et al., 1978, 1980) the Lower Cretaceous carbonate deposits of the Kamenica area are assigned to the Valanginian-Hauterivian and Barremian-Aptian. Radoičić (1978) distinguished four informal lithological members and considered that the preliminary information indicates that the dasycladalean-bearing sequences, assigned to the Barremian on the geological map, in fact belong to the Neocomian (Berriasian-lower Valanginian). Polavder (2014) studied the orbitolinids from the Kamenica section and separated several biosequences: A to C (Berriasian), E and F (Hauterivian-lower Barremian). Polavder also supposed a gap between the upper Berriasian and late Hauterivian. The age of biosequences E and F (late Hauterivian-early Barremian) was based on the following orbitolinids: *Valserina primitiva*, *Paleodictyoconus beckerae*, *Orbitolinopsis debelmasi*, *Paracoskinolina*? *jourdanensis* and *Paracoskinolina cf. hispanica* (Polavder, 2014).

Due to the presence of foraminifera and dasycladalean algae characteristic for the Berriasian to Valanginian within these orbitolinid-rich intervals (cf. Radoičić,1978) the whole succession was sampled again.

Results

The lower Cretaceous succession from Kamenica valley develops conformably over the upper Jurassic limestones, and has a thickness of about 200 m. The lower part consists of fenestral mudstone and wackestone to wackestone-packstone with benthic foraminifera and dasycladalean algae. It is followed by ooidic to bioclastic-peloidal-intraclastic grainstone, also containing dasycladaleans and benthic foraminifera among frequent *Coscinoconus* specimens. Upwards the microfacies becomes more mud-supported (ooidic-bioclastic-intraclastic and ooidal packstone), but still rich in microbiota. The first orbitolinids appear at about the middle part of this Interval, be-coming more abundant in the last 60-70 m within a wackestone to wackestone-packstone microfacies.

The whole succession contains a rich assemblage of benthic foraminifera and calcareous algae characteristic for the Berriasian-Lower Valanginian. Among the foraminifera we mention: *Coscinoconus alpinus, C. campanellus, C. cherchiae, C. delphinensis, C. chouberti, Danubiella gracilima, Freixialina planispiralis, Haplophragmoides joukowskyi, Meandrospira favrei, Mohlerina basiliensis, Montsalevia salevensis, Moulladella jourdanensis, Pfenderina neocomiensis, Protopeneroplis* cf. *banatica, Pseudocyclammina lituus, Scythiolina* div. sp., and

Torinosuella peneropliformis. The algae assemblage consists of: *Actinoporella podolica, Clypeina parasolkani, Cylindroporella faronensis, Falsolikanella campanensis, Pseudocymopolia pluricellata, Rajkaella bartheli, R. iailensis, R. lascarevi, Salpingoporella circassa, S. katzeri, S. praturloni, S. steinhauseri* and *Zergabriella embergeri.* It is worth mentioning that this typical Berriasian-lower Valanginian foraminifera and calcareous algae occur together with the orbitolinids from the upper part of the succession. Assuming that the orbitolinid fauna was correctly identified by Polavder (2014), we have to face two totally different conclusions:

1. The stratigraphic ranges of all these typical Berriasian-lower Valanginian foraminifera and algae have to be extended to the Hauterivian-Barremian [Remark: Nowhere within the Tethyan domain these typical Berriasian-early Valanginian foraminifera and algae were found in deposits younger than the Valanginian (e.g. Arnaud-Vanneau et al., 1988; Chiocchini et al., 1994; Luperto Sinni & Masse, 1994; Neagu, 1994; Granier & Bucur, 2011; Granier, 2019].
2. The ranges of the orbitolinids from the Kamenica section have not been correctly attributed to late Hauterivian-early Barremian species, or that some of these taxa have their first occurrence dates (FOD) already in the late Berriasian-early Valanginian [Remark: The late Hauterivian-early Barremian age was deduced from their ranges in the Urgonian type area, e.g., Clavel et al., 2010). Note that in this area the first orbitolinids were recorded from the late Hauterivian.].

The restudy of the orbitolinid fauna from the Kamenica section (in progress) will bring more light into this dilemma. Enyhow, as Radoičić (1978) already supposed, there are more arguments to consider that the whole succession from the Kamenica section belong to the lowermost Cretaceous (Berriasian-lower Valanginian).

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ORAL

European Triassic coelacanths: new occurrence and the impact on the evolutionary history of the group

Cavin, L.[1], Ferrante, C.[1] & Grădinaru, E.[2]

[1] *Earth Sciences Department, Natural History Museum, CP 6434, 1211 Geneva 6, Switzerland.*
e-mail: lionel.cavin@ville-ge.ch
[2] *Department of Geology, Faculty of Geology and Geophysics, University of Bucharest, Bd.Bălcescu Nicolae 1, 010041 Bucharest, Romania.*
e-mail: egradinaru@gmail.com

Keywords: Actinistia, France, Switzerland, Romania, Mesozoic, Palaeobiogeography

Coelacanths, or Actinista, form a clade of sarcopterygian fishes with a proportionally low taxic diversity and low morphological disparity since their appearance in the fossil record in the Early Devonian. Small peaks of taxic diversity occurred in the Early Triassic and in the Late Jurassic. The morphological disparity was proportionally high in the Devonian, then the level remains low (Cloutier, 1991; Forey, 1998; Schultze, 2004) except for some deviant forms in the Carboniferous. Recent discoveries of fossils of coelacanths from several localities in Europe shed a new light on evolutionary of coelacanths during the Triassic.

In 2014, Cavin and Grădinaru described a new taxon of coelacanth, *Dobrogeria aegyssensis*, from the early Spathian (Early Triassic) of North Dobrogea, Romania (Cavin & Grădinaru, 2014). The material is preserved as isolated ossifications, preserved in 3D, corresponding to a handful of specimens. These fossils allow reconstructing the skull of this species, although some elements remain unknown. Recently discovered material from the same Romanian locality provides new information about this species, and point outs unusual features for coelacanths, notably of their jaw apparatus. In 2017, a bizarre Middle Triassic (early Ladinian) coelacanth was described from Graubünden, Eastern Switzerland, and named *Foreyia maxkuhni*. This species displays distortions of some parts of its body compared to the general coelacanth Bauplan (Cavin et al., 2017). This discovery triggered the launch of a study of coelacanth material found in the XXth century in the renowned site of Monte San Giorgio in Ticino, Southern Switzerland. Previously, only the coelacanth *Ticinepomis* was formally identified from this site (Rieppel, 1980), but the material currently studied reveals that a different, and highly derived coelacanth is also present in this locality (Ferrante et al., 2017). Preliminary observations show that this new taxon shares features with *Foreyia*, but other characteristics appear to be unique and likely derived. Finally, a recent discovery of a fragment of a mawsoniid coelacanth in the Late Triassic Peygros quarry in Southern France indicates that the oldest representatives of this family, previously known in freshwater deposits from the Triassic of North America, also inhabited marine environments of Europe during the Triassic (Deesri et al., 2017).

This series of new discoveries permits to improve the image of the evolutionary history of coelacanths during one of their watersheds in their evolutionary history.

- The Swiss and Romanian discoveries illustrate a broadening of the morphospace occupied by coelacanths in the Early and Middle Triassic. It indicates an adaptation of these fishes to new modes of locomotion and to new nutrition modes. The phylogenetic positions of these species are still to be found out.
- The finding of a marine mawsoniid in the Late Triassic has palaeobiogeographical implications. This family is present during the Triassic in freshwater environments of North America, and during the Cretaceous in brackish and freshwater environments of Western Gondwana (Africa and South America), with some occurrences extending to the Late Cretaceous of Europe. The late Triassic marine occurrence from Southern France, associated to marine European occurrences of this family in the Jurassic (*Trachymetopon*), may illustrate an intermediate episode in the evolutionary history

of this family. Roughly sketched, this intermediate episode, characterized by life in marine environments, contributed to the spreading of mawsoniids from one Triassic episode on North American in freshwater environments towards a Cretaceous episode on Western Gondwana (and Europe) in both brackish and freshwater environments (Cavin et al., 2019).

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POSTER

The Oligocene – Miocene micropaleontological assemblages and sedimentological data from Moldoviţa Basin (Bucovina)

Chira, C. M.[1], Aroldi., C.[1], Bindiu Haitonic, R.[1], Popa, M.V.[1], Juravle, D.T.[2] & Dromereschi, P.[1]

[1]Babeş-Bolyai University, Departament of Geology, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania; e-mails: carmen.chira@ubbcluj.ro; carlo.aroldi@ubbcluj.ro; raluca.bindiu@ubbcluj.ro; mirela.popa@ubbcluj.ro; pavel.1mai@yahoo.com;
[2]"Alexandru Ioan Cuza" University, Faculty of Geography and Geology, 20 A, Carol I Street, RO-700505, Iaşi, Romania, jdorut@yahoo.com;

Keywords: biostratigraphy, calcareous nannofossils, foraminifera, sedimentology.

Introduction

The present work summarized our previous studies concerning the Oligocene-Miocene transition in the Moldoviţa Basin, and especially concerning the Dumbravnic Brook, were one of the best section is present (Chira et al., 2008).
Our new micropaleontological investigations and sedimentological observations are now presented.

Micropalaeontological assemblages: results, discussions and interpretations

Calcareous nannofossils

The previous investigations in the Moldoviţa Basin were done in the Raşca -Vatra Moldoviţei area (Loba Valley) (Chira et al., 2011a) and in the Moldoviţa (Lupoaia Valley) – Paltinu area (Boului Valley) (Chira et al., 2011b).
The Dumbravnic Brook (in the Moldoviţa area) belongs to the northern Paleogene - Early Miocene Moldavides (Săndulescu, 1984), in the flysch succession tectonic belt of the Eastern Carpathians.
The deposits from the Moldoviţa Basin belong to the Tarcău Nappe (Săndulescu, 1984; Juravle, 2007, a.o.), a strongly tectonized unit preserving a complex lithostratigraphy which reflects the changes in depositional conditions.
The calcareous nannofossils from Moldoviţa Basin were analysed from other sections by Ionesi & Mészáros (1989). The Oligocene/Miocene boundary was remarked in the northern part of the Tarcău Nappe (in the Moldoviţa Basin) in the upper part of the lower member of the Vineţisu Formation. The calcareous nannofossils from Izvor Brook were investigated, in particular from the pelitic intervals of the limestones belonging to the Jaslo Limestone. The presence of NP25 Biozone – with *Sphenolithus ciperoensis* and the Biozone NN1 with *Triquetrorhabdulus carinatus* were remarked (Ionesi & Mészáros, 1989).
The calcareous nannofossil assemblages from the lower part of the section of the Dumbravnic Brook, have a large distribution in the Eocene and Oligocene. The most frequent Paleogene species, present in the first part of the succession are predominantly Lower Oligocene (NP21–22): *Reticulofenestra umbilicus, Lanternitus minutus, Coccolithus formosus, Cyclicargolithus floridanus* and *Helicosphaera ethologa* (NP23 – 24) (Chira et al., 2008).
In the upper part of the section the calcareous nannofossil assemblages contain species which are present also at the Oligocene/Miocene boundary and frequent in the Lower Miocene: *Helicosphaera scissura* (NP24 – NN4), *H. recta* (NP24 – NN4), *Discoaster deflandrei* (NP11 – NN7), *Sphenolithus moriformis* (NP12 – NN9). Resuming, the presence of the Paleogene/Neogene boundary was remarked in the section from the Dumbravnic Brook in Moldoviţa Basin (Chira et al., 2008).
The calcareous nannofossil content of a new section on the Dumbravnic Brook, have been investigated (Chira et al., 2018).
In the first part of the section, the most frequent are reticulofenestrids: *Reticulofenestra dictyoda, R. bisecta, R. stavensis, R. reticulata; Zygrablithus bijugatus, Lanternithus minutus, Sphenolithus*

moriformis, S. spiniger, Helicosphaera cf. *compacta, Discoaster* cf. *deflandrei,Coccolithus pelagicus, C. eopelagicus,* ascidian spicules and calcispheres.
Besides these species, the next samples contains: *Helicosphaera scissura* (NN2-NN5) (Aquitanian-Serravalian), which prouve the presence of Lower Miocene. Sometimes, *Zygrablithus bijugatus* (NP9-NN1) (Thanetian-Aquitanian), *Sphenolithus spiniger* and *Helicosphaera* cf. *bramlettei* (NP14-NP25) (Ypresian-Chattian), are also present, reticulofenestrids, *Coccolithus pelagicus* and *C. eopelagicus*.
In the upper part of the succession, is possible that another Paleogene – Neogene transition to occur.

Foraminifera
The foraminiferal individuals were picked from the 63µm residue and are very poorly preserved. The identified *Nothia* spp. and *Bathysiphon* spp. taxa suggest a bathyal deposition with low organic matter flux.

Sedimentology
The Vineţişu Formation represents the last term from the Moldoviţa lithofacies and is constituted by turbiditic sansdstones and clays, 100 – 120 m thick. The calcareous sandstones are disposed in beds with thickness of 30 – 40 cm.
Detailed facies analysis has been made now in the upper part of the studied section. This succession, with a total thickness of 40 meters, belongs to a limb of a tight synclinal, the vertical trend showing a progressive inclination of beds towards the hinge zone.
These deposits have been emplaced turbidity currents with a sandstone/mudstone ratio of 1:1, showing a thinning and fining upward vertical trend. Frequent convolute laminations and dewatering structures observed into the sandstone beds argue for a depositional mechanism from low density turbidity currents.
Sandstone beds have good lateral continuity with predominant Tc-Te Bouma intervals. In particular, Tc is largely represented with cross-laminations that can be observed in perpendicular section, allowing to establish a NE-SW paleocurrent direction trend. Some scour marks (especially flute casts) allow to confirm the above mentioned paleocurrent trend (Aroldi in Chira et al., 2018).

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ORAL

The lizard "pseudo-extinction" that was not - EBSD analysis reveals true affinities of a widespread Late Cretaceous eggshell type from Europe

Choi, S.[1], Csiki-Sava, Z.[2], Moreno-Azanza, M.[3], Prondvai, E.[4] & Lee, Y.-N.[1]

[1] *School of Earth and Environmental Sciences, Seoul National University, Seoul, 08826, South Korea; seung0521@snu.ac.kr, ynlee@snu.ac.kr*
[2] *Laboratory of Paleontology, Faculty of Geology and Geophysics, University of Bucharest, 1 Nicolae Bălcescu Avenue, 010041 Bucharest, Romania e-mail: zoltan.csiki@g.unibuc.ro*
[3] *Geobiotec, Departamento de Ciências da Terra, Universidade Nova de Lisboa, Caparica, 2829-526, Portugal; mmazanza@fct.unl.pt*
[4] *MTA-MTM-ELTE Research Group for Paleontology, Budapest, 1083, Hungary; edina.prondvai@gmail.com*

Keywords: 'geckonoid', *Pseudogeckoolithus*, Electron BackScatter Diffraction, paleobiogeography

During the second part of the Cretaceous, widespread oceanic realms and their connected epicontinental seas covered present-day Europe, transforming it into a continental-scale archipelago – the Late Cretaceous European Archipelago (LCEA, Csiki-Sava et al. 2015). The continental ecosystems populating this mosaic of islands are best known from the second part of the Late Cretaceous, a period from which the areas of former islands covering parts of Hungary (Bakony Island, Santonian), France and Spain (Ibero-Armorican Landmass, Campanian-Maastrichtian) and Romania (Transylvanian or Haţeg Island, latest Campanian-Maastrichtian), respectively, yielded important vertebrate assemblages. These are fairly rich and diverse, and include fishes, amphibians (albanerpetontids, different anurans, urodeles), chelonians (both endemic cryptodires and mainly endemic pleurodires), squamates (different higher-level lizard taxa, including freshwater mosasauroids, besides madtsoiid snakes), various crocodyliforms (mainly endemic ziphodont notosuchians and basal eusuchians – hylaeochampsids and allodaposuchids), azhdarchid pterosaurs, various saurischians (locally common titanosaurs, and diverse but relatively rare theropods) and ornitischians (diverse hadrosauroids, endemic rhabdodontids, and nodosaurid ankylosaurs), birds (dominantly enantiornithines, besides rare ornithurans), and mammals (mostly zhelestid eutherians and kogaionid multituberculates) (see Csiki-Sava et al. 2015). The body fossil record upon which this tally is based is complemented by a relatively rich and abundant paleo-oological record, represented in most cases by eggshell fragments, but often also by complete eggs, even nests or extensive nesting horizons. The most prominent examples of egg remains belong to the megaloolithid morphotype, 2-3 mm thick and compactituberculate eggshells that were variably referred to either titanosaurs (e.g. Bravo and Gaete 2015) or - only in the Haţeg Basin – to hadrosauroids (e.g. Grigorescu et al. 2010). Besides the diverse megaloolithid ootaxa, fossil egg remains are also represented by so-called 'thin eggshells', a term loosely used to refer to a wide variety of thin (1 mm or, most often, significantly less than 1 mm thick) eggshells (e.g. Garcia 2000). These thin eggshells are most commonly recovered as minute isolated fragments through screen-washing of fossiliferous sediments, although rare cases of more completely preserved, 'thin-shelled' eggs are also known (e.g. *Sankofa*; López-Martínez and Vicens 2012). Due to their fragmentary nature, the identity and affinity of these thin eggshells often remains contentious.

One of the most enigmatic of these thin eggshells is represented by *Pseudogeckoolithus* (Vianey-Liaud and López-Martinez 1997), a very thin dispersituberculate eggshell characterized by crater-like tubercles. *Pseudogeckoolithus* is a commonly occurring eggshell morphotype that appears to be endemic to the uppermost Cretaceous of Europe, with a range extension into neighbouring northwestern Africa (Morocco; Vianey-Liaud and Garcia 2003). It was first reported as a potentially dinosauroid eggshell morphotype, but with reminiscences of geckoid (squamate) eggshells as well; its affinities remained undecided (e.g. Garcia 2000), and such eggshells were sometimes used as arguments to support the presence of squamates (potentially geckoes, a group with some members known to lay hard-shelled eggs) in different assemblages (e.g. Csiki-Sava et al. 2015). Meanwhile, other researchers regarded *Pseudogeckoolithus* as a dinosaurian (possibly theropod) egg-

shell, either implicitly (as potential member of the Prismatoolithidae; e.g. Vila et al. 2017), or else supported by detailed microstructural investigations (Prondvai et al. 2017). As the correct identification of the affinity of these eggshells (geckoid squamate or small theropod) influences working hypotheses about the composition, evolution and paleobiogeography of the faunas from the LCEA, we set out to definitively establish this identity, using a microstructural-crystallographical imaging technique called Electron BackScatter Diffraction (EBSD), a technique that was recently shown to be able to successfully differentiate between gecko (Choi et al. 2018) and theropod, including bird, (Choi et al. 2019) eggshells.
We have assembled a representative sample of Late Cretaceous European 'geckoid' eggshells with a wide temporal (Santonian to latest Maastrichtian), geographical (Spain, Hungary, Romania) and paleoenvironmental (estuarine, coastal plain, poorly or well-drained floodplain) coverage, and subjected it to EBSD analysis, together with a sample of modern gecko and bird eggshells. In parallel, we have conducted detailed SEM imaging and electron probe micro-analysis (EPMA) of the same sample, in order to check for consistency within it. These analyses have shown that: 1) the European latest Cretaceous 'geckoid' eggshells (at least those from our random sample) form a rather homogenous assemblage that can be securely referred to *Pseudogeckoolithus*; 2) these 'geckoid' eggshells, despite their external morphology being similar to those of modern geckoes, have a crystallographic and micro-structural make-up markedly different from the gecko eggshell, but which is the same as in maniraptoran theropods (including birds), thus supporting their theropod affinities; and 3) macroscopic similarity in ornamentation between geckoes and *Pseudogeckoolithus* is actually a result of completely different crystal growth patterns, documenting the action of convergent evolution in eggshell genesis between the two groups, and cautioning that features commonly used in the past in eggshell parataxonomical classification may represent homoplasies instead of true homologies. The widespread presence of *Pseudogeckoolithus* in different parts of southern Europe suggests that its egg-layers (most probably a group of small theropods) were similarly wide-ranging, common, probably environmentally non-selective, and long-term residents of the LCEA. Furthermore, identifying true affinities of *Pseudogeckoolithus* removes the need to hypothesize presence and then disappearance of true geckoes in Europe before the Eocene.

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ORAL

Pre-Middle Miocene in the Cluj-Napoca area

Cociuba, I.

Geological Institute of Romania, Cluj-Napoca Branch, email: ioan_cociuba@yahoo.com

Keywords: Paleocene, Eocene, Oligocene, Early Miocene, Hida Formation

Introduction

From geological research point of view, the Cluj-Napoca area benefited from the advantage of the very early existence of a Faculty of Geology in the city. The former Austro-Hungarian Empire was aware that the development of geology is directly related to finding and capitalizing on the richness of the Transylvanian underground. The first stratigraphic studies upon the Transylvanian area refer also to the city of Cluj-Napoca (Koch, 1900), such that the stratigraphy of the urban area of the city was quite well established at the end of the World War II. As always has been a place for better, after the war, many papers published by the Babes-Bolyai University teachers bring cartographic news or fossil lists from different stratigraphic horizons (Mészáros & Marosi 1967, Filipescu 1996). After 1989, there are no significant updates in the mapping of the city, although real estate development has revealed many new data.
We have benefited from the re-launch on 2012 of the IGR 1: 50,000 scale mapping program when we started working at the Cluj-Napoca Sheet, 1:50,000 scale. The first version from that year was followed by extensive corrections, especially after the mapping of the Cojocna Sheet 1:50,000, during the years 2017-2019. In the meantime, we have made the following sheets of maps 1:5,000: Cluj, Huedin, Almaşu Mare, Aşchileul Mare, Borşa, Cojocna, and (unfinished) Turda.
The aim of this paper is not to present the latest version of the geological map of the Cluj-Napoca area, but to present a novelty on the stratigraphic succession of Pre-Middle Miocene deposits. It's about the presence of Hida Formation (Hofmann 1879, Koch 1900), consisting of a succession of detritic rocks (sandstones and conglomerates), with clay intercalations having a thickness of 200-300 meters up to about 1,000 m. Several levels have been distinguished: a conglomerate basal level, a medial marsh clay, and a upper one with gravel. The environment of deposition is a deep-sea one, turbiditic, with regressive trend at the top, very similar to a molase.
It was a well-established fact that in the area of the city the Hida Formation (Lower Miocen) does not appear, but is well represented north of Cluj (Rusu, 1969). All the existing maps, as well as the articles published until now, attest this fact.
We took this assertion, and for this reason we also had significant problems with the attribution of the outcrops to different formations. Therefore, the structural interpretation was difficult. Another problem was the lack of outcrops, especially on the northern slope of the Feleac Hill, and of the high degree of coverage with buildings in the city's hearth. But, in the last 10 years, we were fortunate to take the advantage of the explosion of the new constructions in Cluj-Napoca and we have been constantly looking at these diggings, beginning with 2012. Thus, we have accumulated experience, and over time we have made changes to the older versions of the performed maps.

Methodology

For achieving our goals, the main preoccupation has been the identification of the formations. The most valuable help was the older bibliography and the discussion with the professor Sorin Filipescu, whom I also express my thanks. Since all the older opinions converge to claim that the Hida Formation is not present in the Cluj-Napoca area, the older versions of the city Sheet do not contain the outcrops of this formation.
After completion of the Aşchileul Mare and Borşa Sheets, we found large areas with the Hida Formation that exhibits very diverse lithologies. Because I was struck by the resemblance to some outcrops around the city, we reconsidered many of the outcrops here, attributing them to the Hida Formation. Unfortunately, the arguments of a paleontological nature are completely missing because the fossils are very rare.

The only argument is the lithology and the stratigraphic succession that become more natural and logical in many areas of the city.

Results

In the stratigraphic succession of north-western Transylvania, and therefore in the area of Cluj-Napoca, there have been signaled some major regional discordances: the discordance from the base of Coruş formation, the discordance from the base of the Hida formation, and the discordance from the base of the Dej formation (including here also the member of Ciceu-Giurgeşti). All these discordances were accompanied by underaerial erosion and had a more or less pronounced paleorelief. In different areas, the discordant character is less visible. More marked is often the partial or the total lack of some formations. From this point of view, the discorddance from the base of the Midlle Miocen Formations is the best example. In the northeastern area, the Midlle Miocen Formations cover the Hida formation, and the difference between there inclination angles is visible. But in the eastern part, this formations directly covers older formations (Coruş, Chechiş, Brebi and Mera) and the angle difference between them is small.

In the southern part of the city, on the northern slope of the Feleac Hill, under the Midlle Miocen Formations, there are yellow sands with spherical concretions, which I was initially tempted to assign sometimes to Sarmatian in the Feleac sands facies, sometimes to Corus Formation, and in some cases even to the Formation of Mera. But, in time, I found more outcrops that led me to assign them to the Hida Formation.

One of this is in the courtyard of the Institute of Biological Research in Cluj-Napoca, where the Dej Tuffs appear in the outcrops, with yellow sands with spherical concretions similar to those of Hida Formations. The latter are visible in the stream that flow through the Botanical Garden and who, in turn, stay over the red clays from the Moigrad formation.

In the area of Faget neighborhood, there are large areas where the yellow sands with spherical concretions stay under the outcrops of the Dej tuffs. These yellow sands have different aspect than the Coruş kaolin sands, but the latter may be present on their basis as uneroded remains (which is the case of Zorilor neighborhood).

At the north bottom of Brancuşi Street, the foundations excavated during the last years have revealed the appearance of the Dej Tuffs, covered by marl with interlining of gypsum, visible in outcrop, below which they appear the large surfaces of yellow sands with large spherical concretions.

Conclusions

After mapping some extended areas of the Hida Formation from more northern areas, I have rethought many outcrops that appear around of Cluj-Napoca, attributing them to Hida Formation. Stratigraphic succession and the structure of the city area became simpler and more logical. If they exist, the facies convergences are a great challenge for any mapping geologist. It is the case of sandy facies with concretions of Hida Formation, and sandy facies with spherical concretions of the Feleac Formation. The lack of paleontological arguments, however, makes me consider this assertion as a challenge for the youngest researchers to confirm or not the hypotheses sustained in this work.

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ORAL

Preliminary note on the post- Middle Miocene evolution and structural model of the NW part of the Transylvanian Basin

Cociuba I.[1] & Papp D.[1]

[1] *Geological Institute of Romania, Cluj-Napoca Branch, e-mails: ioan_cociuba@yahoo.com; deliapapp@yahoo.com*

Keywords: Badenian, Sarmatian, Panonian, diapir

Introduction

Starting from 2012, the Geological Institute of Romania re-launched, under the NUCLEU Programme, the 1:50,000 scale Mapping Project which was interrupted for many years due to the lack of funds. We started with the Cluj-Napoca Sheet and continued with the Huedin, Almașul Mare, Borşa, Cojocna, sheets, and from 2018 with the Turda Sheet which is currently unfinished. Initially, on the Cluj-Napoca Sheet, the sediments of the Middle and the Upper Miocene were mapped without any separation. Later, working on the next sheets and gaining experience, we revised the Cluj Sheet and mapped the Miocene formations in more detail. In most cases, the existing 1: 200,000 scale geological maps match well with the situation we encountered in the field, especially for latitudes more northerly than Cluj. Serious problems of interpretation have occurred when we started working on the Cojocna and Turda Sheets, particularly in the areas where on the existing maps is mentioned the presence of the "marginal diapiric folding". Such problems are due to the high degree of fragmentation we found in the field and which was impossible to be represented and deciphered on the 1: 200,000 scale maps.

Methodology

All previous published works mention the difficulties of mapping in the Transylvanian Basin due to the lithological monotony, the changes of facies in the marginal areas, and the rarity of the fossil fauna (Ilie, 1950). The levels of volcanic tuff, which spread out across the entire Transylvanian Basin, are the only stratigraphic markers in the area's mapping. We have also used the tuff levels in our mapping work because they are well dated, both paleontologically and by absolute radio-metric ages (Marza & Meszaros, 1991; De Leeuw et al., 2013). However, during the field work, it was not always clear which tuff level occurs in a particular outcrop. In such case, the dominant lithology of the formations in the roof and in their bed was used as the only discrimination criterion. We didn't find any macro-fossils and it was not in our aim to collect samples for microfossil analyses due to the lack of specialists to perform such analyses. In recent years, many syntheses and compilations on the Transylvania Basin have been published, mainly based on the drilling data resulted from the methane gas exploration and exploitation activities, as well as on the seismic profiles interpreted with modern 3D computing software (Tiliţă, 2016). The density, and hence, the accuracy of these data is high in the central part of the basin, and relatively low in the marginal areas, as is the case of our study area. In addition, the interpretation of seismic profiles, with all the progress of computing software, cannot establish the depths of different formations with a precision greater than a few tens of meters. This means that any changes occurring on less than 25-30 meters cannot be detected. In spite of all these limitations, the progress obtained is significant. Interesting results were obtained by modelling the deformation movements of the basin sediments (back and forth) occurred over time due to the existence of salt (Tiliţă, 2016). However, as this modelling was based on the 1: 200,000 scale maps, the authors logically argued that the diapirs were formed gradually, starting immediately after the sedimentation of salt (Badenian), continued progressively as the thickness of the overlying sediments increased, and undergoing more intensive evolution during the periods of compressive or decompressive tectonic movements. However, the model didn't take into account the downslope movement and the rotation of the basin sediments that occurred during the formation of Eastern Carpathian Arch and the uplifting of the entire sedimentary cover of the basin (Early Quaternary).

Results. The cartographic image we obtained on the 1:50,000 maps, differs significantly from that on the 1: 200,000 maps, being much more complex. In the first place, we identified the fault (we named it Calda Valley Fault) which passes south of Câmpenești, but it can be traced towards the south-west to Băile Someșeni, and towards the north-east to Gădălin and Vişa. It separates a nearly monoclinal block in the north with SSE inclination, from a southern block with folds significantly

inclined to the east. On the 1: 200,000 scale maps, the situation is interpreted as a single fold with SW-NE inclination. More complicated situations have been found in all salt outcrops, and we exemplify with the one at Turda. Far from being a unitary fold, SSV-NNE oriented, as specified on the 1: 200,000 scale map, it rather seems to be an old fold almost N-S oriented, which was deformed by frequent detachment faults, almost perpendicular, formed after the formation of the diapir, probably as the result of the clockwise rotation of the sediments. The situation differs slightly from one diapir to another, but differs significantly from the interpretation on the cited maps. Moreover, the continuity of the diapir on long distances as represented on the 1:200,000 scale maps, turns out to be only hypothetical, and the more complex imagery we found credits the idea of the downslope movement of the entire sedimentary cover and its clockwise rotation. Since we are at the beginning of map interpretation, here we make only a few preliminary judgments about the effects of a such event. The consequences of the extensive gravitational movement occurred at the beginning of Quaternary determined drastic and sudden (in geological terms) changes in the relief of the sediments at the surface, as well as in the structure of the basin sediments at depth. The uplifted margins of the basin, as well as the hidden relief of the fundament, have limited through relatively stable structures (made up of older well-consolidated rocks) the movement of the softer sediments from above the salt. In their vicinity, the previously formed salt diapirs have been accentuated by sliding and faulting, sometimes uplifting at much higher levels the covering sediments. As a consequence, we suppose that immediately after the sliding and rotation movements, kind of “clay mountains” were formed, bordering the edges of the basin. We only need to take a look at the geological map of Romania, and if our assumption that in the area of salt diapirs once existed a high relief, we immediately have an explanation of the flowing paths of some large rivers which were forced to bypass the "clay mountains". Thus, the Olt river flows at the foot of the mountains, and near Sibiu crosses the South Carpathians, even if within the Mureș corridor there are mostly soft rocks and the altitudes are incomparably lower than in the South Carpathians. The two branches of Someș bypassed the same "clay mountains" in the northwest, and after their confluence, they cross the mountains north and not south through the softer rocks of the basin. The Mureş and the Târnave rivers drain to the west the bottom of a former lake whose eastern part was tectonically uplifted. Initially, they had probably to cross this barrier and accumulated into a lake.
Such hypothesis should be supported by evidences of the age of these river terraces or by 3D modelling. We hope to obtain them through new research and through collaborations with other specialists. In this respect, the entire area of the north-western part of the Transylvanian Basin is included in a 3D modelling project that started in 2019 within the Geological Institute of Romania. At the end of the project we hope to obtained new data and a more detailed illustration.

Conclusions. Mapping activities for the 1:50,000 scale maps in the NW part of the Transylvanian Basin reveals a much more complex structure than that specified on the 1: 200,000 scale maps. They support the previous idea of the gravitational downward movements (Ilie, 1952) and the clockwise rotation of the sediments above the salt (Krejek, Bally, 2006). The age of this event is roughly at the base of the Quaternary, and geologically speaking it was quite sudden. Its consequence is the formation of a "clay mountains" belt, hundreds of meters in high that overlapped the salt diapirs belt. Presently there is little evidence of their existence due to their clayey nature and their fast erosion. However, they determined the course of the main rivers in the Transylvanian Basin, which is still maintained today and which, without this scenario, is unexplainable.

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ORAL

Being (relatively) simpleminded – how does is work for you? A weird new multituberculate from the Upper Cretaceous of Romania adds to the list of peculiar island adaptations known in vertebrates

Csiki-Sava, Z.[1], Vremir, M.[2], Meng, J.[3], Brusatte, S. L.[4] & Norell, M. A.[3]

[1] *Laboratory of Paleontology, Faculty of Geology and Geophysics, University of Bucharest, 1 Nicolae Bălcescu Avenue, 010041 Bucharest, Romania e-mail: zoltan.csiki@g.unibuc.ro*
[2] *Department of Natural Sciences, Transylvanian Museum Society, 2-4 Napoca Street, 400009 Cluj-Napoca, Romania e-mail: vremirmatyi@gmail.com*
[3] *Division of Paleontology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024, USA e-mail: jmeng@amnh.org, norell@amnh.org*
[2] *School of GeoSciences, University of Edinburgh, Grant Institute, James Hutton Road, Edinburgh EH9 3FE, UK e-mail: Stephen.Brusatte@ed.ac.uk*

Keywords: Kogaionidae; Late Cretaceous European Archipelago; island effect; adaptive changes

Kogaionids are a derived clade within Multituberculata (e.g., Kielan-Jaworowska et al. 2004), one that was endemic to Europe during its documented evolutionary history, from the latest Cretaceous to the middle Paleocene. The first known members of the clade were described based on isolated teeth from the Paleocene of western Europe (Spain, Belgium, France; e.g. Pélaez-Campomanes et al. 2000, de Bast and Smith 2017), but its best fossil record hails from the uppermost Cretaceous (uppermost Campanian-Maastrichtian) of Romania, where they are represented by several sympatric taxa, and more importantly, by much better preserved and more complete fossils, including jaws and jaw fragments with *in situ* teeth, incomplete skulls, and even partial skeletons (e.g., Rădulescu and Samson 1996, Csiki et al. 2005, Smith and Codrea 2015). Until recently, two genera were reported, the more common and widespread *Barbatodon*, with two species (Rădulescu and Samson 1986, Codrea et al. 2014, Solomon et al. 2016) that are known from the Transylvanian, Haţeg and Rusca Montană basins, and the monospecific *Kogaionon* (Rădulescu and Samson 1996), the type genus of the family, currently only occuring in the Haţeg Basin. Although well-preserved partial skulls are available for both of these taxa, critical areas of the kogaionid cranial morphology - including the full morphology of the braincase - remained undocumented,. This situation changed with the description of a third kogaionid genus – *Litovoi*, characterized by an autapomorphically domed skull – from the Haţeg Basin (Csiki-Sava et al. 2018), a taxon represented by a partial cranium and postcranial elements, including a virtually complete and underformed braincase.
This fortuitous discovery allowed for the first time the detailed study of the kogaionid braincase, and – using high-resolution micro CT-scanning to reconstruct the digital endocast of *Litovoi* – that of the morphology of the brain itself; actually, *Litovoi* represents one of the few instances when such an information is available for multituberculates. The braincase structure of *Litovoi* conforms to the general pattern documented previously in multituberculates (e.g. Kielan-Jaworowska et al. 2004) in the presence of well-developed olfactive bulbs; remarkably, however, it is characterized by a three-fold division of the cerebellum, with a central vermis and lateral cerebellar hemispheres, a structure typical for therians but suggested previously to be absent in multituberculates (e.g. Kielan-Jaworowska and Lancaster 2004). *Litovoi* thus documents the presence of an unexpectedly derived, therian-like hindbrain region in multituberculates, that is nevertheless associated with a more primitive forebrain, with greatly enlarged olfactory bulbs. But the more suprising endocranial feature of *Litovoi* is represented by a very narrow brain, corresponding to its overall elongated and narrow braincase. This also results in a very small endocranial volume for this genus. On the other hand, the available skeletal material (reconstructed skull, complete femora) allows reliable body size/mass estimates for *Litovoi*, data that are, again, available for the first time in the case of a kogaionid. Together, these two body measurements show that *Litovoi* had a shockingly small relative brain mass compared to virtually all known mammals, fossil or recent, with a brain-to-body mass ratio, as well as an encephalization quotient (EQ), similar to that of non-mammaliaform

cynodonts or very basal mammaliaforms, but distinctly smaller than in other multituberculates or other advanced mammals. This pattern of relative brain size reduction is reminiscent of that reported in some Cenozoic island-dwelling mammals (e.g. Köhler and Moyà-Solà 2004), where brain reduction is hypothesized to have contributed to increased fitness under restrictive insular conditions, by diverting energy output (and thus vital resources) from investment into growing and maintaining a large brain towards other adaptations required for successful survival, such as forage or reproduction. Conversely, the olfactory bulbs and paraflocculi of *Litovoi* (both brain regions important in sensorial activity – olfaction, respectively eye movement control and possibly also hearing) were relatively more developed, compared to its body or brain mass, than in most mammals, including all multituberculates, suggesting that these skills were probably essential in the survival of the genus. This association between low relative brain mass/EQ and high olfactory bulb and parafloccular ratios is as yet unreported in other mammals (including insular ones), and documents a novel type of island habitat-induced biological adaptation.

The presence of such a ‚weird’, peculiar island habitat-related adaptation is by no means unique or unprecendented in the wider home of *Litovoi*, the Late Cretaceous European Archipelago (LCEA; Csiki-Sava et al. 2015). Such patterns are already well documented for Cenozoic to recent insular mammals and other vertebrates that react(ed) to the limitations imposed by their restrictive habitat by modifications in their body size, posture, diet, locomotor style, habitat preference, or even metabolism, physiology and life history (e.g. van der Geer et al. 2010). Before the advent of the Cenozoic mammal-dominated faunas, however, similar adaptations were defintively also widespread in the dinosaur-dominated insular faunas of the LCEA. These modifications include secondary flightlesness and gigantism in pterosaurs and birds; life history and - probably - metabolic alterations in sauropods and ornithopods; changes in body size, posture and proportions in ankylosaurs, ornithopods, sauropods and theropods; lifestyle-correlated anatomical changes in theropods; or dietary shifts in crocodyliforms (Csiki-Sava et al. 2015 and references cited therein); now *Litovoi* adds a new and unprecedented adaptation type (brain size reduction but increased central neural control of sensory acuity) to this list of peculiar adaptations.

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POSTER

Last millennium hydroclimate evolution in Eastern Carpathians, Romania

Diaconu, A.-C.[1], Gałka, M.[2], Feurdean, A.[1], Panait, A.[1], Ruskal, A,[1] & Tanţău, I.[1]

[1] *Department of Geology, Babeş-Bolyai University, Kogălniceanu, 1, 400084 Cluj-Napoca, Romania; e-mail andreicos-mind@yahoo.com*
[2] *5Department of Geobotany and Plant Ecology, Faculty of Biology and Environmental Protection, University of Lodz, 12/16 Banacha Str., Lodz,*

Keywords: testate amoebae, pollen, plant succession, carbon isotope, climate change

For more precise climate predictions, we need to better understand the past climate variability and the forces that drives their changes, ideally reconstructed at centennial to millennial scales. For this study we used high resolution multi-proxy analyses (C^{14} dating, $\delta^{13}C$ stable isotopes, organic matter content, bulk density, testate amoebae, micro- and macrocharcoal remains, plant macrofossils and pollen), with the aim to reconstruct 1) past climate changes and 2) disentangle the effect of climate from the human influence in the evolution the Mohoş peatbog ecosystem from the Eastern Romanian Carpathians. Specifically, we seek to acquire a high resolution palaeoecological data set and quantitatively reconstruct the hydroclimate effect on the bog hydrology and its evolution for the past 1000 years, period difficult to understand due to the growing presence of human communities.

Four distinct periods of hydroclimate and anthropogenic impact and their effect on the peatbog development were identified over the past millennium: 1) Between AD 1050 and 1325, a moderately wet period although with slightly contrasting conditions between proxies, dominated by a forest ecosystems with intense fire events, while the human presence in the area was limited. 2) Between AD 1325 and 1625, highly fluctuating peatland surface moisture conditions, with densely forested canopy (92 %) and low natural fire activity. 3) Between AD 1625 and 1850 a drying trend with more intense fire events and disturbance in the peatbog evolution. 4) From AD 1850 to present, increasingly dry conditions, intense human activity and disturbances by fire events as well as peatland drainage.

Our quantitative reconstruction of the hydroclimate and palaeoecological evolution of Mohoş peatbog, based on high resolution multi-proxy analyses, represent one of the few to investigate the last millennium environmental changes in the central-eastern Europe. The results show strong correlation with other studies from central and central-eastern Europe. However, we observed different conditions when correlated with other studies from north-western Europe.

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POSTER

South-eastern Europe (Romania) fire patterns of a grassland ecosystem during the Holocene

Diaconu, A.-C.[1], Tanţău, I.[1], Grindean, R.[1], Ruskal, A.[1] & Feurdean, A[1].

[1] *Department of Geology, Babeş-Bolyai University, Kogălniceanu, 1, 400084 Cluj-Napoca, Romania; e-mail andreicosmind@yahoo.com*

Keywords: Romania, Fire regime, grassland, pollen, low-lands

Fire drives significant changes in ecosystems structure, diversity and functions. While disturbances by fire are widely acknowledged to benefit tropical and North America temperate grasslands and dry woodlands, the effect of fire on temperate European grasslands and tree-grass dynamic is poorly understood. To better understand the effect of fire on temperate European open grassy systems, we performed multi-proxy palaeoecological analyses (radiocarbon dating, macrocharcoal counts and morphologies, pollen) on a 10 meter long core profile extracted from Lake Oltina, south-east Romania, and present the first record of Holocene variability in fire regime, fuel source and fire types in extant steppe grasslands from south-eastern Europe.
We identified five distinct periods in the past fire activity. Between 7000 and 6000 cal yr BP, the pollen based vegetation reconstruction show a mixed forest-steppe environment, whereas charcoal record reveal a fire return interval (FRI) of 70 years, fire peaks of moderate magnitude and charcoal morphologies dominated by Poaceae and other herbaceous plants. From 6000 to 3900 cal yr BP, the pollen record shows a slight increased proportion of forest, especially of *Quercus*, whereas fire became more frequent and fire events of low magnitude. The charcoal morphologies remained dominated by non-woody type, with a small increased in wood charcoal type. During the period 3900-2200 cal yr BP, the pollen record show a marked decline in forest cover, FRI increased to 90 years, fires were of high magnitude and the dominant charcoal morphologies were herbaceous type. From 2200 to 910 cal yr BP, the regional vegetation became dominated by Poaceae and steppe herbs including indicators of human impact. FRI became shorter (50 years) and characterized by fires of low magnitude, whereas charcoal morphologies show the predominance of herbs, Poaceae and deciduous leaves. The most recent period, 910 cal yr BP-present show a marked decline in fire activity, associated with charcoal morphologies predominantly of Poaceae and herbs.
This study provides the first reconstruction of fire regime variability from the south-eastern European grassy systems, and is one of the few studies that demonstrate the value of charcoal morphologies to determine the type of fire and biomass fuel. We show that between 7000 and 3900 cal yr BP fire was important for tree-grass interaction and the maintenance of grasses and steppe herbs. Canopy fires were also more common during this period. However, this pattern changed between 3900 and 2200 cal yr BP, when fires became of lower magnitude and primarily surface fires.
This is associated to a stronger human impact, the landscapes becoming more open. We suggest that the human-driven fuel limitation and fragmentation led to fire becoming less strong.

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POSTER

A review of the flight adaptations in the paravian group of dinosaurs and the ambiguous transition between birds (Aves) and theropods

Dragoş, A.-G.

National Institute for Marine Geology and Geo-ecology, 23-25 Dimitrie Onciul Street, RO-024053, Bucharest, Romania, e-mail: d.andreigabriel@geoecomar.ro

Keywords: *phylogenetics, carpometacarpus, theropods, paleornithology, clade.*

Paravians (paraves) were a widespread clade of theropod dinosaurs that have evolved since the end of the Jurassic period and dominated a big part of the Mesozoic fauna through unique biological innovations. Despite the traditional image of these animals, influenced by pop culture, the paravians were a well distinguished group of dinosaurs and very diversified (including birds), some subdivisions being considered quite bizarre (Feduccia, 1999).

For a long time, birds were considered a stand-alone group of animals, being grouped into the class Aves. The paravians, respectively the dromaeosaurids, avialans, troodontids and scansoriopterygids, are a clade of relatively small, cursorial, omnivorous and bird-like theropods which are part of the larger Maniraptoran group and according to most specialists in vertebrate paleontology and paleornithology, these animals are defined by several synapomorphic morphological characteristics (Chiappe, 2002):

- Long arms and larger manus than feet
- Three-fingered hands
- Presence of the semi-lunate carpal
- Fused clavicles (furcula)
- Fused bones of the manus (carpometacarpus), hindlimbs and pelvic girdle in certain species
- Advanced plumage and asymmetrical feathers (flight feathers) in many species
- Pubis bone that points backwards

Birds, from a philogenetic point of view, are part of this group of dinosaurs and based on the traditional taxonomic classification, we may consider certain species of dinosaurs as birds due to their very close morphological characteristics (Wellnhofer, 2009). Moreover, phylogenetics show a more complex and confusing story because there are examples of "chimeras" and evolutionary experiments such as the *Protoavis*, *Balaur*, *Jeholornis*, *Confuciusornis* and *Yi* genera (Chatterjee, 1999; Csiki et al., 2010; O'Connor et al., 2013; Zhou & Hou, 2002; Xu et al., 2015). Morphological changes, especially those that have led to a convergent evolution situation and flight capability and the factors that have influenced them, are the key elements for understanding the evolution of these animals and the delicate taxonomic and phylogenetic positions (Wellnhofer, 2009).

The morphological characters which are usually considered avian have been traced back to the more basal members of the Celurosauria clade and the (at least) two parallel groups of paravians who developed powered flight and their (independently evolved) similar traits have been put side by side and analyzed to describe an extraordinary case of convergent evolution (Sullivan et al., 2010).

Herein, the evolutionary changes that lead to avian flight and the delicate taxonomic position of some controversial genera from the paravian clade (i.e., the Scansoripterygidae Family, Microraptoria clade and the *Balaur bondoc* species) are presented. Besides, taking into account the paleornithologic published data and using anatomical comparisons based on phylogeny, a generalization of the avian evolutionary tree and the paradox towards the aerial life of various groups of paravians, including birds, has been made (Feduccia, 1993).

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ORAL

The evolution of bird feathers: New and old evidence from the fossil record

Dyke, G.[1,2], Laurent, C.[1,2]. & Lendvai, A.[1,3]

[1] *Babeş-Bolyai University, Faculty of Biology and Geology, 44 Gheorghe Bilaşcu Street, RO-400015, Cluj-Napoca*
[2] *University of Southampton, UK*
[3] *Evolutionary Zoology, University of Debrecen, Debrecen, Hungary*

Keywords: Biomechanics, Feathers, Evolution, Flight, Microstructure, Phylogenetics

Feathers have long been thought to be unique structures within vertebrate animals, first (for more than 150 years) to birds, and then, more recently, within dinosaurs (the lineage that includes birds). We know that these structures are epidermal appendages comprising mostly β-proteins (β-keratins); our team has been at the forefront of feather micro- and chemical imaging of these structures, including the development of approaches to the use of spectroscopy to understand the structural evolution both based on living material and fossils (Benton et al., 2019; Laurent et al., 2014, 2019).
Fossil data now imply that feathers were widespread amongst dinosaurs and pterosaurs, close sister-groups within reptiles (Benton et al., 2019; Swartz et al., 2019) Anatomical work also implies that feathers arose first as simple monofilaments perhaps used for insulation or selection within archosaurs and basal dinosaurs during the Early Triassic, a time when land vertebrates were rapidly evolving new physiologies, erect gaits, and endothermy
Feathers have long been regarded as the innovation that drove the success of birds (e.g., Prum and Brush 2002). We review the evolution of these features in this short presentation, including recent developments in structure and wing shape evolution in both two- and three-dimensions. The evolution of both feathers and wing structures in dinosaurs was much more complex than has previously been argued (Laurent et al., 2019; Swartz et al., 2019).

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ORAL

Discussion on the stratigraphic position of the upper Oligocene to middle Miocene shallow marine sediments in the noth-western Transylvanian Basin, based on fossil foraminifera

Filipescu S.[1], Szekely F. S.[1], Bindiu Haitonic R.[1] & Paşcalău P.[1]

[1]*Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania; e-mails: sorin.filipescu@ubbcluj.ro, szekelyflavius@gmail.com, raluca.bindiu@ubbcluj.ro, maria.patricia64@yahoo.com*

Keywords: foraminifera, biostratigraphy, lithostratigraphy Miocene, Transylvanian Basin

The upper Oligocene to lower Miocene marine formations from the north-western Transylvanian Basin developped into three distinct and related types of facies: beach to nearshore (Buzaș and Corușu formations), shelf (Vima and Chechiș formations) and slope (Hida Formation). Foraminifera in these formations have been used for biostratigraphic purpose since several decades but, as recently proven, this incorrectly assigned a particular chronostratigraphic value to the whole lithostratigraphic units.

Having as an outline the biostratigraphic zonation of Popescu (1975), our biostratigraphic approach on several sections located along the basin (Fântânele, Tihău, Gălpâia, Racăș, and Corușu – see Székely & Filipescu, 2015, 2016; Székely et al., 2016, 2017) proved that the characteristic facies was heterochronous and migrated in relation to the relative sea-level changes, starting progressively from north (late Oligocene - *Globigerina angulisuturalis* - *Chiloguembelina cubensis* Zone) to south (middle Miocene – *Orbulina suturalis* Zone).

Fossil foraminifera reflect these facies shifts and can be successfully used as paleoenvironmental indicators. The transgressive and regressive trend transformed sometimes the main facies into a transitional zone or into particular intercalations in the neighboring lithostratigraphic units.

This study demonstrates the poor chronostratigraphic value of the lithostratigraphic units developped in a tectonically active context.

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ORAL

The Prososphinctes Bioevent (Ammonoidea, Perisphinctidae) in the Cordatum Zone (Lower Oxfordian) as a proxy for environmental changes in the marine ecosystem — Polish Jura Chain, central Poland

Głowniak, E.[1], Wierzbowski, H.[2] & Grabowski, J.[2]

[1] *University of Warsaw, Faculty of Geology, Żwirki i Wigury 93, 02-089 Warsaw, Poland, e-mail: eglownia@uw.edu.pl*
[2] *Polish Geological Institute - National Research Institute, Rakowiecka 4, 00-975 Warsaw, Poland, e-mail: hubert.wierzbowski@pgi.gov.pl; jgra@pgi.gov.pl*

Keywords: Late Jurassic, Polish Jura Chain, ammonites, bioevents, oxygen and carbon isotopes, geochemistry, TOC, magnetic susceptibility

Introduction

Our contribution is based on works which date back to the years 2003-2009, when several Lower Oxfordian sections (*e.g.*, *Wrzosowa* and *Gnieździska*) were studied in the Polish Jura Chain and the Mesozoic margin of the Holy Cross Mountains (*Góry Świętokrzyskie*) in central Poland in order to examine ammonite biostratigraphy and palaeoecology as well as bioevents and paleoprovincialism of ammonite faunas in the Late Jurassic epicratonic sea of central Poland (Głowniak, 2012). Lower Oxfordian is developed there in carbonate facies of a thickness of up to 5.5 m. Second stage of work (years 2014-2016) was focused on geochemical analyses of belemnite rostra and bulk rock samples from the *Wrzosowa* section, which were precisely biostratigraphically constraint. The studies included oxygen and carbon isotope analyses (belemnite rostra), elemental composition, TOC content and magnetic susceptibility analyses (rock samples).

Aims

The goal is to investigate a possible correlation between the discovered *Prososphinctes* Bioevent (referred to as *Prososphinctes* Acme Horizon, abbreviated further in text as PAH) and geochemical and physical factors, which were linked to environmental changes in the Early Oxfordian marine Polish Basin.

Methods

Fossils (ammonites and belemnites) and rock samples were collected from 30 numbered and stratigraphically well documented Lower Oxfordian layers in the Wrzosowa section; with an accuracy up to a horizon level. The research is based on abundant material: 1290 ammonite specimens; 35 belemnite rostra including 7 archival ones published by Wierzbowski 2002; Wierzbowski et al. 2009; and more than 30 rock samples, which were studied for geochemistry, magnetic susceptibility (MS), TOC and $CaCO_3$ content.

Results

(**i**) Biochronology: Collected ammonites document a complete Lower Oxfordian stratigraphic succession in all the studied sections; that comprises the Mariae Zone (with Scarburgense and Praecordatum subzones) and the overlying Cordatum Zone (with Bukowskii, Costicardia and Cordatum subzones) (**ii**) Bioevents: The most conspicuous *Prososphinctes* Bioevent (*Prososphinctes* Acme Horizon) has been distinguished in the middle Cordatum Zone (Costcardia Subzone) (Głowniak, 2012). It is characterized by a short-term, mass occurrence of (Sub)Mediterranean ammonite species of *Prososphinctes claromontanus* (microconchs) - *consociatus* (macroconchs) group (Family Perisphinctidae). (**iii**) Paleobiogeographic fluctuations: Ammonites of all three (sub)provinces — Boreal, Mediterranean and (Sub)Mediterranean co-occur in the Lower Oxfordian sections of central Poland. These groups fluctuate from the bottom up to the top of the Lower Oxfordian, with predominance of the (Sub)Mediterranean families in the Mariae Zone, and with significant increase of Boreal Cardioceratidae ammonites in the overlying Cordatum Zone. (**iv**) The belemnite $\delta^{18}O$ and

$\delta^{13}C$ values fluctuate from the bottom up to the top of the lower and middle Cordatum Zone, reaching the highest values in the proximity of the PAH in the middle Cordatum Zone. (**v**) The bulk rock P/Al, Ba/Al, Ni/Al and Cu/Al ratios show a concave trend from the bottom up to the top of the Wrzosowa section with the minimum values in the proximity of the PAH. (**vi**) TOC values remain more or less stable through most of the studied stratigraphical interval, except of the upper part of the middle Cordatum Zone, where they clearly increase; This trend is opposed to (**vii**) the one of Th/U ratio values (paleoredox proxy), which in the mentioned interval decreases. (**viii**) Magnetic susceptibility MS shows a high linear correlation with lithophil elements (e.g., Al, Mg, K, Zr, Ti); MS is in high reverse correlation with $CaCO_3$ content.

Conclusions

The ammonite *Prososphinctes* Bioevent is an accurate indicator of short-time marine environment changes discovered in the middle Cordatum Chron (Costicardia Subchron). It correlates with the maxima of $\delta^{18}O$ and $\delta^{13}C$ belemnite values (pointing to high temperature or salinity and low bioproductivity, respectively), and with the minimum values of P/Al ratio (pointing to low productivity). These data show that proliferation of the perisphinctid genus *Prososphinctes* occurred in a short-time period of oligotrophication of basin waters associated with a phase of cooling or increased water salinity during middle Costicardia Subchron; somewhat later, eutrophic conditions started to prevail. The perisphinctid genus *Prososphinctes* represents a generalist ammonite group of higher tolerance for short-term environmental stress. Research on paleoecological conditions responsible for ammonite bioevents and ocean circulation in the Oxfordian are a matter of further studies.

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ORAL

Dating the final stage of the Eastern Getic Carbonate Platform, by ammonite fauna

Grădinaru, E.[1] & Vašíček, Z.[2]

[1] *Department of Geology, Faculty of Geology and Geophysics, University of Bucharest, Bd. Bălcescu Nicolae 1, 010041 Bucharest, Romania; e-mail: egradinaru@gmail.com*
[2] *Institute of Geonics, Academy of Sciences of the Czech Republic, Studentska 1768, CZ-708 00 Ostrava-Poruba, Czech Republic: e-mail: zdenek.vasicek@ugn.cas.cz*

Keywords: Berriasian, ammonites, Southern Carpathians, Romania

The Eastern Getic Carbonate Platform, labelled as the Leaota Carbonate Platform by Patrulius et al. (1976), is largely extended in the eastern part of South Carpathians. It includes the Upper Jurassic-lowermost Cretaceous carbonate succession, generally ascribed to the Štramberk Limestone facies, from the Piatra Craiului Massif, Dâmbovicioara Couloir, Brașov Mountains, Piatra Mare Massif, Măgura Codlei and the Bucegi Mountains (Patrulius 1969, Dragastan 2010).
Dating the final stage in the evolution of the Eastern Getic Carbonate Platform represented and still represents a challenging debate. Based on foraminifera and calcareous algae, the carbonate succession of the Eastern Getic Carbonate Platform is assigned to the Kimmeridgian-lowermost Valanginian stratigraphic interval (e.g. Bucur 1978; Bucur et al. 2011, 2014; Grădinaru et al. 2016; Mircescu et al. 2014, 2016, 2019).
Among the macrofaunas, the ammonites that apparently seemed to be scarcely occurring received a little attention and only occasionally have been mentioned and discussed. There were a few findings mentioned in the older literature (Popovici-Hatzeg 1898; Jekelius 1938). Patrulius (1969), Patrulius et al. (1976) had referred to some of them. Patrulius & Avram (2015) taxonomically revised the two specimens in Popovici Hatzeg's collection as *Berriasella (Picteticeras)* cf. *picteti* (JACOB) (= *B. callisto*, in coll. IG P 780), *Berriasella* (*Picteticeras*) aff. *elmii* LE HÉGARAT (= *Perisphinctes eudichotomus*, in Popovici-Hatzeg's coll. IG P 10522), and dated them as the lowermost Berriasian.
As the ammonites are particularly valuable biostratigraphic time indicators and precise tools for time-correlation of strata, we decided to identify in the collections the ammonite specimens mentioned in the above-mentioned publications, aiming for an accurate taxonomic identification of them. Besides the two ammonite specimens that have been found by Popovici-Hatzeg in the Dâmbovicioara area and revised by Patrulius & Avram (2015), in the collections of the Geological Museum of Romania have been identified the two ammonite specimens found by Popovici-Hatzeg (1898) in the olistolith from Piatra Arsă, in the Bușteni region on the eastern slope of the Bucegi Mts. From the same region, there is another historical finding done by Gh. Murgoci (*Berriasella*, in coll. IG P 485). Till now, the repository of the ammonites mentioned by Jekelius (1938) is not identified yet.
The results of the taxonomic revisions are as follows:
1/ *Berriasella (Berriasella) elmii* LE HÉGARAT, 1973 (specimen designated as *Berriasella (Picteticeras)* aff. *elmii* LE HÉGARAT, by Patrulius & Avram, 2015)
2/ *Berriasella oxycostata* MAZENOT, 1939 (specimen of Murgoci designated as *Berriasella*, and specimen designated as *Berriasella (Picteticeras)* cf. *picteti* (JACOB) by Patrulius & Avram, 2015).
An ammonite specimen identified as *Spiticeras (Spiticeras) kiliani* DJANÉLIDZÉ, 1922, which has been found in the limestone clasts of the Bucegi Conglomerate occurring on the Bucegi Plateau, is added here to the two above-mentioned berriasellid species.
According to the literature, all specimens occur in the lower Berriasian (Jacobi ammonite Zone) (e.g. Vašíček & Skupien 2013, 2016; Vašíček et al. 2017, 2018).
It is worth to note that *Tintinnopsella carpatica* (Murgeanu & Filipescu) has been described from the limestone bearing the berriassellid specimen found by Murgoci (fide Patrulius 1969, foote note p.95).

The ammonite specimen assigned to *Berriasella carpathica* (Zittel) (coll. IG P 735) is too fragmentary to be identified, but the dense ribbing and type of coiling suggest a some berriasellid from the upper Berriasian.
Concluding, by the available ammonite fauna the last stage in the evolution of the Eastern Getic Carbonate Platform did not overcome the Berriasian, as Patrulius (1976) already stated.
Although at the first sight, the occurrence of the ammonite fauna in the Štramberk facies of the Eastern Getic Carbonate Platform seems to be scarce, however the case of the Outer Western Carpathians, in Czech Republic, should be a stimulus for a more intensive collecting of earliest Cretaceous ammonite faunas, aiming to better dating the last stage in the evolution of the Eastern Getic Platform.

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ORAL

Geochemical and mineralogical evidence of microbial signatures related to genesis of the Middle Jurassic ferruginous stromatolites (Southern Carpathians, Romania)

Grădinaru, M. [1], Lazăr, I. [1], Ducea, M.N. [2, 3] & Petrescu, L. [2]

[1] *University of Bucharest, Department of Geology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania, e-mails: mihaela.gradinaru@unibuc.ro, iuliana.lazar@g.unibuc.ro*
[2] *University of Bucharest, Department of Mineralogy, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania, e-mails: lucpet@geo.edu.ro, ducea@email.arizona.edu*
[3] *University of Arizona, Department of Geosciences, Tucson, AZ 85721, USA.*

Keywords: ferruginous stromatolites, microbial signatures, iron isotopes and rare earth elements, Jurassic, Romania

Introduction

Iron-rich rich laminated deposits are widespread during the Archaean and Proterozoic but are restricted temporally and spatially during the Phanerozoic. It has been suggested that the genesis of these deposits could be associated with global episodic geologic events, generated from interactions between geologic, geochemical and biological processes (Chan et al., 2016 and references therein). These ferruginous laminated textures usually form crusts associated with complex hardgrounds surfaces and/or form the laminated cortex of macro-oncoids, oncoids and ooids. The genesis of the iron rich sedimentary deposits (e.g. banded iron formation, ferruginous stromatolites / microstromatolites) had long been a subject of many contradictory discussions and continues to be a topic of research interest. Numerous authors suggest that the genesis of the ferruginous stromatolites and banded iron formations could be related to the microbial activity that plays an important role in precipitation of iron compounds of these structures (e.g. Palmer & Wilson, 1990; Préat et al., 2008; Planavsky et al., 2009; Reolid & Nieto, 2010; Grădinaru, 2011; Lazăr et al., 2013; Lazăr & Grădinaru, 2014; Chan et al., 2016). Others suggested a diagenetic origin (e.g. Sandoval & Checa, 2002). However, the formation mechanisms of iron-rich stromatolitic deposits are still widely debated.

The purpose of this paper is to report new morphological and geochemical data interpreted as biosignatures involved in the genesis of ferruginous stromatolites. Moreover, this study leads to the first interpretation of REE+Y in the Middle Jurassic ferruginous stromatolites of Southern Carpathians, Romania.

Methodology

In the studied sections, more than 250 samples have been collected from the condensed unit and the adjacent strata. Microfacies types and the meso- and microstructures of the ferruginous stromatolites were investigated in 120 thin-sections under petrographic and binocular microscopes; 35 polished slabs were examined under cathodoluminescence (CL) microscopy. The chemical and mineralogical analyses were performed on 22 samples from all the studied sections.

Results

The studied ferruginous stromatolites occur in the Middle Jurassic condensed deposits of Southern Carpathians, Romania. These ferruginous stromatolites are formed in association with microaerophilic Fe-oxidizing micro-organisms that can preserve morphological and geochemical signatures of microbial iron oxidation. Two main categories of ferruginous stromatolites have been distinguished: (1) Ferruginous microstromatolites (Fems) associated with hardground surfaces and (2) Domical ferruginous stromatolites (DFeS) developed, within the *Ammonitico Rosso*- type succession. Scanning electron microscope examination revealed that the ferruginous stromatolites were formed by the activity of microbial mats dominated by the filamentous structures. The studied stromatolites yield a large range of $\delta^{56}Fe$ values, from -0.75‰ to +0.66‰ with predominantly positive values indicating the prevalence of partial ferrous iron oxidation. The lowest negative δ^{56}Fe values (up to -0.75‰) are present only in DFeS samples and point to initial iron mobilization where the Fe(II) was produced by dissimilatory Fe(III) reduction of ferric oxides by Fe(III)-reducing bacteria. The rare-earth elements indicate that Ce anomalies display moderate to small negative values for the Fems, indicating weakly oxygenated waters compared with the DFeS samples that show moderate positive Ce anomalies suggesting deeper water anoxic-suboxic environments. Besides, positive Eu anomalies indicate the involvement of a diffuse hydrothermal input on the seawater during the Middle Jurassic ferruginous stromatolites.

Conclusions

Based on the morphological and geochemical results we propose that microaerophilic Fe-oxidizing micro-organisms played a significant role in the genesis of the Middle Jurassic ferruginous stromatolites. Iron isotopes data of the Fems and DFeS show that δ^{56}Fe have predominantly positive, near zero, or even low negative values. The Fems samples show a gradual increase from low negative to positive data (from -0.20‰ to +0.66‰) with predominantly positive values, suggesting that there was partial oxidation of Fe(II) to Fe(III) precipitation maintained by the Fe(II)-oxidizing bacteria. The lowest negative δ^{56}Fe values (up to -0.75‰) are present only in DFeS samples and point to initial iron mobilization where the Fe(II) was produced by dissimilatory Fe(III) reduction of ferric oxides by Fe(III)-reducing bacteria. Moderate to small negative Ce anomalies suggest that the Fems indicate weakly oxygenated conditions suitable with slowly reducing environments in comparison with the DFeS samples that show moderate positive Ce anomalies suggesting that they formed in deeper, anoxic-suboxic waters. The presence of positive Eu anomalies and the negative iron isotope values show that local development of the ferruginous stromatolites during the Middle Jurassic could be related to diffuse hydrothermal input on the sites of their formation.

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ORAL
(Plenary lecture)

Microfossil stratigraphy in carbonate platforms of the Tethys Ocean, in Urgonian facies and at the Jurassic-Cretaceous transition (methods and implications)

Granier, B.

Dépt. STU, Fac. Sci. Tech., UBO, 6 avenue Le Gorgeu, CS 93837, 29238 Brest cedex 3, France
e-mail: bgranier@univ-brest.fr

Keywords: holostratigraphy, sequence stratigraphy, benthic foraminifer, calcareous algae, Berriasian, Barremian

The microfossils most commonly found in Lower Cretaceous Tethysian carbonate facies are calcareous algae and benthic foraminifers. Ammonite and calpionellid records in such environments are rare and rather scattered, which has been one of the major limiting factors for placing the microfossils into an accurate biostratigraphic scheme.

Before the development of sequence stratigraphy, the approach was clearly "empirical". For instance, when "*Likanella campanensis*" was first described by Azéma and Jaffrezo (1972), it was ascribed a "Portlandian" or Berriasian age. Later, Jaffrezo (1980) modified it to the middle Berriasian-lower Valanginian range whereas Granier (1987) tuned it up to the upper Berriasian-lower Valanginian. Finally, considering the subendemic character of the species, supplementary stratigraphic evidences, and a new "pragmatical" approach, Granier (2019a) restricted its range to the sole upper Berriasian.

The pragmatical approach (Clavel *et al.*, 2010, 2014; Granier *et al.*, 2013, 2014, 2018; Granier, 2019a) envolves a sequence stratigraphic model (that per definition is not necessarily an exact stratigraphic representation, but that can be improved upon in the course of time) and more generally holostratigraphy, *i.e.*, integrated stratigraphy.

Two case studies are documented:

1) the ranges (mostly the first occurrences) of Barremian microfossils were calibrated on ammonites (and sequence stratigraphy) in a basinal section at L'Estellon (Drôme department, SE France), called the "Rosetta Stone" of the Urgonian stratigraphy;
2) the ranges of mostly Berriasian microfossils were calibrated on sequence stratigraphy (and ammonites and calpionellids) in several platform sections in the Jura Mountains: Crozet, Fort L'Écluse, Montricher, and Vuache (W Switzerland and SE France), with implications regarding the identification of the Jurassic/Cretaceous system boundary in such paleoenvironments (Granier, 2019a, b, c).

The pragmatical approach corrects and significantly improves the existing biozonations.

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POSTER

Dental microwear texture analysis - "New Data from Old Fosils"

Haiduc[1], B.-S., Brânzilă[1], M., Răţoi[1], B.G. & Păun[1], E.-I.

[1] *Carol I Avenue, No. 20A, Iaşi – 700506, Alexandru Ioan Cuza University of Iaşi, Faculty of Geography and Geology, Department of Geology, haiduc.bogdan91@gmail.com; mib@uaic.ro; bog21rat@gmail.com; elenaionelapaun@gmail.com .*

Keywords: paleoecology, diet, paleoenvironments , trophic adaptations

Trophic behaviour is widely recognized as one of the most important parameter, underlying behavioural and ecological differences among living animals.
Biologists, bioarchaeologists and palaeontologists reconstruct diets of prehistoric humans and extinct animals because it emphasizes a serie of information which could fluctuate from the health status of the individuals to adaptations and evolution of the species.
Dental microwear texture analysis represents one of the most efficient method of inference (identification) of paleodiets of the past populations and fossil species.
This approach involves the study of microscopic pattern of tooth use/wear and its applicable to a wide range of species, giving a direct evidence of a individual`s trophic diet during his lifetime.
Under the current technique, observation and analysis of the dental microwear patterns, can be achieved by:

- the use of a stereomicroscope (Solounias et Semprebon, 2002);
- the use of a confocal profilometer microscope (Merceron et al., 2005).

The analysis of dental microwear texture can be grouped, according to the type of ecological issues (of paleoecology) that the researchers want to clarify, such as: group specific ecology, intra-specific ecology, class (or several classes) specific niche, the overlapping of trophic behaviour and the evolution of the ecology in time (adaptation of the trophic behaviour).
Applying this method to an "old" paleontological collection, in the absence of the data of the sampling point, but with slight stratigraphic appraisals, can help yet to obtain paleoenvironmental and palaeoecological data.
In the response to a wide range of questions related to neoecology and paleoecology, the dental microwear texture analysis is a more and more commonly used method; it may be desirable to be used in combination with other ecological protocols.

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POSTER

Upper Jurassic – Lower Cretaceous limestone from Mănăstirii valley – Întregalde Gorge zone (Trascău mountains): microfacies and depositional environments

Hoan, D.T.[1], Săsăran, E.[1], Bucur, I.I.[1], Bia, T.[1] & Oprișa, A.[1]

[1] *Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, 1 M. Kogălniceanu str., 400084 Cluj-Napoca, Romania, e-mail: daotrunghoan@gmail.com; emanoil.sasaran@ubbcluj.ro; ioan.bucur@ubbcluj.ro; oprisaalin@gmail.com.*

Keywords: Upper Jurassic – Lower Cretaceous, isolated carbonate platform, microfacies, depositional environments, Trascău Mountains.

Introduction

The carbonate rocks from the Bedeleu Ridge form large scale outcrops north of Valea Mănăstirii. They belong to an isolated carbonate platform which was formed during Upper Jurassic-Lower Cretaceous. This study analyses the carbonate deposits belonging to the Bedeleu Platform together with some olistoliths from the southern part of the Mănăstirii Valley, in the Valea Mănăstirii-Cheile Întregalde/Poiana Galdei area. Fieldwork, petrographic, biostratigraphic and microfacies analysis methods were used in order to highlight the associated depositional environments and their relationship with postdepositional tectonics.

Results

The Kimmeridgian-Berriasian-lower Valanginian limestones of the Bedeleu carbonate platform and the Pleașa Râmeților and Poiana Galdei olistoliths share similar sedimentological, biostratigraphical and microfacial characteristics. Based on these features, the following depositional systems were identified:

1) The shelf slope system is present in the eastern part of the Bedeleu Ridge carbonate platform and on the western margin of the Pleașa Râmeților ridge. These deposits contain different types of clasts with distinct microfacies types originating from various depositional environments. Reefal detritus and inner platform carbonates are present within turbidites or other types of mass flow deposits. 2) The shelf -edge system contains bioconstructions and bioclastic shoals. It is present in the Poiana Galdei and Pleașa Râmeților olistoliths. Bioconstructions are represented by corals and sponges which are heavily encrusted by microbial crusts. The internal sediment frequently contains *Crescentiella morronensisis*. Microbialites were playing a key role in stabilizing the reefal framework. The associated bioclastic banks contain bioclastic intraclastic packstone/grainstone facies types with shelf margin clasts. The Pleașa Râmeților olistolith contains bioconstructions with calpionelids in their internal sediment. *Calpionella alpina* is the most frequent of these species. Based on these characteristics, the age of these deposits can be attributed to the lower Berriasian.

3) The open shelf system contains micro-reefs and subtidal/lagoon type deposits. It is represented by bioclastic packstone/wackestone with corals, sponges and echinoderm fragments. These bioclasts are encrusted by cyanobacteria and microbial crusts. 4) The coastal/ nearshore system is represented by low and high energy subtidal and intertidal deposits. Other cathegories include tidal bars, supratidal flats and marches rich in microbialites (algal-microbial mats).

These depositional systems are present both in the Bedeleu Carbonate Platform and the olistoliths from the upper Cretaceous deposits. The existing microfossils and depositional systems indicate that the largest olistolith from Romania (Pleașa Râmeților) and the Poiana Galdei olistoliths were sourced as large fragments (slides) from the Bedeleu isolated carbonate platform during the mesocretaceous tectogenesis. The Pleașa Râmeților olistolith has an overturned position within the upper Cretaceous deposits of the Râmeț Formation. The identified microfossils (calpionelids) indicate that the reefal bioconstructions of the Bedeleu isolated platform were developing until the Berriasian.

ORAL

New identified trees in the late Cretaceous Petrified Forest from Mureș corridor, Apuseni Mts, Romania.

Iamandei, E.[1] & Iamandei, S.[1]

[1] *Geological Institute of Romania (GIR), 1st Caransebeş Street, 012271 – Bucharest, Romania, e-mail: iamandei@gmail.*

Keywords: banatite, petrified wood, plant assemblage, new species, palaeoclimate.

The geological evolution of southern Apuseni mts., in Mureş corridor area, during latest Cretaceous, was marked by the banatitic volcanism, of laramian phase, whose products appear in all areas where Fața Băii Conglomerates, or their equivalent, have been accumulated. So, in Zlatna-Techereu area, Roșia Montană and Mureș corridor, from Galda to Săsciori, from Oarda to Vinț, in Hațeg Basin and from Deva to Gurasada-Coștei, the basins have been filled by continental coarse detritic deposits, as resulting from the exacerbated denudation of the neighbor emerged and tectonized regions, all of these under a warm and arid climate. This is betrayed by the dominant reddish color of the Fața Băii Conglomerates, as well as by the preserved remains of the terrestrial flora and fauna, since the emerged lands were highly forested and the volcanic products have created ideal conditions of plant parts preservation.
The material studied for this work is represented by samples of petrified wood collected from these regions, in the area of the above mentioned localities. From all the samples were prepared thin sections standard-oriented (transversal, tangential and radial) - and they were studied by optic microscope. Microphotos were obtained by AVerMedia-Camera, and processed by computer.
In this study a review of the previous identified arboreal vegetation in Mureș corridor is made (E. Iamandei, 1997-2008). When necessary, a formal revision already described species was made. Also new material coming from those areas was studied, and new species were described. As a result, a new revised list of arboreal taxa of the latest Cretaceous forests living the emerged areas from the flanks of Mureș corridor, comprising species of conifers as *Brachyoxylon, Agathoxylon, Prototaxodioxylon, Pinuxylon,* angiosperms as *Laurinoxylon, Spyroplatanoxylon, Sapotoxylon, Manilkaroxylon, Quercoxylon, Fagoxylon, Cornoxylon, Mastixioxylon, Paraphyllanthoxylon, Securinegoxylon, Euphorbioxylon* and also, remains of monocotyledons as *Palmoxylon* and *Rhizocaulon*.
The paleoecologic significance of these trees and of the whole arboreal association outlined here, indicate a Mixed Mesophytic Forest with a lot of paleotropical members, equivalent to Oak-Laurel forests or Lauraceae-Mastixiaceae forests, as other intermediary aspect to "tropical forests" (sensu Wang, in Wolfe, 1971). This type of vegetation strongly indicates a warm temperate palaeoclimate (so called ”paratropical climate”) developed within an insular region (probably situated at 30-35^0 North latitude - where Dinosaurs and Crocodiles lived) and characterized by hot, dry summers and short, mild and wet winters. The palynological association and the presence of typical Mesozoic floristic elements within these continental reddish formations from Mureş Corridor give also stratigraphical specifications regarding the correlation and the age of these deposits of late Cretaceous, poor in fossils.

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ORAL

Palaeoxylotomical studies in the Cenozoic Petrified Forests of Greece. Part two-conifers.

Iamandei, S.[1], Iamandei, E.[1], Velitzelos, D.[2] & Velitzelos, E.[2]

[1] *Geological Institute of Romania - 1st, Caransebeş street, Bucharest, # 012271, Romania; e-mail: iamandei@gmail.com*
[2] *National and Kapodistrian University of Athens, Faculty of Geology and Geoenvironment, Athens, Greece, e-mail: veljim@geol.uoa.gr*

Keywords: Petrified Forest, conifers, Evros, Limnos, Lesbos, Oligocene, Miocene, volcanic.

As a part of a Greek project, a study of the Petrified Forests was started, and we present here the last results of second part of this study, concerning a number of 184 samples with coniferous structures. In the first part, about 100 samples with Palm structure have been studied identified and already published (Velitzelos, D. et al., 2019, in press). The third part, concerning Angiosperm structures, is in study. Some years ago we have participated in some field campaigns in Greece, collecting numerous samples of petrified wood and doing field observations. Otherwise, Greece is a "Heaven of Cenozoic Petrified Forests", with many fossiliferous localities in the insular part, as well as in the continental part. Even if the evolution of the Cenozoic Flora in this large region is generally known by various palaeobotanical and palynological complex researches (Velitzelos et al., 2014), however, a systematic palaeoxylotomical study of those Petrified Forests is still needed.
In fact, the Aegean area was, during Cenozoic, an emerged land area, as a result of continuous subduction of the African plate at collision with Eurassian plate, expressed by a complicate tectonic, an intense volcanism and earthquakes. So, closely related to the development of post alpine back-basin, in Evros (East Trakia), a significant Cenozoic calc-alkaline, high-K calc-alkaline to shoshonitic magmatic activity has manifested as plutonic-subvolcanic (monzonites, monzodiorites, granodiorites, microgranite porphyries) and volcanic rocks (banakites, trachytes, andesites, dacites, rhyolites, accompanied by volcano-sedimentary formations composed of marls, sandstones, clays and intercalations of volcanic rocks as lavas, tuffs, pyroclastics, discordantly covering the basement rocks of the Rhodope massif and Circum Rhodope Belt. K/Ar ages of the volcanic rocks, in this area, range from 33.5 to 19.6 Ma, i.e. an Oligocene to Lower Miocene period of magmatic activity (Voudouris et al., 2007, with references). In Lemnos Island on a sedimentary basement including molassic deposits of Middle Eocene - Lower Miocene age, is covered by volcanic products of Lower Miocene age. Similarly in Lesbos island. All these emerged areas at that times, were highly forested and the petrifaction of the woody material was directly related to the intense volcanic activity, which in Lesbos island has manifested during Early Miocene, the main stage of volcanic activity in Lesbos, occurred between 18.5 and 17 Ma, i.e. Aquitanian–Burdigalian (Zouros et al., 2007). In the continental part, in Kastoria-Kozani-Grevena Area (West Macedonia), belongs to the Meso-Hellenic-Basin, which is an elongated depression of NW–SE direction along the axis of the Hellenides, filled with molassic sediments of late Eocene to middle Miocene age. The last deposits, of Miocene age, consists of thick conglomerates alternating with sandstones and sandy marls which, at Grevena, preserves an interesting mid-Miocene Flora with riparian elements (Velitzelos D. et al., 2014, with all references).
The studied material comes from all the above specified areas. From all the samples of petrified wood were prepared thin sections standard-oriented (transversal, tangential and radial) - and they were studied by the optic microscope. Microphotos were obtained by AVerMedia-Camera, and were processed by computer.
Few fossil woods were described from these areas, even if their presence was known from long-time, and many of them were subject of revision. This study represents the second part of our systematic study in which we present identification of 14 taxa of conifers, as species of *Taxodioxylon, Glyptostroboxylon, Sequoioxylon, Cupressinoxylon, Thujoxylon, Tetraclinoxylon, Abietoxylon, Pinuxylon*.

These identified taxa confirm the supposed subtropical, warm and wet palaeoclimate in the Aegean region, during Miocene, and also the presence of numerous conifers in those large forested areas, beside Angiosperms and Palms.

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ORAL

Reconstructing the palaeoambiental parameters of the Middle Miocene of the Haţeg Basin with the use of fossil foraminifera assemblages and statistical methods

Ilieş, I. A.[1], Oltean, G.[1], Bindiu Haitonic, R.[1] & Filipescu, S.[1]

[1] *Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, 1 M. Kogălniceanu str., 400084 Cluj-Napoca, Romania, e-mail: iliesiuliaandreea@gmail.com, geluolteanS@gmail.com, raluca.bindiu@ubbcluj.ro, sorin.filipescu@ubbcluj.ro*

Keywords: Miocene, Badenian, univariate indices, multivariate indices, paleoenvironment, fossil foraminifera, statistics.

Using the standard micropalaeontological methods a new set of samples has been processed. The samples, containing mainly fossil foraminiferal assemblages have been collected from an outcrop from the side of the E79 road in the Hateg Basin (south of Galati village, Hunedoara County – 45.521437 N, 23.059556 E). The aim was to interpret the samples from a biostratigraphic point of view as well as understand the paleoenvironmental setting of the Miocene.

There have been previous descriptions of similar assemblages from the Vienna Basin by d'Orbigny (1846) and Karrer (1862, 1863, 1865) as well as from closer sites, such as Lăpugiu and Coştei (Neugeboren 1847, 1850, 1851, 1852, 1856, Karrer 1868). However, these studies were focused mainly on taxonomy, information about the paleoenviroment or statistical analysis has not been provided.

In order to better understand the depositional and paleoenvironmental settings during the middle Miocene, the fossil foraminiferal assemblages have been analyzed from a statistical point of view. In a previous preliminary study (Ilieş et al., 2017), a number of univariate diversity indices (Fisher Alpha, Shannon, Simpson, Hurlbert) were used to illustrate the changing taxonomic abundance. Furthermore, additional information regarding the paleobathymetry, nutrient quantity, oxygen levels and the sea-level changes at local scale was provided based on statistical methods such as BFOI, P/B ratio, Pielou Equitability.

The highly diverse and abundant foraminiferal assemblages provide great correlation potential at a regional scale. For this reason, it was of significant importance to continue with the use of statistical methods in order to understand the evolution of the assemblages and the depositional setting in even greater detail. By separating the epifaunal and infaunal taxa, calculating the percentage of agglutinated, benthic and planktonic foraminifera, and also separating benthic morphogroups will allow a detailed insight into the microhabitats and their succession. In addition, separation of feeding strategies will provide better insight into the type and how the nutrient supply fluctuated. Additionally, the statistical methods highlighted the possible changes in the environmental parameters based on individual abundance of foraminifera. Lastly, the use of multivariate indices, such as clusters and dendrograms, help to clearly understand and to better illustrate the previous results acquired by univariate indices.

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ORAL

New data on the fossil fauna from the *Cryptomactra* Formation reveals unexpected diversity

Ionesi, V.[1], Grădianu, I.[2], Copilaș-Ciocianu, D.[3]., Loghin, S.[1], Mare, S.[4], Dumitriu, S.-D.[5] & Matei, C.[1]

[1] *„Alexandru Ioan Cuza" University of Iași, Faculty of Geography and Geology, Department of Geology, Carol 1 Bd. 700505, Iași, Romania, e-mail: vioion@uaic.ro, sergiu_loghin@yahoo.com, cristinelmatei111@gmail.com;*
[2] *Natural Sciences Museum Piatra Neamț, Petru Rares, No. 26, 610119 Piatra Neamț, Romania, email: igradianu@hotmail.com;*
[3] *Nature Research Centre, Laboratory of Evolutionary Ecology of Hydrobionts, Akademijos 2, 08412 Vilnius, Lithuania, e-mail: denis.copilas-ciocianu@gamtc.lt*
[4] *S.C. Geologic Worldwide Services S.R.L. Bucharest, silvia_mare@yahoo.com;*
[5] *CGG Robertson, Llandudno, North Wales LL30 1SA, United Kingdom siminadumitriu@gmail.com.*

Keywords: Middle Miocene, *Cryptomactra* Formation, fossil fishes, amphipods, insects.

Introduction

The *Cryptomactra* Formation, also known as "the *Cryptomactra* clays", outcrops on both sides of the Prut River and extends in a perimeter between Cahul – Bârlad – Tg. Frumos – Ștefănești – Bălți – Orhei – Chișinău and Komrat (Ionesi et al., 2005). Researches on the *Cryptomactra* Formation started in the beginning of the last century, the first study was carried out by Văscăuțanu (1929), which accurately dated these deposits. A rich fossil fauna of molluscs, foraminifera, ostracods, statoliths fish fragments was reported by a large series of authors (see Ionesi et al., 2005).

Methodology

During February 2019, several boreholes 1.2 m diameter were dug in the central area of Iași city in order to build a bridge over the Bahlui River. The *Cryptomactra* Formation was intercepted from a depth of 8 – 10 meters until 24 – 26 meters. From one of these boreholes 12 samples were collected at an interval of approximately 1,5 meters, in order to determine the micropaleontological content. Moreover, from the lower part of other 8 boreholes (between 21,5 – 25 m in depth) numerous samples were collected were molluscs, fish skeletons and amphipods were identified (Ionesi et al., 2019). Taking into account these new data on the *Cryptomactra* Formation we also extended our study on a series of outcrops from the neighbouring Vlădiceni quarry were a rich fossil fauna was also identified.

Results

In the studied boreholes, the following mollusc species were identified, *Cryptomactra pesanseris* (Mayer-Eymar), *Mactra vitaliana* d'Orb., *Obsoletiforma* cf. *sarmatica* (Barbot), *Inaequicostata barboti* (R. Hoernes), confirming the appartenance of the studied deposits to the *Cryptomactra* Formation.

Moreover taxa of foraminifera, i.e., *Elphidium macellum* (Fichtell et Moll), *Dogielina sarmatica* Bogdanowicz et Voloshinova and *Quinqueloculina akneriana* (d'Orbigny) etc.), ostracod species *Cyprideis pannonica* (Méhes) and *Xestoleberis dispar* Müller, mysid statoliths, ascidian spicules and otoliths were also identified in the studied material.Among these, the ascidian spicules belonging to the Didemnidae family are reported for the first time in this formation.

As we afforementioned, in the lower part of the boreholes we identified a series of fish skeletons, which are relatively uncommon in this Formation. Previously, only isolated scales of clupeids and skeletons of carangids (*Caranx* aff. *gracilis* Kramberger 1882), have been reported by Macarovici (1970). In the lower part of the drill we identified a fish fauna represented mainly by poorly preserved and incomplete fish skeletons. However, we are able to identify specimens belonging to the following families: Clupeidae (*Sardinella sardinites* (Heckel, 1850)), Merlucciidae (cf. *Merluccius* sp.), Syngnathidae (cf. *Syngnathus* sp.), Scorpaenidae (*Scorpaenidae* gen. et sp. indet.), Serranidae

(*Serranidae* gen. et sp. indet.), Scombridae (cf. *Scomber* sp.), Bothidae (cf. *Arnoglossus* sp., *Bothus* cf. *B. parvulus* (Kramberger 1883)).

Levels rich in amphipod fragments were also identified in the lower part of the boreholes as well as in the Vlădiceni quarry. Most of the borehole specimens are poorly preserved, making their precise identification problematic. However, the specimens from Vlădiceni are in a better state of preservation. The research on these fossils is at an incipient stage, but we can confidently ascertain that they belong to the Gammaridae family. They have systematic affinities with the extinct genus *Andrussovia* Derzhavin, 1927 described from Upper Sarmatian marls from the Caspian Basin, and also to the extant members of the *Gmelina* Sars, 1896 group, endemic to the Ponto-Caspian region. It is very likely that these fossils represent basal members of the extant Ponto-Caspian gammarid radiation. So far, amphipods have never been reported from the *Cryptomacra* Formation. Their presence is even more exceptional given that only a small number of taxa have been reported worldwide.

The mollusc fauna identified in the Vlădiceni quarry is corealable with the one in the studied boreholes (see above) which indicate that this deposit belongs to the *Cryptomactra* Formation. Well preserved fish skeletons as well as amphipods were also recognised. A remarkable finding is that of exceptionally well preserved fossil insects, reported so far only in Tállya area from the Tokaj Mountains, Hungary (Sziráki and Dulai, 2002) and Tunjice Hills, Slovenia (Žalohar, 2004).

Conclusions

Our research on the fossil fauna from the *Cryptomactra* Formation uncovered additional fossiliferous levels which harbour a unique assemblage that has never been described before. Among the newly discovered taxa are the amphipods, the insects and the ascidian spicules. The high number of fish remains (mentioned only by Macarovici, 1970) is also noteworthy. The abundance of these newly discovered taxa in the *Cryptomactra* Formation enables us to employ a systematic approach which would provide an important insight into their evolution and also illuminate the regional and interregional palaeoecology among different European basins.

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ORAL

Lithology and dating using microfauna analysis on Sarmatian cutting samples recovered by 2 wells in the Siliştea area

Ioniţă , C.[1] & Singhel, C.-V. [2]

[1] *OMV Petrom S.A, Upstream – Development & Reservoir Engineering, ICPT, 29 Culturii Blvd., 105600 Câmpina, Prahova, Romania, email: corina.ionita@petrom.com*
corina.ionita@petrom.com
[2] *OMV Petrom S.A, Upstream – Development & Reservoir Engineering, ICPT, 29 Culturii Blvd., 105600 Câmpina, Prahova, Romania,, e-mail: victor.singhel@petrom.com*

Keywords: foraminifera, ostracods, Bessarabian, Volhynian, biozones, Moesian Platform

In this paper are presented the lithology and the microfauna assemblages identified in cuttings samples from the Sarmatian sedimentary deposits intercepted by two wells located in the Siliştea area (the southern-central part of the Moesian Platform). Using the range of the fossils, the bi-ozones used in the entire Paratethys, it was possible to establish the boundaries between the Maeotian and Sarmatian ages, the delimitation of the Bessarabian and Volhynian substages, and the boundary between Sarmatian and Cretaceous stages.
The content of microfaunal assemblages shows major changes from one sedimentary deposit to another. In the Maeotian samples the dominant lithology are the calcareous claystones with ostracods (*Eucypris gajtanensis* STANCHEVA, *Candona subtrapezoidales* STANCHEVA, *Euxinocythere (Maeotocythere) praebacuana* (LIVENTAL), Caspiolla aculeata STANCHEVA). In Sarmatian the lithology and the microfaunal content are very diversified (calcareous claystones with interbbeds of limestones and marls in Bessarabian; sandstone with interbeds of limestones, ooliths and calcareous claystone and sand in Volhynian; benthic foraminifera: *Pseudotriloculina consobrina consobrina* (D`ORBIGNY), *Varidentella reussi* BOGDANOWICZ, *Dogielina sarmatica* BOGDANOVICH and VOLOSHINOVA, *Articulina problema* BOGDANOWICH, *Ammonia beccarii* (LINNAEUS), *Fissurina bessarabica* (POPESCU), *Fissurina daraensis* POPESCU, *Bolivina moldavica* DIDKOWSKYI, *Porosononion subgranosus subgranosus* EGGER, *Nonion bogdanowiczi* VOLOSHINOVA, Elphidium crispum (LINNAEUS), *Elphidium hauerinum* (D`ORBIGNY), *Elphidium macellum macellum* (FICHTEL & MOLL); ostracods: *Aurila merita* (ZALANYI), *Amnicythere tenuis* (REUSS), *Cytheridea hungarica* ZALANYI, *Callistocythere egregia* (MEHES), *Loxocorniculum hastatum* (Reuss), *Loxoconcha punctatella* (REUSS), *Xestoleberis fuscata* SCHNEIDER; mysids: statoliths; gastropods: indeterminable fragments, bivalves: *Ervilia* sp.; fish debris: otoliths, bones, teeth, *Semseya lamelatta* FRANZENAU). The Cretaceous samples contain white argillaceous limestone with a huge number of benthic and planktonic foraminifera species).

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POSTER

Lithofacial and tectono-structural reflex in post-Moldavian morphogenesis from Obcina Mare (Eastern Carpathians)

Juravle, D.-T.[1], Ursu, A.[1], Chelariu, C.[2], Juravle, V.[3]
[1]*University "Alexandru Ioan Cuza" of Iasi*, *Department of Geography*, *20 A*, *Carol I Street*, *RO-700505*, *Iasi*, *Romania*, *e-mail*: *jdorut@yahoo.com*, *ursu_v_adrian@yahoo.com*
[2]*University "Alexandru Ioan Cuza" of Iasi*, *Department of Geology*, *20 A*, *Carol I Street*, *RO-700505*, *Iasi*, *Romania*, *e-mail: ciprian.chelariu@uaic.ro*
[3] *S.C. DAFLOG*, Medias, Romania, *e-mail*: *juravlevalentin@yahoo.com*

Keywords: Moldavides, petrofacies, post-Moldavian morphogenesis, Obcina Mare.

Introduction

The purpose of this paper is to analyze the correlation between the lithological and tectonic units of Eastern Carpathian Moldavia with the geomorphological units of Obcina Mare and its contact with the Moldavian Plateau, between Suceava and Sucevița valleys. Geographically, the researched area belongs to Suceava's hydrographical basin, characterized by a network of orders 1-3 in the Horton-Strahler hierarchical system. It is neighbored at the north by the Romania-Ukraine border, at the south by the Sucevita Valley, at the west by the Sadau-Brodinioara line, and at the east by the Vicovul de Jos - Solca line, superimposed on the Pericarpathic fault. In the studied region, the Moldavian Carpathian deposits, which form the flysch nappes of Tarcau and Vrancea and the Subcarpathian nappe, which is composed of molasses deposits, occupy the largest area. In the eastern part, on the Carpathian wedge-top, the Badenian-Volhinian deposits of the last sedimentation cycle of the Moldavian Platform are transgressively arranged. The general sedimentogenic conditions in the external basin of Moldavian foreland north of Moldova (senso Ionesi, 1971, Juravle et al., 2008, 2009) determined a number of tectonic and lithofacies related peculiarities found in the Suceava-Sucevita area. (a) In the Lower and Middle Cretaceous, the sedimentation conditions were broadly uniform in Tarcau area, giving rise to the deposits of the Audia and Cirnu-Siclau formations. Starting from the Upper Cretaceous, the sedimentation basin morphology changed to create conditions for the differentiation of sedimentation and the accumulation of heteropic lithofacies (Grasu et al., 1999; Giugliuto et al., 2004; Juravle et al., 2016). In these conditions, in the proximal areas, reported to the central-Carpathian source, deposits accumulate in the arenitic fractions, unlike the distal areas, where the characteristic note is given by the close alternation of the arenitic deposits with the silto-lutitic deposits with a strong calcareous character. (b) In literature, at the Eocene level, three heteropic lithofacies were described (in the western part - Tarcău Lithofacies, in the median part - Tazlău Lithofacies and in the east - Doamna Lithofacies), which are maintained with a partial overlap at the level of Oligocene – Lower Miocene (in the west - Fusaru Lithofacies, in the median part - Moldovita Lithofacies and in the east - Kliwa-Petricica Lithofacies) (Bogatu, 1999; Florea, 1999; Juravle, 2007). Researching the column characteristic of the three lithofacies, one can notice the lithostratigraphic variations, from west to east, in the sense of increasing the weight of the arenitic material in the lithological columns of the western formations. The deposits in Suceava Plateau analyzed in the study area belong to the Subcarpathian Nappe and to the deposits of the Moldavian Platform The Subcarpathian Nappe is made up of Lower Miocene molasse deposits, being represented by the Solca Formation (green friable sandstones, green clays and silt) and the Salt Formation with gypsum and gemstone salt. Buglovian deposits close the Subcarpathian Nappe succession (sandy clays, argillaceous limestones, and gray limy clays).

Materials and Methods

Geological and Geomorphological Data: The cartographic material for the Suceava-Sucevita region, which was the basis of the present analysis, is based on literature data (Ionesi B., 1969; Joja et al., 1968; Joja et al., 1984; Bogatu, 1999; Florea, 1999; Juravle, 2007; Juravle et al., 2016) and on-site mapping of the research team. Geomorphological data taken into account is based on results generated from analyzing topographical maps at 1:50.000 scale, sheets: L-35-3-B, L-35-3-D, L-35-

3-B, L-35-4-A, L-35-4-B, L-35-4-C, L-35-4-D, through Geographical Information System, as well as data from literature (Barbu, 1976; Florea, 1999; Pop, 2000; Juravle, 2007; Oprea-Gancevici, 2014). ***GIS analysis:*** To illustrate the links between the geological substrate and the morphological response on the surface of the earth crust, it was necessary to spatially analyze morphometric layers, in raster format, in relation to the geologic vector layers, and this allowed us to extract new data. The data used in this study are: geological map in vector format at 1:50.000 scale and a 30 m terrain numerical model made by SRTM. The geological map was made by screen digitizing of the lithological formations and the tectono-structural features, followed by the creation of the attribute data base associated with the polygons. The morphometric layers of hypsometry, slope and shading were generated automatically, from the digital elevation model. After that, we separated each lithological formation in a vectorial format and calculated the histograms, for slope and elevation values distribution within the formations. These histograms were then aggregated in the graphs below.

Results and Conclusions

The analysis was conducted in two directions: (1) The reflection of the tectono-structural architecture in the hypsometric distribution and (2) Reflection of lithofacial peculiarities in slope distribution. In the first case (1), altitudes over 1050 m, are due to thrusting or reverse faults at the forefront of the digitations and overturned folds, which bring in the elevated tectonic position the couple of turbiditic formations of Hangu (lithologically dominated by limestones, marls and calcareous clays) and Izvor (lithologically dominated by sandy-limestones, clastic and bioclastic limestones). For the second case (2), the slope analysis requires a more laborious methodology, the litostratigraphic formation does not always have a specific response to the morphogenetic "aggression". Often, in the case of predominantly silto-lutitic formations, intercalations of sandy-limestone materials are constituted as "tops", with a significant role in the preservation of accentuated slopes over low-strength silto-lutitic formations. Solving these correlations and interconditioning of geological and climatic factors in the morphogenesis process will find a reasonable solution through a future regional study, elaborated at least at the level of the entire orogene of the Eastern Carpathians.

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POSTER

Eocene larger benthic foraminiferal accumulations from Albești Limestone: microfacies analysis and paleoecological implications

Kövecsi, S.-A.[1], Pleş, G.[1], Bindiu Haitonic, R.[1], Less, G.[2] & Silye, L.[1]

[1] *Babeş-Bolyai University, Department of Geology, Kogălniceanu 1, 400084 Cluj-Napoca, Romania, e-mail: szabolcs.kovecsi@ubbcluj.ro, george.ples@ubbcluj.ro, raluca.bindiu@ubbcluj.ro, lorand.silye@ubbcluj.ro*
[2] *University of Miskolc, Department of Geology and Mineral Resources, 3515, Miskolc-Egyetemváros, Hungary foldlgy@uni-miskolc.hu*

Keywords: nummulitic limestone, paleoenvironment, carbonate ramp, Romania

The Albești Limestone (Eocene) was regarded as an important raw material and used during the last centuries for the ornamentation of numerous buildings and monuments in the south-eastern part of Romania. Due to its abundant bioclastics (mostly nummulite shells) and structural/textural traits these carbonate rocks show a unique pattern, hence its widespread usage as an ornamental rock. Even if its economic value is well known, the data on its micropaleontological associations, and microfacies are scares.

In order to shade light on the nature and characteristics of this less known nummulite accumulations twenty-three limestones samples were collected from a former quarry located in Albești village (Argeş). The collected samples were cut in think-sections, then studied both for microfacies and their microfossil content.

Thin-section analyses of these samples revealed several microfacies showing slightly different sedimentological/paleontological traits along the studied section. In the lower part of the quarry the Eocene succession starts with bioclastic packstones with nummulites, small echinoid and red algae fragments. Also, glauconitic particles and ferrous oxy-hydroxides were observed within these microfacies, and some nummulite shells are filled with glaucony-rich fine sediment. In the middle part of the studied sedimentary record grainstones/packstones with the same micropaleontological content as at the base of the section are developed followed by packstones and grainstones with abundant B-form *Nummulites*. The upper part of the studied sedimentary record is composed mostly by nummulitic packestones/grainstones with small bioclastic fragments and glauconite. Sometimes imbricated nummulites and micro-stilolitic structures were observed, covered by a layer composed by abundant B-form *Nummulites* and a 10 cm thick, coarse nummulitic grainstones/packestones. The top of the studied stratigraphic interval is marked by a thick pile of sandy-marly deposit.

The identified microfacies and micropaleontological record suggests that the sampled succession was deposited most probably in a shallow-water depositional paleoenvironment located in the median part of a carbonate ramp. Further detailed analyses will provide additional data regarding the relationships between nummulitic assemblages and the carbonate ramp depositional environments.

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ORAL

The rediscovery of Burmite and it's palaeontological significance for understanding the development of Avian flight in the mid-Cretaceous.

Laurent, C.[1] & Dyke, G.[2]

[1] *Babeş-Bolyai University, Faculty of Biology and Geology, 44 Gheorghe Bilaşcu Street, RO-400015, Cluj-Napoca, e-mail: christian_laurent@live.com*
[2] *Babeş-Bolyai University, Faculty of Biology and Geology, 44 Gheorghe Bilaşcu Street, RO-400015, Cluj-Napoca, e-mail: garethdyke@gmail.com*

Keywords: Amber, feathers, evolution, flight, microstructure

A large number of feathers have been added to the fossil record since the 1990s (Grimaldi et al. 2002) and many of the most recent descriptions have come from the Burmese Amber(Xing et al. 2016*a*, *b*, 2017, 2018*a*, *b*). The feathers preserved here contain more information related to the development of flight in the mid-Cretaceous than fossils from sedimentary rock because the most salient developmental innovations have been in the microstructure (Prum 2005). These innovations include for instance, the development of hooklets and notches on the barbs, which allow the vane to create a cohesive flight surface, and of asymmetrical vanes which are more stable in flight (Prum and Brush 2002), etc. These features preserve exceptionally well and also in three-dimensions when they are mummified in amber.
This presentation will introduce a productive locality from Northern Myanmar, comment on local collection practices and briefly review a number of recent descriptions, outlining major palaeontological conclusions and commenting on the validity of the developmental hypothesis of feather evolution by Prum and Brush (Prum and Brush 2002).

Conclusions

The Hukawng valley of Myanmar is a productive locality for mid-Cretaceous aged avian fossils. Some of these fossils preserve detailed microstructure on articulated wings and it can be expected that many more descriptions of fossil feathers will be added to the fossil record in the coming decade. The amber fossils will provide an invaluable insight into the development of avian flight and the tissues required. The evolutionary model proposed by Prum and Brush (Prum and Brush 2002) and furthered by Xing (Xu 2006) may now require an update.

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POSTER

Lower Sarmatian foraminiferal assemblages from the NW border of the Transylvanian Basin

Lázár, B.[1] & Silye, L. [1]

[1] *Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania, e-mails: lazarboty@gmail.com, lorand.silye@ubbcluj.ro*

Keywords: Sarmatian, foraminiferal assemblages, paleoenvironment, micropaleontology

Introduction

The study of fossil foraminiferal assemblages in the Transylvanian Basin has a long history. The first published papers are dated from the 19th century (de Montfort, 1808). Since then, the research methods were modernized, providing important data about the age of the rocks, paleo-environment and biostratigraphy.

The Sarmatian (middle Miocene) is characterized by important tectonic processes in the Carpathians, which are reflected by the sedimentary record of the Transylvanian Basin (Krézsek şi Bally, 2006; Tiliţă et al., 2013). The Sarmatian record in Cluj-Napoca area is quite thick and can be separated in two lithostratigraphic units (Iris and Feleac Formation) which correspond to two different depositional settings and time intervals (Filipescu, 1999; Kovács, 2001).

Methods

The studied material (mainly clay/marls) was collected from two cores, each of about 8 m long. These were studied at relatively high resolution i.e. the sampling distance was ~15 cm. The collected samples (~250 g each) were prepared using the standard micropaleontological technique: each sample was boiled in water with baking soda added, then washed through a 63 µm mesh sieve using tap water and finally dried in an oven at 95°C overnight.

Results

The recovered assemblages belong into the *Anomalinoides dividens* (Łuczkowska, 1967) Biozone and most likely the *Varidentella reussi* (Bogdanowicz, 1947) Biozone, therefore they are early Sarmatian (Volhynian).

The most striking feature of the studied foraminiferal assemblages are the specimens of *Tenuitellinata* (Li, 1987), *Tenuitella* (Fleisher, 1974) and *Globigerina* (d'Orbigny, 1826) genus. These are known mainly from upper Badenian (Kossovian) stratigraphic record of the Transylvanian Basin (Filipescu and Silye, 2008), but in some cases they might occur in the base on the Sarmatian as well. However, the recovered planktonic species possess small test, in some cases without any morphological details. Hence, based on the previous studies we can conclude either that the recovered planktonic foraminiferal tests are reworked, however it might also be likely that they are in situ.

The foraminiferal assemblages suggest an inner shelf or eventually a distal prodelta depositional paleoenvironment for the studied stratigraphic interval.

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ORAL

Facies and depositional setting of the Upper Jurassic to Lower Cretaceous platform carbonates from eastern South Carpathians (Bucegi Mountains, Romania)

Lazăr, I. [1], Pleș, G. [2], Grădinaru, M. [1], Bucur, I.I. [2], Săsăran, E. [2], Oprișa, A[2]. & Ungureanu, R. [2]

[1] *University of Bucharest, Department of Geology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania, e-mails: iuliana.lazar@g.unibuc.ro, mihaela.gradinaru@unibuc.ro*

[2] *Department of Geology, Babeş-Bolyai University, Str. M. Kogălniceanu 1, 400084 Cluj-Napoca, Romani, e-mails: george.ples@ubbcluj.ro, ioan.bucur@ubbcluj.ro, emanoil.sasaran@ubbcluj.ro, oprisaalin@gmail.com, navzar22@yahoo.com*

Keywords: Pelagic carbonate sedimentation, Upper Jurassic, Lower Cretaceous, South-eastern Carpathians, Romania

Introduction

The morphology of the eastern part of the Getic Carbonate Platform was depicted by Patrulius (1969) who separated different "*facies zones*" within the Upper Jurassic-Lower Cretaceous successions, the Dâmbovicioara, Piatra Craiului Mouniatns and Braşov-Codlea, representing shallow-water platform carbonates that are gradually replaced in the Bucegi Mountains and neighbouring areas by resedimented carbonates interlayered with hemipelagic and pelagic carbonates.

Numerous papers have been dedicated to the Upper Jurasic-Lower Cretaceous history of the eastern part of the Getic Carbonate platform starting with Patrulius (1969) untill the recent papers of Grădinaru et alii, (2016 and references therein), Săsăran et alii, (2017), Mircescu et alii (2019).

This paper focuses on: (1) the microfacies, sedimentological and biostratigraphical analyses of the deepest settings of the Getic Carbonate Platform that crop out on the western slope of the Bucegi Mountains and (2) tracing carbonate platform-basin transitions using grain composition logs to document the complex paleotopography of the eastern part of the Getic Carbonate Platform (in the Bucegi Mountains) during the Kimmeridgian – Valanginian time-interval.

Methodology

Eight stratigraphic sections were studied and more than 400 samples were collected from the Bucegi Mountains and Rucăr-Bran area. From north to south, the studied sections are located in the following zones: La Poliție section, Gaura Valley, Bătrâna Mountain, Strunga-Grohotișu, Strunga-Strungulița, Tătaru Mountain, Cheile Grădiștei-Moeciu sections and Lespezi Quarry section. Detailed lithostratigraphic logs were produced for each studied section; sampling was performed at meter to centimetre resolution; the microfacies and diagenetic features were investigated under petrographic microscope and stereomicroscope.

Results

A condensed pelagic carbonate succession is documented in the northern part of the Bucegi Mountains (La Poliție section), developed on the top of a pelagic swell during the Kimmeridgian-early Valanginian interval. The carbonate sedimentation in this area started with condensed *Rosso Ammonitico*- type of facies (upper Oxfordian-upper Kimmeridgian) and continues with pelagic carbonate sedimentation till the early Valanginian. The Kimmeridgian – Tithonian carbonates from central and southern part of the Bucegi Mountains are represented by hemipelagic and pelagic carbonates interbedded with mass-flow carbonates deposited on the upper slope settings.

The biostratigraphy of the studied sections is complicated considering the low resolution of Kimmeridgian-Tithonian micropaleontological assemblages. However, based on the results of the present paper correlated with the results of previous published papers few remarks could be presented here: (a) from the western part of Bucegi Mountains, Patrulius (1969) identified ammonoid assemblages certifying the Kimmeridgian stage and ammonoid and brachiopod assemblages characteristic for the lower-middle Tithonian interval; (b) the micropaleontological association of the lower-middle Tithonian is poorly relevant. The identified microfossils are agglutinated benthic foraminifera, rare trocholinid-neotrocholinid, spirillinid, and patellinid foraminifera (*Coscinoconus* sp., *Ichnusella* sp., *Spirillina* sp.,*Patellina* sp.), associated with *Crescentiella morronensis* (CRESCENTI), *Terebella lapilloides* MÜNSTER, and *Saccocoma* fragments. The investigated succession contains numerous fragments of *Saccocoma*, the highest abundance of *Saccocoma* ossicles occuring in the lower part of the upper Tithonian; (c) the calpionellids represents the most important biostratigraphic tool for dating the carbonate deposits from the western part of the Bucegi Mountains. They are abundant in the upper part of two sections: Lespezi Quarry and La Poliţie section. Within the Lespezi Quarry we identified three calpionellid zones: Crassicollaria, Calpionella (with Alpina subzone), and Calpionellopsis (with Simplex and Oblonga subzones). Within the La Poliţie section two calpionellid zones were identified, the Calpionella zone (with Alpina and Elliptica subzones) and the Calpionellopsis zone (with Simplex and Oblonga subzones).

Conclusions

The northern part of the Bucegi Moutains (La Poliție section) the Kimmeridgian - lower Valanginian limestones were deposited on the top of a pelagic plateau or a pelagic swell surrounded by allodapic carbonates.

The Kimmeridgian – Tithonian carbonates from central and southern part of the Bucegi Mountains are represented by hemipelagic and pelagic carbonates interbedded with mass-flow deposites on the upper slope settings.

In the southern part of the Bucegi Mountains (Lespezi Quarry), the upper Tithonian-upper Berriassian succession is represented by allodapic carbonates deposited in a deep pelagic environment.

Tectonic activity and eustatic sea-level fluctuations were most probably the main factors that led to fault-block tilting and even local emersion during the latest Berriasian and subsequent drowning of the eastern part of the Getic Carbonate Platform during the latest Valanginan-Hauterivian.

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POSTER

Biostratigraphy and paleoecology of the Sarmatian deposits (Middle Miocene) from Ciofoaia section

Loghin, S.[1], Dumitriu, S.D.[2], Seserman, A.[1] & Brânzilă, M.[1]

[1] *Alexandru Ioan Cuza" University of Iași, Faculty of Geography and Geology, Department of Geology, Carol 1 Bd. 700505, Iași, Romania, e-mail: loghin_sergiu@yahoo.com, anca.seserman@uaic.ro, mib@uaic.ro*
[2] *CGG Robertson, Llandudno, North Wales LL30 1SA, United Kingdom siminadumitriu@gmail.com*

Keywords: Middle Miocene, microfossils, sedimentology, depositional environment, paleoenvironment

Introduction

An integrated study (micropaleontological and sedimentological) was carried out on a 26 m outcrop from the Sarmatian deposits of Moldavian Platform. The studied section is situated between Arghira I and Arghira II levels of Arghira member, Șomuz Formation (Ionesi, 1968, Ionesi, 2006). The age of the deposits was established by Ionesi (1968, 1991) and Ionesi (2006) based on macro- and microfossil content. The latter authors defined the *Elphidium rugosum* and *Pseudotriloculina consobrina* foraminiferal abundance zone, indicating the early Sarmatian (Volhynian).

Methodology

Integrating micropaleontological and the sedimentary facies analysis we have reconfirmed the age of the deposits, reconstruct the paleoecological parameters, and established the depositional environment. For the micropaleontological analysis, 27 samples were collected from both muddy and sandy deposits, an abundant foraminiferal fauna being identified. The most abundant taxa belong to *Elphidium*, *Ammonia*, *Porosononion*, *Quinqueloculina* genera followed by *Bulimina* and *Globigerina.* The ostracod content is scarcer, the most representative genera being *Cyprideis*, *Aurila, Loxoconcha* and *Henryhowella*. The sedimentary facies analysis implied the logging of a 26 m outcrop trought „bed by bed" observations on lithology, grain size, bed thickness, lateral continuity, internal sedimentary structures and fossil content. All these features helped the identification of the sedimentary facies in terms of their processes, in order to distinguish the facies association characterizing the depositional (sub)environment (Nemec, 1995 in Miclăuș, 2006).

Results

From all 27 collected samples we identified 18 species of foraminifera and 10 of ostracods. Among the foraminifera *Elphidium rugosum* (d'Orbigny)*, Elphidium antonium* (d'Orbigny)*, Varidentella reussi* (Bogdanowicz)*, Porosononion subgranosum* (Egger)*, Ammonia beccarii* (Linné)*,* confirm the early Sarmatian (Volhynian) age of the studied deposits. Regarding the ostracod species, *Aurila notata* (Reuss), *Loxoconcha minima* Müller, *Cyprideis pannonica* (Mehés), *C. sublitoralis* Pokorny and *Hehryhowella asperrima* (Reuss) are the most representative taxa. Among these, *Aurila notata* is an index taxa for NO 12 – *Neocyprideis kollmani – Aurila notata* Ostracod Zone established by Jiřiček and Rija (1991) for the lower Sarmatian from Vienna Basin.

In general, the foraminiferal assemblage identified in the studied section (e.g., *Ammonia, Elphidium, Porosononion, Varidentella,* are usually associated with shallow environments (inner to outer neritic) of brackish to normal marine salinity conditions (Filipescu et al., 2014; Silye, 2015) and decreasing salinity (for low species-richness assemblages) (Culver et al., 2012). However, the presence of the assemblage composed of *Bulimina* and *Globigerina,* indicates deeper sea depths with rather normal-salinity and low oxygen-content at the sea-floor (Murray, 1991; Drinia et al., 2016; Pezelj et al., 2016). The cytheracean ostracods identified in the analysed samples are indicating a well oxygenated sea bottom (Whatley, 1995) and a shallow basin depth ranging at few dozens meters. Additionally, *Loxoconcha minima* was found by Müller (1894) in the neritic area from Naples Gulf waters. In the logged section from Ciofoaia brook 13 sedimentary facies have been described. The aforementioned sedimentary facies were genetically grouped in four facies associacions representing (sub)envirомnents of a coastal siliciclastic depositional system.

The first two meters *Facies association I* – mainly muddy, with wavy heterolithics (***Swrcl***) deposits with sandy lens are characterising a lower shoreface depositional system. This is followed by *Facies association II* – mainly sandy with ripple cross lamination (***Srcl***) and sporadic storm beds *hummocky* and *swalley cross stratification* (***Shcs-scs***) which was attributed to the middle shoreface. The next five meters of stratigraphic succession are represented by massive sands with trough cross stratification (***Stcs***) and describe *Facies association III* – characteristic for an upper shoreface environment, covered by *Facies association IV* defined by six meters of muddy and silty deposits with two coal strata, each varying from 7 to 12 cm which corresponds to a backshore depositional environment. For the next five meters no sedimentary structures are visible so the contact to overlaying 10 m of FA 2 deposits is not exposed.

Conclusions

The micropaleontological assemblages described on Ciofoaia outcrop shows a variation in water salinity, from brackish to slightly elevate, and shallow environments (inner to outer neritic), with some slightly deeper episodes suggested by *Bulimina* and *Globigerina* species. Moreover, the ostracod assemblage indicates a well oxygenated sea bottom and a shallow basin depth. Regarding the age of the deposits, it is attributed to *Elphidium rugosum* and *Pseudotriloculina consobrina* foraminiferal zones and to NO 12 – *Neocyprideis kollmani – Aurila notata* Ostracod Zone, both describing the lower Sarmatian.

The shallowing upper trend displayed in the sedimentary colomn suggests that the sediment source was closer and closer to this sectiondeposits "pushed" the shoreline basiward in a progradational stacking pattern. Looking on the sea-level fluctuations (Popov et al, 2010), at Badenian (Konkian) - lower Sarmatian (Volhynian), we observed a small regressive episode in Eastern Paratethys, followed by a transgression marked by a +40 hold up during middle-late Volhynian, and a rise up to +80 in middle Bessarabian.

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ORAL

Facies associations and microfossils from the Middle-Upper Triassic limestones of Perşani Mountains (Eastern Carpathians, Romania)

Mircescu, C.V.[1, 2], Bucur, I.I.[1 ,2], Ghionea, Ş [1] & Popa, G.L.[1]

[1] *Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu, 400 084 Cluj Napoca, Romania, e-mails: cristianvictormircescu@hotmail.com; stefania.ghionea@yahoo.com; george.popa.leonard@gmail.com*
[2] *Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu, 400 084 Cluj Napoca, Romania, e-mail: ioan.bucur@ubbcluj.ro*

Keywords: Reefs, Wetterstein facies, Anisian-Ladinian-Carnian, olistoliths, corals, sponges, fore-reef

The southern and northern part of the Olt Gorges contain extensive Triassic limestone outcrops, near the Racoş locality in the central part of the Perşani Mountains. Such outcrops are located in the Old Racoş Quarry, Olt Gorges, Tipia Racoşului Hill and Tipia Ormenişului Hill.
Two hundred twenty samples were collected from carbonate olistoliths. An equal number of thin sections were prepared in order to identify their microfacies and micropaleontological associations. Carbonate rock classification follows Dunham (1962) and Embry and Klovan (1971).
Eleven lithofacies types were grouped together in four major facies associations. The lithofacies consist of brecciated limestones with encrusting organisms and cyanobacteria, packstone-grainstone with sponges and encrusting organisms, boundstone with grainstone internal sediment, peloidal wackestone-packstone, peloidal packstone-grainstone, intraclastic grainstone-rudstone.
Encrusting organisms played an important role in building reefal edifices, together with corals and calcareous sponges. Such frameworks were providing coarser material which was delivered on a fore-reef slope along the shelf margins. Finer material was deposited in protected back-reef lagoons, behind the reefs. Balck pebble type intraclasts were reworked in this type of environment.
The micropaleontological association consists of foraminifera [*Earlandia* sp., *Endoteba* sp., *Endotebanella* sp., *Endotriadella wirzi* (Koehn-Zaninetti, 1969), *Endotriadella* sp., *Glomospirella* sp., *Meandrospira dinarica* Kochansky-Devide & Pantić, 1966, *Ophtalmidium* sp., *Paleolituonella* sp., *Reophax* sp., *Turriglomina mesotriasica* (Koehn-Zaninetti, 1969) and *Turriglomina* sp., duostominid foraminifera], microproblematic organisms [(*Bacinella ordinata* Pantić, 1972, *Bacanella floriformis* Pantić, 1971, *Ladinella porata* Ott, 1968, *Perturbatacrusta leini* Schlagintweit & Gawlick, 2011, *Plexoramea cerebriformis* Mello, 1977, *Radiomura cautica* Senowbari-Daryan & Schaffer, 1979, *Tubipytes* sp.)], calcareous sponges [*Celyphia zoldana* Ott, Pisa & Farabegoli, 1980, *Colospongia catenulata catenulata* Ott, 1967, *Solenolmia manon manon* (Münster, 1841)]. This micropaleontological association indicates an Anisian-Ladinian or Carnian age for the studied succession. The present study brings new data concerning the age of these carbonates. In addition, the presence of some microfossil species is mentioned for the first time in this area.

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POSTER

Microfacies and micropaleontological assemblages in Upper Jurassic limestones from Fundătura Ponorului (Haţeg-Pui Zone, Romania)

Oprişa, A.[1], Pleş, G.[1], Bucur, I.I.[1], Săsăran, E.[1] & Mircescu, C.V.[1]

[1] *„Babeş-Bolyai" University, Faculty of Biology and Geology, Department of Geology, Str. M. Kogălniceanu 1, 400084, Cluj-Napoca, Romania, e-mail: oprisaalin@gmail.com, george.ples@ubbcluj.ro, ioan.bucur@ubbcluj.ro, emanoil.sasaran@ubbcluj.ro, cristianvictormircescu@hotmail.com;*

Keywords: Kimmeridgian-Tithonian, carbonates, microfacies

This study focuses on the microfacies and microfossil assemblages from Fundătura Ponorului outcrop. The sampled zone is located on the western-central part of Gradiştea Muncelului-Cioclovina Natural Park, along Ponor River (westernmost flanks of Şureanu Mountains, Southern Carpathians, Romania). Here, the existing carbonates were previously assigned by Pomîrjanschi (1975) to the Barremian-lower Aptian interval (massive limestones) and to the Kimmeridgian-Tithonian (pink stratified limestones).

These limestones belong to the Cioclovina-Băniţa sector of the Getic Carbonate Platform (Patrulius, 1976; Pleş et al., 2019) and together with other similar deposits from surrounding areas, represent a fragment of the sedimentary cover of the Getic Nape. The sedimentary sequence from this zone starts with Lower Jurassic sandstones followed by Middle Jurassic siliciclastic rocks and deep-water carbonates. The Upper Jurassic and Lower Cretaceous deposits are characterized mostly by shallow-water limestones being transgressively covered by Cenomanian breccia/conglomerates with Upper Jurassic–Lower Cretaceous reworked elements (Pleş et al., 2019).

The Fundătura Ponorului outcrop is approximately forty meters thick and is divided by Fundătura Fault. The limestones above the fault plane have a thickness of twenty-five meters and are characterized mainly by stratified pink limestone beds with thicknesses varying from centimeter to decimeter. In the lower part of the profile, above the fault plane, lenticular and rounded cherts were found. These pink stratified limestones were also identified in Cioclovina sector (Stillă, 1985; Pleş et. al. 2019). The main microfacies types are represented by: peloidal packstone/grainstone with ferrous oxyhydroxides rims between clasts and microproblematic organisms, peloidal grainstone with sub-angular clasts and peloidal rudstone with cracks filled with ferrous oxyhydroxides. Few microfossils are present within these limestones: microproblematic organisms [*Crescentiella morronensis* (Crescenti)], *Clypeina* sp. fragments, *Thaumatoporella parvovesiculifera* (Raineri), calcified sponges (*Neuropora* sp. fragments), *Reophax rhaxelloides* (Schlagintweit & Gawlick), *Lenticulina* sp., echinoid fragments, rare *Saccocoma* brachial fragments and abundant poriferan spicules, rare miliolid and textulariid foraminifera and terebellid worm tubes. Microfacies analysis and micropaleontological assemblages identified on this section of the profile suggests that these limestones were formed in a slightly deep environment of the carbonate platform slope (?median part). The petrographic similarities (pink stratified carbonates) with the deposits from the Cioclovina sector and also the micropaleontological content suggest that these carbonates represent most probably the upper part of the Kimmeridgian slope succession described form that zone (Pleş et al., 2019). During the uppermost Kimmeridgian-lower Tithonian a transition towards the reef-flank and reef-crest is encountered demonstrated by the presence of shallow water debris and by the development of massive shallow-water limestones above. The identified microfacies types are: coral boundstone and peloidal-bioclastic grainstone/rudstone (bioconstructed carbonates and reef debris). Thin section analysis revealed a micropaleontological assemblage composed mainly of coral fragments, calcified sponges, rare textulariid foraminifera, microproblematic organisms [*Crescentiella morronensis* (Crescenti), *Radiomura cautica* (Senowbari-Daryan and Schaefer)], small dasycladalean fragments and *Thaumatoporella parvovesiculifera* (Raineri). Microfacies analysis and micropaleontological assemblages identified within the massive shallow-water carbonates suggests that these limestones were formed in platform margin sedimentary settings (reef and fore-reef deposits).

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ORAL

Nummulite banks: a review

Papazzoni, C.A.[1]

[1] *University of Modena and Reggio Emilia, Department of Chemical and Geological Sciences, Via Campi 103, 41125 Modena, Italy, e-mail: papazzoni@unimore.it*

Keywords: Eocene; Larger Foraminifera; Paleoecology; Sedimentology

Introduction

After Papazzoni & Seddighi (2018) published a description of the main characters of nummulite banks, some questions arise regarding the possible interpretations of these still-enigmatic sedimentary bodies.
The following questions are briefly developed as a starting point for discussion. The "answers" are to be intended as further food for thought.

1. Did we need a definition for nummulite banks?

Apparently, some researchers do think that a definition is useless, either because they think the concept is sufficiently clear and self-evident or because, if after more than 50 years nobody thought to fix it, there is probably no need for doing so.
However, from a brief survey of the recent and less-recent literature it is evident that the term 'nummulite bank' has been used with quite different meanings. Papazzoni & Seddighi (2018) demonstrated that nummulite banks can be defined (quantitatively) by a combination of only two parameters: A/B ratio and dominance in the assemblage. This combination does not occur in all nummulite-rich deposits, therefore all the 'nummulite banks' named after the simple abundance of nummulites in a rock are really something very different.

2. Are nummulite banks a passive accumulation due to transportation?

This interpretation is apparently the most popular at present among sedimentologists. It dates back to Aigner (1982) and following papers of the same author. It has the advantage of bringing attention to the hydrodynamic properties of the foraminiferal tests, therefore to consider them also as sedimentary particles. It doesn't explain why there is dominance of one species only (up to 100%) with the two generations having different hydrodynamic behaviour. Indeed, the increasing amount of specific data regarding the main component of the banks, i.e., A and B forms of only one large species of nummulites, and the fine-grained matrix, are clearly inconsistent with a pure hydrodynamic interpretation.

3. Are nummulite banks autochthonous bodies produced by unusual biological activity?

This was the original interpretation given by Arni (1965) together with the first (qualitative) definition of nummulite bank. In this view they are linked in some unspecified way to particular ecological conditions and they are even able to build a sort of barrier comparable with coral reefs. The main point of weakness is of course that the tests are not building a frame, because they are not connected each other, if we exclude some rapid early cementation (Guido et al., 2011).
Moreover, the biological explanation still lacks any conclusive evidence about which process or condition could lead to this kind of accumulation.

4. Are the data still too few to build an explanatory model?

In recent years, a great deal of data has been accumulated on the topic of nummulite banks (e.g., Guido et al., 2011; Seddighi et al., 2015; Kövecsi et al., 2016; Briguglio et al., 2017; Papazzoni & Seddighi, 2018). Of course more data are welcomed, but probably we have now the chance to build a model taking into account all the observations made.
Moreover, even if we do not know any modern analogue of the nummulite banks, some more

investigation on modern accumulations of larger foraminifera could bring precious data for interpreting the past.

Conclusions

As mentioned above, the field observations and the laboratory researches performed since now are giving results that are apparently supporting two different models. I suspect that this has to do with the lack of a shared definition, leading to label as 'nummulite banks' quite different sedimentary bodies. Some of them could be simply the result of passive mechanic accumulations, whereas others – the ones following the definition of Papazzoni & Seddighi (2018) – could indicate particular conditions that are in some way confined to the large nummulitids of the Eocene. The recognition of an *Assilina* bank is important because it breaks the monopoly of the genus *Nummulites* in building banks and open the chance for other larger foraminifera to do the same. A good candidate for these alternative banks is the genus *Heterostegina*, which has been reported in extensive accumulations during the Miocene in the Mediterranean area; no studies have been made since now on these accumulations to check their possible affinities and differences with the nummulite banks.

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POSTER

Palaeoecological interpretations on the Racăş section (Transylvanian Basin, Romania), based on fossil foraminifera assemblages

Paşcalău, P.[1], Bindiu Haitonic, R.[1], Filipescu, S.[1] & Szekely, F.S.[1]

[1]Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania; e-mails: maria.patricia64@yahoo.com, raluca.bindiu@ubbcluj.ro, sorin.filipescu@ubbcluj.ro, szekelyflavius@gmail.com.

Keywords: foraminifera, palaeoenvironments, biostratigraphy, Miocene, Transylvanian Basin

The investigated formations are located in the north western Transylvanian Basin, near Racăş village (N 47º05’36.2”, E 23º16’58.6”). The lithostratigraphical informations initially framed the deposits in the Chechiș (shelf clays) and Hida (deep turbidities and fandelta) formations.
Planktonic and benthic foraminiferal assemblages were used for paleoecological and biostratigraphic analyses. The very well preserved foraminifera assemblages, their diversity and the presence of potential biostratigraphic markers were the main reasons to approach this study. The collected samples were processed by standard micropaleontological methods, followed by qualitative and quantitative interpretation of foraminifera assemblages using the PAST application (PAleontontological Statistics – Hammer & Harper, 2006).
The foraminifera assemblages are dominated by planktonic forms; in lower proportions calcareous and agglutinated benthic foraminifera were also identified.
The biostratigraphical interpretations considered the zonations proposed by Popescu (1975) and Cicha et al. (1998). The presence of *Globigerinoides trilobus* (in all the studied samples) suggests an early Miocene age. Besides, the presence of *Globigerinoides quadrilobatus, Globigerinoides bisphericus,* and *Globigerina bulloides* suggest that the age could extend up to the middle Miocene.
The statistical analysis highlighted the percentage contribution of the main foraminifera groups, the diversity indices (Fisher, Shannon), clusters, Planktonic/Benthic ratio and benthic foraminifera oxygen index (BFOI). The diversity values, the distribution of the infaunal/epifaunal forms and the BFOI vary along the succession, indicating frequent oscillations of environmental parameters, mainly in terms of nutrient supply and oxygenation. The Planktonic/Benthic ratio suggest a deepening of the environments to the top of the succession probably as a consequence of a transgressive trend.
The composition of the foraminifera associations together with the sedimentological primary data suggest that the sediments were deposited on outer shelf-upper bathyal zone.
The qualitative and quantitative composition of foraminifera assemblages provided criteria for facies correlation and allowed the reconstruction of the regional evolution of the north western part of the Transylvanian Basin.

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POSTER

Equidae (Mammalia, Perissodactyla) from the late Miocene of Pogana (Scythian Platform, Romania)

Păun, E.-I.[1],Ursachi, L.[2], Rățoi, B.G.[1], Brânzilă, M.[1], Haiduc, B.-S.[1], Guy, F.[3]., Daver, G.[3] & Badea, D.-D.[1]

[1]*University "Al. I. Cuza", Department of Geology, 20 B Carol I Avenue, 700505, Iași, Iași County; e-mails: elenaionelapaun@gmail.com, bog21rat@gmail.com, mib@uaic.ro, haiduc.bogdan91@gmail.com*
[2]*Vasile Pârvan" Museum of Bârlad, Natural Sciences Branch, 235 Republicii Street, 731070, Bârlad, Vaslui County, Romania; ursachi_laur@yahoo.com*
[3]*PALEVOPRIM, UMR 7262 CNRS INEE, Laboratoire Paléontologie, Evolution Paléoécosystèmes, Paléoprimatologie, Université de Poitiers, , Bat. B35, TSA 51106, 6 rue M. Brunet, 86073 Poitiers, Cedex 9, France; e-mail: guillaume.daver@univ-poitiers.fr*

Keywords: Equidae, Mammalia, *Hipparion,* Pogana, Scythian Platform, Romania, Late Miocene.

The last sedimentary megasequence on the Scythian Platform (Săndulescu 1984) is referred as Upper Badenian (Middle Miocene) - Pleistocene (Ionesi 1994). The deposits associated with this sedimentary episode outcrop on the south-western side of the Bârlad Plateau, on Tutovei Hills.
The Pogana outcrop, located south of Pogana locality, Vaslui County, is a small open sand pit located 15 km North-West of Bârlad in the near vicinity of the road 243, that connects Bârlad to Bacău. Here, the Maeotian (late Miocene) deposits characterized by gray clay and sand are continental and suggest a fluvial environment (Ursachi et. al., 2016).
Among the taxa identified at Pogana, Equidae represent a finding particularly important because of their potential biostratigraphical significance. Notably, this locality yielded several remains of *Hipparion*, mainly consisting in isolated teeth and postcranial remains. Morphological analyses of these Hipparionine postcranial materials, were carried out by using bivariate plots and log10 ratio diagrams. Using these methods, it can be recognized the presence of the species *Cremohipparion cf. moldavicum* from the late Miocene of Pogana. The Hipparionine fauna present at Pogana suggests that these deposits have a biostratigraphical age corelated to Late Turolian.

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ORAL

Calcified sponge assemblage in Upper Jurassic carbonates of the eastern Getic Carbonate Platform (Southern Carpathians, Romania). Palaeoecology, microfacies analysis and reef zonation

Pleş, G.[1], Schlagintweit, F.[2], Lazăr, I.[3], Bucur, I.I.[1], Săsăran, E.[1] & Grădinaru, M.[2]

[1] *Department of Geology and Center for Integrated Geological Studies, Babeş-Bolyai University, 1 Mihail Kogălniceanu, 400084 Cluj-Napoca, Romania; e-mails: george.ples@ubbcluj.ro; ioan.bucur@ubbcluj.ro; emanoil.sasaran@ubbcluj.ro;*
[2] *Lerchenauerstr. 167, 80935 Munich, Germany; e-mail: felix.schlagintweit@gmx.de;*
[3] *Department of Geology, University of Bucharest, 1 Nicolae Bălcescu, 010041 Bucharest, Romania, e-mail: iuliana.lazar@g.unibuc.ro; mihaela.gradinaru@unibuc.ro*

Keywords: Sponges, microencrusters, intra-Tethyan realm, reef zonation, palaeoenvironments, palaeoecology, Kimmeridgian–Tithonian

The discovery of a rich calcified sponge association within the easternmost part of the Getic Carbonate Platform allowed new insights into the growth patterns and internal architecture of the main sponge species in order to understand the biostratinomical, taphonomical and palaeoecological features which controlled the evolution of mixed sponge-coral-microencruster build-ups.
Thin section analysis permitted a three-dimensional panorama over the skeletal inner-structure of all poriferan species and, consequently the discovery of new diagnostic traits in some species (*Sarsteinia babai*, *Sphaeractinia steinmanni*). Moreover, several species are described here from the first in the Upper Jurassic carbonates of Southern Carpathians (*Calciagglutispongia yabei*, *Sarsteinia babai*, *Sphaeractinia steinmanni*) including an interesting large new *Neuropora* species. The observed growth patterns of the statistically most abundant calcified sponges show both low-domical encrusting features and spherical or cylindrical shapes. Considering the unstable hard substrate of the fore-reef environment, species like *Sarsteinia*, *Calcistella*, *Perturbatacrusta, Calciagglutispongia* (or several *Neuropora* specimens) should develop mostly crustose morphologies. The cylindrical to spherical morphotypes (*Neuropora* and *Sphaeractinia*) are regarded as a result of the sedimentary input fluctuations in this agitated environment or as structural adaptations triggered by the competition for nutrients. The dominance of calcified sponges *versus* corals here can be explained by the poriferan adaptations for much warmer waters and agitated environments with lower nutrient input.
The existing paleoecological and paleoenvironmental settings generated preferential adaptations of the sponge species to a specific Tethyan domain and also different distribution patterns towards the reef profile. Corroborating the present material with the existing data on similar carbonates, three poriferan zones are proposed: *Cladocoropsis*-*Milleporidium* zone (back-reef area); *Bauneia*-*Chaetetopsis*-*Parastromatopora* zone (central reef area) and *Sphaeractinia*/*Ellipsactinia*-*Neuropora* zone for the fore-reef area. Despite the fact that this model cannot integrate each peculiarity of such Upper Jurassic reef carbonates, it presents the key features in recognizing facies zones based on biotic distribution and the intra-Tethyan character of the analyzed carbonates.
Even if the palaeogeographic picture of the intra-Neotethyan realm during the Late Jurassic was characterized mainly by an extensional tectonic regime, this territory provided optimal conditions for the development of relatively small sponge-coral-microencruster build-ups on the marginal zones of the existing isolated carbonate platforms. The overall analysis of the calcified sponge assemblage provided valuable information in understanding why these peculiar reefs strongly influenced the carbonate production throughout this realm. In the absence of a true reef framework (*e .g.* northern Tethyan reefs) the calcified sponges developed typical morphologies, new palaeoenvironmental adaptations and associations with other biotic groups. These features also triggered competitive behavior among these organisms which has generated abundance events and, consequently, a substantial improvement of the bioconstructing potential.

POSTER

Strâmtura Valley section of the Codru Nappe System revisited. An example of the mid-Carnian drowning of the Wetterstein Carbonate Platform (Apuseni Mts., Romania)

Pleş, G.[1] & Gawlick, H.-J. [2]

[1] *Department of Geology and Center for Integrated Geological Studies, Babeş-Bolyai University, 1 Mihail Kogălniceanu, 400084 Cluj-Napoca, Romania, e-mail: george.ples@ubbcluj.ro*
[2] *Montanuniversität Leoben, Chair of Petroleum Geology, Peter Tunner Strasse 5, 8700 Leoben, Austria, e-mail: Hans-Juergen.Gawlick@unileoben.ac.at*

Keywords: Triassic, microfacies, open-marine limestones, conodonts, reef carbonates

Near Sohodol, in the Strâmtura Valley (Vălani Unit), Patrulius et al. (1976) described an open-marine Ladinian to lower Carnian sedimentary succession above Anisian dolomites, defined as Roșia Formation. The Ladinian to earliest Carnian open-marine limestones were dated by conodonts (Kozur & Mirăuță, 1980: Fassanian; Patrulius et al., 1976: Longobardian – earliest Carnian). This open-marine sequence is overlain by massive, partly recrystallized shallow-water limestones, interpreted by Patrulius et al. (1976) as Carnian in age. After an early/middle Norian gap, late Norian siliciclastics and carbonates should be deposited. However, beside some few biostratigraphic data on the Triassic succession of the Codru Nape System in the Strâmtura Valley (respectively in the Sohodol area) microfacies analyses of the carbonate rocks were not carried out until recent times. Nevertheless, only age dating in combination with litho- and microfacies studies allow a precise reconstruction of the sedimentary evolution, the depositional realm and the palaeogeographic provenance of a sedimentary succession. Especially the Carnian sedimentary evolution, i.e. onset and drowning of the latest Ladinian to earliest Carnian (Cordevolian as lowermost part of the Julian) Wetterstein Carbonate Platform, age and facies of its overlying sedimentary rocks which is crucial for Middle-Late Triassic palaeogeographic reconstructions in the Western Tethyan realm.
According to our new results from an old quarry in the Strâmtura Valley we draw following sedimentary evolution: Above an open-marine late Anisian to Ladinian succession a coarsening and shallowing trend in the succession shows the prograding Wetterstein Platform of earliest Carnian age. The evolution of the Wetterstein Platform lasted until the early Mid-Carnian as elsewhere in the Western Tethyan realm. In the studied Strâmtura Valley section on top of coarse-grained light-grey slope limestones dark-grey fine-grained turbiditic crinoidal limestones with shallow-water debris and rudstones with reef builders (calcareous sponges) and encrusting organisms (*Tubiphytes* sp.) were deposited which contain conodonts of the higher Julian 1 (*Paragondolella polygnathiformis*, *Quadralella* cf. *auriformis*). Upsection the content of fine-grained siliciclastic increased and in cases up to 5 cm thick greenish marly claystones with bentonite content were deposited. The roughly 25 m thick open-marine influenced mid-Carnian siliciclastic-influenced succession shows in its upper part again a shallowing trend. Thick beds with resedimented shallow-water debris appear as turbiditic layers from a newly prograding shallow-water carbonate system. The age of the higher part of the succession in the quarry is rather identical as the lower part of the succession, as proven by the occurrence of *Paragondolella* cf. *polygnathiformis* from the highest part of the open-marine influenced succession.
This sedimentary sequence is topped by strongly recrystallized light-grey thick bedded to massive fore-reefal to reefal limestones (Strâmtura Limestone=Wetterstein Carbonate Platform). This more than 10 metres thick succession rests with an unconformity respectively an erosional contact on top of the dark-grey open-marine limestones with resediments. The age of this reefal limestone is considered by Patrulius et al. (1976) as lower Carnian in age. Several microfossils (e. g. *Ladinella porata*) identified within these shallow-water limestones confirm this statement. In moderately preserved parts recrystallized reef builders (most probably sponges) with encrusting organisms (*Tubiphytes* sp.) and microbial structures are noticed forming cement crusts. We interpret this shal-

low-water limestone levels as huge resedimented block from the adjacent emerged Wetterstein Carbonate Platform. Such blocks occur widespread in similar mid-Carnian open-marine successions. This succession resembles in age, sedimentological characteristics, litho- and microfacies the evolution of the Leckkogel Formation in the southern Northern Calcareous Alps (Flügel et al., 1978; Lein, 2010).

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POSTER

Scapula and coxal of *Mammuthus meridionalis* (Nesti, 1825) from Leu, SW of Romania

Popescu, A.

Museum of Oltenia Craiova, Department of natural Sciences, 8 Popa Sapca str. 200244 Craiova, Romania, e-mail: aurelian_popescu@yahoo.fr

Keywords: *Mammuthus meridionalis*, postcranial skeleton, Pleistocene, Romania

Introduction

The paleontological deposit Leu is located 25 km SE from Craiova, on the right slope of the Frasin Valley, in a sand and gravel quarry. The fauna discovered at Leu contains: *Mammuthus meridionalis* (Nesti), *Stephanorhinus* group *etruscus/hundsheimensis*, *Equus stenonis* Cocchi, *Leptobos etruscus* Falconer, *Leptobos* sp., *Eucladoceros* sp., *Castor plicidens* Major, *Ursus etruscus* Cuvier and a few coproliths belonging to a canid. There is a remarkably large number of bones of *M. meridionalis* belonging to the poscranial skeleton. Among these, the scapula and the coxal bone, rarely found in the fossil deposits. The mammalian association from Leu was attributed to Pleistocene, namely to the zone MN 18.

Methodology

The fossil materials come from the fossils found at Leu, respectively scapula sin, inv. no. 44649, and coxal bone sin, inv.no. 45427. After they were extracted from the layer, cleaned and marked, they were then reconstituted and recorded in the documents of the Oltenia Museum. For specific identification, we proceeded to systematic measurements of their characteristic dimensions and to their comparison with those existing in the specialty literature.

Results

At the scapula discovered at Leu (reconstituted from several fragments) the glenoid cavity, the spine and the adjacent sides are well preserved. Examining the measurements of the *M. meridionalis* scapula from Leu and Nogaisk (Table 1) reveals that the Nogaisk specimen piece is larger in both length and width.

Table 1. Measurements of the *Mammuthus meridionalis* scapula from Leu and Nogaisk.

Measurement (mm)	Scapula sin *M. m.* from Leu, inv. no. 44649	Scapula *M. m.* from Nogaisk
Maximum height	108,7	115,5
Length of the spine tuber	33,1	-
Length of the dorsal part	-	70,5
Height of the spine	89,5	-
Length of the glenoidal cavity	24,0	27,0
Maximum length of the glenoidal joint	31,0	38,0
Width of the glenoid cavity	14,4	16,9
Length of the col	27,4	33,0

The coxal from Nogaisk has been preserved only as insignificant fragments, so the only measure that can be compared is the length of the acetabular cavity, which is larger at the specimen from Nogaisk. The measurements of the *Mammuthus meridionalis* coxal bone are in the Table 2.

Table 2. Measurements of the *Mammuthus meridionalis* coxal bone from Leu and Nogaisk.

Measurment (mm)	Coxal sin *M. m.* from Leu, inv. no. 45427	Coxal *M. m.* from Nogaisk
Minimum width of the ilium	261	-
Minimum circumference of the ilium	610	-
Length of the acetabular cavity	205,5	255
Minimum height of the ischium	76	-

Minimum circumference of the ischium	-	-
Length of the obturatum foramen	-	-
Minimum circumference of the pubis	315	-

Conclusions

In Romania, postcranial skeleton parts of *M. m.* are relatively rarely found in paleontological excavations and very rarely studied. Particularly scapula and coxal, which are bones that, due to shape and size are quite hard to keep in the paleontological deposit. The results of this research are therefore a necessary contribution to the better knowledge of the postcranial skeleton of the *M. m.* species.

ORAL

Paleogene Foraminifera from Micești (Cluj district, Romania)

Popescu, G.[1] & Crihan, I.M. [2]

[1] *Str. Arhitect Antonescu Petre, Bucharest, Romania, e-mail: gippopescu@yahoo.com*
[2] *Universitatea Petrol-Gaze din Ploiesti, Bd. Bucuresti nr. 39, Ploiesti, e-mail : crihanim@upg-ploiesti.ro*

Keywords: Iara Basin, benthic foraminifera, Upper Eocene

The studied microfaunas come from samples that were collected by one of us (G. Popescu) while doing field mapping in the Iara Basin, south of Cluj-Napoca. They were collected from small outcrops in whitish and reddish silty-sandy clays occuring in the riverbed of Micești Brook, a left tributary of the Hășdate River, south of Micești village. These clays did not show any obvious bedding and were somewhat unusual for an area supposed to be covered with Neogene deposits, of Badenian and Sarmatian age.
After preparing the samples they yielded very rich benthic shallow water microfaunas, made mostly of foraminifera, but some ostracods, bryozoans and small brachiopods were also present. In most of the samples the microfaunas are rather well preserved, with various degrees of diagenetic calcifications and erosions.
The foraminifera assemblages are dominated by rotaliids of the genera *Pararotalia* and *Neorotalia* (sensu Hottinger et al. 1991) and *Cibicidoides* (sensu Schweizer et al. 2009). Some agglutinated foraminifera are also present, mostly of the genera *Valvulina* and the species *Arenagula kerfornei* (Alix, 1922), together with rather rare miliolids. There are also present some small undetermined nummulits.
The exact age of these microfaunas is difficult to determine since no marker species is actually present. Most of the species determined have a range that might begin in the Middle Eocene and continue through the Late Eocene to the Oligocene, or even Early Miocene. But considering the earlier mentions of some of them from the Eocene deposits of Cluj-Napoca area (Popescu et al. 1978) and the lithology of the sampled reddish deposits, we believe that they could be assigned to the ”reddish tongues” of the Grey Marl Member of the upper part of the Mortanușa Marls in the Iara Basin (Popescu 1984), which is of Lower Upper Eocene age.

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ORAL

Analyses of bioerosion on Middle Miocene bivalve shells and corals from Tăşad, Bihor, Romania

Posmoşanu, E.

Ţării Crişurilor Museum, Department of Natural Science, 1A Str.. Armatei Române, 410087 Oradea, Romania, e-mail: eposmosanu@gmail.com

Keywords: <*Gastrochaenolithes*, *Entobia*, *Maeandropolydora*, *Caulostrepsis*>

Introduction

Oyster and large pectinid shells are excellent substrates for bioeroders, due to their thickness and structure.

The analysed oysters, pectinids and corals were collected from Middle Miocene shallow water deposits from Tăşad, which is located 22 km away from Oradea. There is a high frequency of bioerosion traces developed on the collected bivalve shells and coralligenous limestones, consisting of borings and galleries made by sponges, bivalves and polychaete worms.

The highest frequency of bioerosion trace fossils and encrustation structures, as well as the highest number of ichnotaxa occurring on a single shell of *Gigantopecten nodosiformis* from Tăşad was recently described by Posmoşanu et al., (2018). The articulated shell of *G. nodosiformis* preserved four ichnospecies: *Entobia cateniformis, Gastrochaenolites lapidicus*, *Maeandropolydora sulcans* and *Caulostrepsis* isp. (Posmoşanu et al., 2018).

Methodology

A total number of 65 specimens were analysed, consisting of 15 oyster shells, 13 pectinid shells and 37 coral branches. These were collected from two Middle Miocene deposits from Tăşad, respectively the Morii Valley and Cuţilor Valley, two almost parallel valleys, nearby the locality Tăşad. The lithological features of the outcrops of these two valleys are the same, bio-lithoclastic and coralligenous limestones, comprising the same shallow marine fauna of Badenian age. The fauna is very rich in invertebrates consisting of bivalves, corals, gastropods and echinids.

The specimens are hosted in two locations: in the collection of the Natural Sciences Department of Ţării Crişurilor Museum Oradea and in the collection of the Association for Conservation and Promotion of the Local Natural and Cultural Heritage “Tasadia”- Tăşad.

Results

The analyse of bioerosion traces on the studied specimens revealed the presence of at least 7 ichnospecies, belonging to four genera. The occurrence of ichnotaxa is summarized in Table 1., identification being made using the work of Kelly and Bromley (1984), Bromley and D’Alessandro (1989), El-Hedeny (2007), El-Hedeny and El-Sabagh (2018) and Radwański et al (2011).

The borings of sponges are present only on the external surface of the oyster and pectinid shells, indicating that the shell might have been colonized during the life of the bivalve.

The analysed coral branches of *Tarbellastrea reussiana* revealed bioerosion traces as well, the most common taxa are *Gastrochaenolithes torpedo* and *G. lapidicus*, but clionid sponges are present as well, especially in the form of Entobia “balls”, very similar to those described by Radwański et al. (2011) for the Badenian biohermal complex of Medobory, Ukraine.

In oder of frequency, the most abundant ichnogenera is *Entobia*, which occurs on oysters, pectinids and corals as well, followed by *Gastrochenolithes, Maeandropolydora* and *Caulostrepsis*, which is the less abundant among the analysed traces. *Gastrochaenolithes lapidicus* is more abundant on the bivalve shells, whereas *G. torpedo* has a higher occurrence on the coral collonies.

Encrustation structures are also present on the analysed pectinids and oysters, the shell surfaces being encrusted by Polychaete annelids, bivalves, corals or bryozoans.

Ichnotaxa	Substrate	Possible producer	Location
Entobia cateniformis	*Gigantopecten nodosiformis*	*Cliona vermifera* *Cliona vastifica* *Cliona schmidti*	Cuților Valley
Entobia cf. ovula	*Gigantopecten sp.*	*Cliona vermifera* *Cliona vastifica* *Cliona schmidti*	Morii Valley
Entobia geometrica	*Crassostrea gryphoides*	Clionid sponges	Cuților Valley Morii Valley
Entobia isp.	*Tarbellastrea reussiana*	Clionid sponge	
Gastrochaenolithes lapidicus	*Gigantopecten nodosiformis* *Crassostrea gryphoides* *Tarbellastrea reussiana*	*Lithophaga* sp., *Hiatella* sp.	Cuților Valley Morii Valley
Gastrochaenolithes torpedo	*Tarbellastrea reussiana*	*Lithophaga lithophaga*	Morii Valley Cuților Valley
Maeandropolydora sulcans	*Gigantopecten nodosiformis* *Crassostrea gryphoides*	Polychaete annelids	Cuților Valley Morii Valley
Caulostrepsis isp.	*Gigantopecten nodosiformis*	Polychaete annelids	Cuților Valley

Table 1. Ichnotaxa occurring on Middle Miocene bivalves and corals from Tășad

Conclusions

The Middle Miocene bioerosion trace fossil assemblage from Tășad can be regarded as the *Entobia* ichnofacies, which indicates a near-shore, shallow marine environment with low sedimentation rate. The relationship between the bioerosion trace fossils and the substrate, as well as their spatial distribution on the bivalve shells, allow the reconstruction of the succession of the ichnocoenoses. The presence of the bioerosion traces on the exterior surface of the shells indicate that the sponge-dominated community colonized the shell first, followed by polychaete annelids and the bivalve dominated community, which were the last bioeroders which left their borings on the bivalve shells and corals.

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POSTER

Rhinocerotidae and Chalicotheriidae (Perissodactyla, Tapiromorpha) from the Late Miocene of Pogana (Scythian Platform, Romania)

Rățoi, B.G.[1] , Ursachi, L.[2], Brânzilă, M. [1],
Haiduc, B.S. [1], Păun, E.I. [1], Badea, D. [1],Guy, F.[3] & Daver, G. [3]

[1] *Carol I Avenue, No. 20A, Iaşi – 700506, Alexandru Ioan Cuza University of Iaşi, Faculty of Geography and Geology, Department of Geology,bog21rat@gmail.com*
[2] *Muzeul "Vasile Pârvan" din Bârlad, Secția Științe Naturale; ursachi_laur@yahoo.com*
[3] *Laboratoire Paleontologie Evolution Paleoecosystemes Paleoprimatologie (PALEVOPRIM), UMR-CNRS 7262, Universite de Poitiers, Bat. B35, TSA 51106, 6 rue M. Brunet, 86073 Poitiers, Cedex 9, France, guillaume.daver@univ-poitiers.fr*

Keywords: Rhinocerotidae, Chalicotheriidae, Tapiromorpha, Pogana, Ancylotherium

The geological deposits of the Pogana open pit correspond to the last sedimentary megasequence in Scythian Platform (Săndulescu, 1984). Those deposits refer to the Middle Miocene-Pleistocene time span (Ionesi, 1994). The Maeotian mammal fauna from the Scythian Platform consists of the following emblematic taxa: *Deinotherium gigantissimum* Ştefănescu, 1891 (= D. *proavum* Eichwald, 1835) (Ştefănescu, 1891), *Hipparion moldavicum* Grom., *Aceratherium incisivum* Kaup., *Tragoceras leskewitschi* Boris. (Sevastos, 1922), *Gazella brevicornis* Roth. et Wagner (Simionescu, 1904), *Chilotherium* sp. (Codrea et al., 2011), and *Dihoplus* sp. (Sava & Codrea, 2011). In terms of sedimentology, the facies associations described in this area shows a fluvial depositional system.
Here we describe dental, and postcranial remains referable to Rhinocerotidae and Chalicotheriidae (Perissodactyla, Tapiromorpha) originating from the vertebrate locality of Pogana (Scythian Platform). The three rhinocerotids recognized comprise the horned rhinocerotine *Dihoplus sp.*, and two small chilothere aceratheriines: *Chilotherium sp.* and *Acerorhinus* sp. A chalicotheriine schizotheriid, *Ancylotherium* sp., is documented by postcranial bones. Although the rhinocerotid assemblage of Pogana is in total agreement with a single biostratigraphical age, estimated to be correlated with the late Turolian.

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ORAL
(Plenary lecture)

Ocean acidification and the interglacial decline of coral reef stromatolites

Riding, R.

University of Tennessee, Department of Earth and Planetary Sciences, 1621 Cumberland Avenue, Knoxville TN 37996-1526, USA, e-mail: rriding@utk.edu

Keywords: carbonates, microbial, Quaternary, seawater chemistry

Since the Last Glacial Maximum, 21000 years ago, ocean acidification by atmospheric carbon dioxide has significantly reduced the formation of calcified bacterial stromatolites in tropical reefs. Unlike major reef builders such as coralline algae and corals that more closely control their calcification, bacterial calcification is very sensitive to ambient changes in carbonate chemistry. Bacterial crusts in reef cavities at Tahiti have declined in thickness over the past 14,000 years, with largest reduction occurring 12,000-10,000 years ago. This pattern is supported by global data (Riding *et al*., 2014), and appears to be due to the effect of deglacial ocean acidification on reef calcification. Similar decline has occurred at sites in the Great Barrier Reef, Australia (Braga *et al*., 2019). It is likely that, throughout the Quaternary, reef stromatolites of this type were thicker when seawater carbonate saturation was increased during glacial intervals, and thinner - or absent - during interglacials. Such changes in crust thickness could have substantially affected reef development over glacial cycles, because rigid crusts significantly strengthen framework and their reduction would have increased the susceptibility of reefs to biological and physical erosion. Glacial to interglacial changes in stromatolite thickness reveal previously unrecognized millennial-scale acidification effects on tropical reefs. This directs attention to the structural role of crusts in reef formation and the ability of bioinduced calcification to reflect relatively subtle changes in seawater chemistry.

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ORAL

Quantitative hydroclimate reconstruction between 12,7-6,2 ka BP from the Apuseni Mountains

Ruskal, A. [1], Diaconu, A. [1], Grindean, R. [1], Panait, A. [1] & Tanțău, I.[1]

[1]*Babeş-Bolyai University, Department of Geology, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania; agnes.ruskal@gmail.com, andreicosmind@yahoo.com, roxana.grindean@ubbonline.ubbcluj.ro, pnt_andrei@yahoo.com, ioan.tantau@ubbcluj.ro*

Keywords: testate amoebae, hydroclimate, pollen, loss on ignition, magnetic susceptibility

As climate changes and water availability are raising great concern nowadays, understanding how the ecosystems respond to certain hydrological conditions has become very important. Therefore, the aim of our study was to reconstruct the palaeohydroclimatic conditions in the Apuseni Mountains (NW Romania) between 12,7-6,2 ka BP.

We were able to reconstruct the fluctuations of the water table depth and the evolution of Ic-Ponor peat bog by applying a multi-proxy approach (lithology, radiocarbon dating, loss on ignition, magnetic susceptibility, testate amoebae, pollen) on a 340 cm long peat sequence.

The sequence starts with a clayey sandy layer from ca. 12,7 ka BP, which marks an initial lacustrine phase. Between 12,5 and 6,2 ka BP the peat has been accumulating with different rates.At around 6,2 ka BP a hiatus occurs, marked by a light brown clayey layer, when the peat bog was probably flooded by the Somesul Cald River. The peat started to accumulate again ca. 400 years ago.

By using a testate amoebae based transfer function, we were able to reconstruct the depth to water table (DTW). During the Younger Dryas, the DTW values are increasing (from 22 to 25 cm). The driest phase occurred between 11,5 and 9,2 ka BP,as the DTW values are above 25, but they start decreasing between 9,2 and 8,7 ka. The period between 8,7-6,2 ka BP was characterized by many hydroclimatic fluctuations.The lowest DTW values (10-11 cm), which suggest the wetter phases, were identified during this period. The loss on ignition, magnetic susceptibility and pollen results show good correlation with the hydroclimatic conditions.

Our quantitative reconstruction provides new and significant insights of the palaeoenvironment and palaeoclimate of the Apuseni Mountains and is in good agreement with other studies from NW Romania.

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POSTER

Biostratigraphy of the Late Cretaceous shallow-marine deposits from Misea Hill, Roşia basin, Apuseni Mountains, Romania

Săsăran, L.[1], Bălc, R.[2], Săsăran, E.[1] & Țuțuianu, M.[1]

[1]*Babeş-Bolyai University, Faculty of Biology and Geology, Department of Geology, Mihail Kogălniceanu Street 1, 400084, Cluj-Napoca, Romania; E-mails: liana.sasaran@ubbcluj.ro; emanoil.sasaran@ubbcluj.ro.*
[2]*Babeş-Bolyai University, Faculty of Environmental Science and Engineering, Fântânele Street 30, 400294 Cluj-Napoca, Romania. E-mail: ramona.balc@ubbcluj.ro.*

Keywords: biostratigraphy, rudist (bivalvia), nannofossils, shallow-marine deposits, Late Cretaceous, Romania

The sedimentation of the Late Cretaceous shallow-marine sediments from Roşia Basin, situated in the western part of the Apuseni Mountains, lasted from Coniacian - in the eastern, to Early Maastrichtian in the northern areas. Early Santonian–Early Maastrichtian interval is mainly documented based on macropaleontological data: rudists (Lupu, 1976; Patrulius, 1974), corals (Şuraru, 1961) and inocerams (Lupu, 1974). The present investigated stratigraphic succession concerns the Late Santonian-Early Campanian deposits from Misea Hill that are located on the northern border of Roşia Basin and overlie the Permo-Mesozoic and crystalline rocks of the Bihor Autochthounos unit. The stratigraphic succession is about 70 meters-thick and consists in mixed silicilastic-carbonate deposits started with a basal conglomerates level, covered by intercalations of sandstone, marls and four limestone levels. This succession is known for their richness and good preservation of macrofossils, which range from pure coral through mixed coral-rudist towards complete rudist assemblages on the top. The present study was mainly focused on paleontological issues concerning the composition of the rudistid and corals associations. Additionaly, the calcareous nannofossils assemblages has been investigated in order to obtain a detailed biostratigraphy of these deposits.

Misea Hill is the type locality for some new rudists species described by Lupu (1971, 1976) and Patrulius (1974): *Biradiolites alatus* Lupu, 1976, *Biradiolites biplicatus* Lupu, 1976, *Klinghardites musculosus* as type species for *Klinghardites* genus (Lupu, 1971) and *Miseia pajaudi,* type specie for Miseia genus Patrulius (1974). The rudist assemblages contains 27 species belonging to three rudist families: 16 taxa from the Radiolitidae Family, 10 taxa belonging to Hippuritidae Family and 1 specie Plagiopthychidae. 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 shallow-marine deposits.

The coral associations from Măgura Hill has been described previously by Șuraru (1961) and Todiriță-Mihăilescu (1968). Solitary, discoidal corals have been collected from the sandstone levels belonging to the Cunnolites genus (*Cunnolites elliptica*, *Cunnolites orbignyi*, *Cunnolites polymorpha*, *Cunnolites macrostoma*, *Cunnolites giganteus).* Additionaly, colonial or solitary corals with different growth form were identified from limestone levels: *Phyllocaenia marticensis, Rennensismilia (=Phyllosmilia) complanata* (solitary), *Lamellofungia* (*=Thamnastrea) carinata* (colonial, massive), *Synastrea agaricites* (colonial, massive), *Hydnophora styriaca* (colonial, cylindrical), *Columnastrea striata* (colonial, massive).

The calcareous nannofossils assemblages also 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. In clastic successions, corals are the most abundant macrofossils, whereas rudists predominate within carbonate sections. 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.

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POSTER

Cantabriconus? *meridionalis* n. sp., a new orbitoliniform benthic foraminifera from the Barremian of the Reşita–Moldova Nouă zone, Romania

Schlagintweit, F.[1], Bucur, I.I.[2]

[1] *Lerchenauerstr. 167, 80935 Munich, Germany, e-mail: felix.schlagintweit@gmx.de*
[2] *Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, 1, M. Kogălniceanu str., 400084 Cluj-Napoca, Romania*

Keywords: Lower Cretaceous, larger benthic foraminifera, systematics, Southern Carpathians

The Urgonian limestones from the Reşita – Moldova Nouă Zone, Southern Carpathians, developed on a large carbonate platform with different facies from marginal reef to platform interior containing abundant microbiota, mainly dasycladalean algae and benthic foraminifera (Bucur, 1997). The diverse associations of Dasycladales and other calcareous algae have already been described in several papers (e.g., Bucur, 2002). Instead, the rich assemblage of benthic foraminifera was not described in detail so far. Research carried out in recent years allowed the identification of a new complex larger benthic foraminifera *Banatia aninensis* (Schlagintweit & Bucur, 2017), and the emendation of a species known since decades as a doubtful representative of the genus *Paracoskinolina* Moullade as *Moulladella jourdanensis* (Foury & Rat) (Bucur & Schlagintweit, 2018). In a third contribution, a new larger benthic foraminifera showing dimorphism is described as *Cantabriconus*? *meridionalis* n. sp. (Family Coskinolinidae?) from these limestones. With its prominent, eccentric initial trochospire, undivided marginal zone, and pillars in the central zone it cannot be included in the genera *Urgonina* Foury & Moullade, *Falsurgonina* Arnaud-Vanneau & Argot (see Bucur 1997, pl. 15, fig. 19, pl.16, fig. 1, as *Falsurgonina* sp.), or *Montseciella* Cherchi & Schroeder. Due to some doubts about the wall structure (solid or pseudo-keriothecal?), the form is here tentatively assigned to the genus *Cantabriconus* Schlagintweit, Rosales & Najarro becoming its possibly third representative apart from the type-species *C. reocinianus* (late Aptian-earliest Albian of Spain, type-species), and *C. altaretae* (Arnaud-Vanneau) (Schlagintweit et al., 2017).

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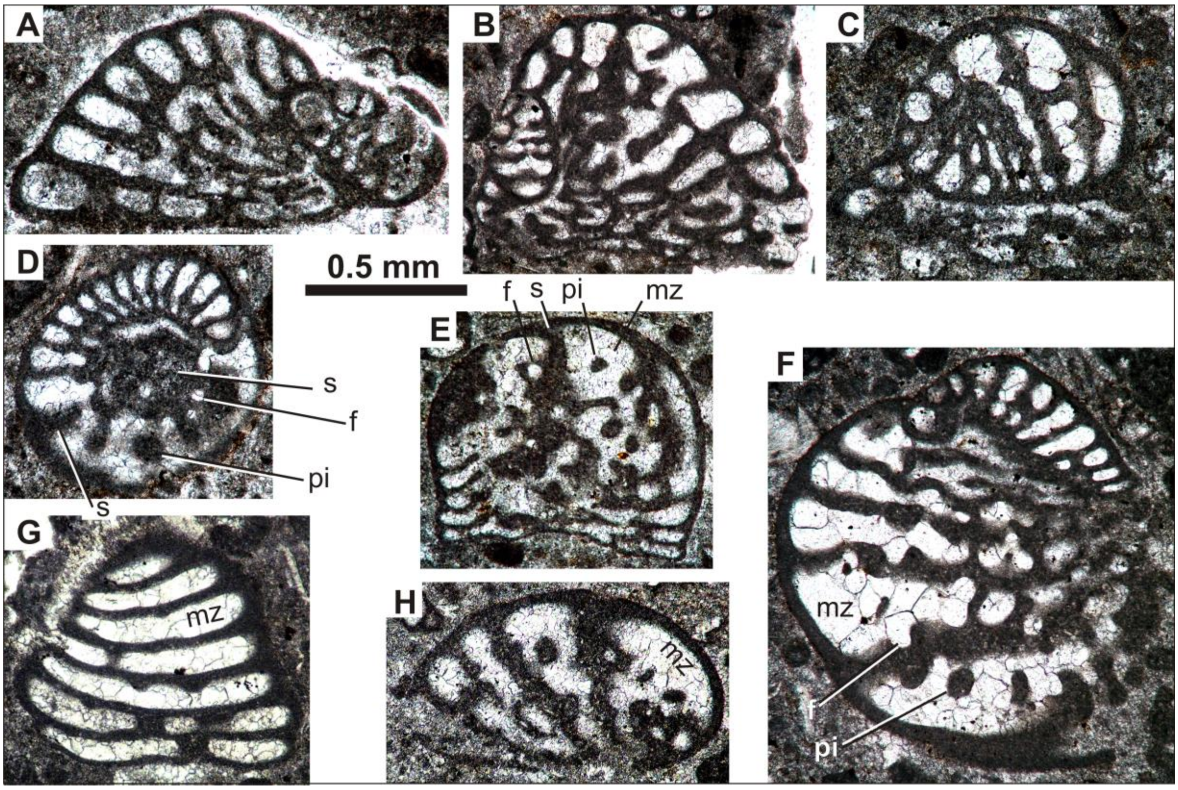

Fig. 1. *Cantabriconus*? *meridionalis* n. sp. from the lower Aptian of the Southern Carpathians. A-C Axial sections of megalospheric specimens showing large initial trochospire. D oblique transverse section. E, H oblique sections. F oblique section of a possibly microspheric specimen. G tangential section showing undivided marginal zone; outer part of central zone with pillars is cut below. Abbreviations: f = foramen, mz = marginal zone pi = pillar, s = septum.

ORAL

The Mount Chah Torsh section, Central Iran: a new K/T shallow marine sequence

Schlagintweit, F.[1], Rashidi, K. [2] & Thajbakhsh, G.R.[2]

[1] *Lerchenauerstr. 167, 80935 Munich, Germany, e-mail: felix.schlagintweit@gmx.de*
[2] *Department of Geology, Yazd University, 89195-741 Yazd, Iran,e-mails: kooroshrashidi@yazd.ac.ir, tajbakhsh@yazd.ac.ir*

Keywords: Maastrichtian, Danian, larger benthic foraminifera, calcareous algae

The studied section is located ~55 km southeast of the small town of Mehriz, near Yazd city, Central Iran. In previous works this locality is named Kuh-é-Tchahtorch in Deloffre et al. (1977), Tchah-Torch in Khosrow-Tehrani (1987), Kamar-e-Chahtorsh in the Geological map of Yazd (Nabavi 1972), and Kuh-e-Chah Torsh in the new Geological Map of Majidifard and Vaziri (2000). Geotectonically, the study site is part of the Central Iranian Microcontinent, namely the Yazd Block. Palaeogeographically it is part of the former Northern Neotethyan margin.

The exposed sedimentary sequence of this relict mountain starts with Lower Cretaceous "*Orbitolina*" Limestone (= Taft Formation), followed with erosional contact by clastic deposits, overlain by Upper Cretaceous sandy limestones with bryozoans, Larger Benthic Foraminifera (LBF), and peyssonelliacean algae. The LBF *Orbitoides gensacicus* (Leymerie), *Canalispina iapygia* Robles-Salcedo et al., *Sirelina orduensis* Meriç & Inan, *Sirtina ornata* (Rahaghi), *Orbitoides gruenbachensis* Papp, and *Omphalocyclus macroporus* (Lamarck) indicate a late Maastrichtian age.

The K/T boundary can be fixed within a series of sandy marls between orbitoidid-bearing strata below and bright sandy limestones with rotaliids above grading into dark-grey limestones. No unconformity or sharp boundary is observable. These contain the *Ankarella trochoidea* Sirel, *Haymanella paleocenica* Sirel, *Kolchidina paleocenica* (Cushman), and the calcareous algae *Ovulites morelleti* Elliott, *Terquemella* sp., and *Cymopolia tibetica* Morellet & Morellet. This assemblage can be ascribed to the Danian (= SBZ 1 of Serra-Kiel et al. 1998). A higher stratigraphic resolution (e.g., gaps?) is not possible. The Danian algal-miliolid limestones (thickness ~ 25 m) are followed by conglomerates, almost unfossiliferous sandstones, a rhyolitic sill, and finally sandy dolomites devoid of both macro- and microfossils. Both (larger) benthic foraminifera and calcareous algae display a considerable diversification in the following upper carbonatic part of the section assigned to the Selandian based on LBF. This observation is in line with global phylogenetic trends of the two groups (e.g., Barattolo 2002, Hottinger 2014).

The lithological series, occurring taxa and assemblages of LBF offer a comparison of the Mount Chah Torsh section with the Caldag Formation of the Haymana region, Central Pontides of Turkey (Sirel 1998). Mount Chah Torsh is the first record of a seemingly continuous K/T boundary section within a mixed siliciclastic-carbonatic shallow-water succession from Iran. The K/T boundary was so far only recorded from deeper-water successions, e.g. the Alborz Mountains to the north (Rostami et al. 2018), the Kopet Dagh Basin to the northeast (Ezampanah et al. 2018), or the Zagros Zone (Gurpi Formation) to the south–west (Darvishzad et al. 2007). The Kuh-e-Chahtorsh setion can be considered a key locality for Danian to Selandian carbonates of Central Iran (SBZ 1–2) that offers a wide spectrum of further investigations.

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ORAL

New insights on the middle Eocene nummulitic accumulations from the Transylvanian Basin

Silye, L.[1], Kövecsi, Sz.-A.[1], Less, Gy.[2], Bindiu Haitonic, R.[1], Pleş, G.[1], Zágoršek, K.[3], Bălc, R.[4,5], Filipescu, S.[1], Barabás, E.[1] & Jakab, A.[1]

[1] *Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania, e-mails: lorand.silye@ubbcluj.ro, szabolcs.kovecsi@ubbcluj.ro, raluca.bindiu@ubbcluj.ro, george.ples@ubbcluj.ro, sorin.filipescu@ubbcluj.ro, bemese96@yahoo.com, anna.jaxi@gmail.com*
[2] *University of Miskolc, Department of Geology and Mineral Resources, 3515, Miskolc-Egyetemváros, Hungary, e-mail: foldlgy@uni-miskplc.hu*
[3] *Department of Geography, Technical University of Liberec, 229 Studentská 2, 461 17 Liberec, Czech Republic, e-mail: kamil.zagorsek@gmail.com*
[4] *Babeş-Bolyai University, Faculty of Environmental Sciences and Engineering, 30 Fantanele Street, 400294 Cluj-Napoca, Romania, e-mail: ramona.balc@ubbcluj.ro*
[5] *Interdisciplinary Research Institute on Bio–Nano Sciences, Babeş–Bolyai University, 42 Treboniu Laurian Street, 400271 Cluj–Napoca, Romania*

Keywords: microfossils, odd pairs, paleoecology, microfacies, Paleogene

The larger benthic foraminifera (LBF) were the most important carbonate producers of the Paleogene shallow-marine subtropical and tropical environments. Hence, the LBF accumulations, especially those resulted from the sedimentation of the *Nummulites* tests, are widespread along the former Neotethyan margin, including the Transylvanian Basin, Romania.
In the Paleogene sedimentary record of this basin the most important nummulitic accumulations are the Bartonian *Nummulites perforatus* accumulations, exposed mainly in the north-western part of the basin (Popescu, 1978; Rusu *et al.*, 2004). Although these offer an insight into a very peculiar LBF dominated paleoenvironment, which has no modern counterpart, little has been known until recently about the diversity and ecological structuring of the fossil assemblages preserved by the nummulitic accumulations of the Transylvanian Basin. Nevertheless, their sedimentary features, including their microfacies and stacking, has never been studied in detail before. As a result, even their paleoenvironmental significance is poorly understood.
Therefore, we have in the last year systematically studied using paleontological and sedimentological approaches the *Nummulites perforatus* accumulations. Our studies focused on various fossil groups (calcareous nannofossils, larger and smaller benthic foraminifera, bryozoans), microfabrics and microfacies in order to describe in detail these accumulations and to better constrain their paleoenvironment.
Our main results so far are: 1. the *N. perforatus* accumulations are proper nummulitic banks; 2. they were formed mostly by only one LBF (*N. perforatus*), but in some cases an interesting ecological co-occurrence of *N. perforates* and *N. beaumonti* occurred. This was interpreted as an odd pair and is the first odd pair so far observed in *Nummulites* assemblages (Kövecsi et al., 2018); 3. although the smaller benthic foraminiferal species have low abundance, their assemblages have very distinctive diversity and species composition in different parts of the *N. perforatus* banks, suggesting the deepening of the depositional environment south-east to north-west, and changes of the organic flux along the nummulitic accumulation; 4. the oldest occurrence of Kylonisa triangularis KEIJ show that even the oligotrophic environment dominated by one species, like the N. perforatus accumulation, could serve as habitat for a large variety of organisms (Kövecsi et al., 2018), and 5. the microfacies and stacking observable along the studied N. perforatus banks underline the importance of depositional and possibly post-depositional processes in the alteration and preservation of fossil assemblages.

Acknowledgments

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ORAL

Pliocene-Pleistocene ostracods from Caspian Basin

Stoica, M.[1] & Rausch. L.[1, 2]

[1] *University of Bucharest, Department of Geology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania, e-mail: marius.stoica@g.unibuc.ro*
[2] *Department of Animal Ecology & Systematics, Justus Liebig University, Heinrich-Buff-Ring 26–32 IFZ, 35392 Giessen, Germany, e-mail: leanrausch@gmail.com*

Keywords: Paratethys, Ostracods, Biostratigraphy, Neogene

The high morphological diversity of the ostracods fragile shell that has evolved over time, mirrors the paleoecological differences of each Ponto-Caspian basin throughout the Pliocene and post-Pliocene period.
The predominant facies association during the deposition of the Productive Series (PS) was fluvial-lacustrine. Respectively the ostracod fauna consists mainly of freshwater genera (*Cyclocypris, Ilyocypris, Zonocypris, Cypris, Eucypris, Darwinula, Cyprinotus, Cypridopsis, Limnocythere, Pseudocandona*).
The onset of the Akchagylian is marked by an important transgressive momentum, suggesting a marine connection at the PS – Akchagylian boundary, reflected by the influx of planktonic foraminifera. The prevailing freshwater assemblage was rapidly replaced by a brackish water association that is poorly preserved as the result of alternating dysoxic-and oxyc conditions. The environment stabilized towards the top of the Akchagylian and a more diverse and strongly calcified ostracod fauna re-established. The assemblage is dominated by *Eucythere naphtatscholana* and candonids like *Candona abichi, C. candida, C. combibo, C. convexa, C. angulata, Camptocypria acronasuta, Typhlocypris gracilis* and *Eucypris* sp. Several occurring limnocytherids, loxoconchids and leptocytheridae species include *Limnocythere alveolata, L. luculenta, L. tschaplyinae, Loxoconcha eichwaldi, L. petasa, L. babazananica* and *Leptocythere gubkini, Amnicythere nata, A. bona* and *A. cymbula*. In the late Akchagylian sequence, *Amnicythere andrussovi* and possibly related morphotypes of the species (*A. saljanica, A. palimpsesta, A. olivina* and *A. picturata*) became more prominent.
At the base of the Apsheronian another appearance of euryhaline foramnifera is suggesting the occurrence of a minor flooding event. Brackish conditions re-establish shortly after the transgression and a great diversification in the ostracod assemblage occurred. Most species from the previous Akchagylian continued to flourish next to newly occurring species like *Tyrrhenocythere azerbaidjanica, T. papillosa, T. bailovi, Cyprideis torosa, Cytherissa bogatschovi, Camptocypria acronasuta* and *Candona candida*, suggesting a proximal – distal environment. The uppermost part of the Apsheronian (equivalent to the Tyurkanian stage) contains fluvial –lacustrine freshwater ostracods.
The Bakunian ostracod fauna consists of brackish water species, resembling the assemblage present in the Apsheronian. Morphological transformations of some of the carapace features are occurring. Some of these early stage morphotypes finally evolved into new species that are characterizing the modern day Caspian Sea ostracod fauna.

POSTER

Palynology and palynofacies of Devonian – Carboniferous deposits from the Eastern part of the Moesian Platform (Romania)

Țabără, D.[1], Tudor, E.[2] & Chelariu, C.[1]

[1] "Al. I. Cuza" University of Iași, Department of Geology, 20A Carol I Blv., 700505 Iași, Romania. e-mail: dan.tabara@yahoo.com; ciprian.chelariu@uaic.ro
[2] Hunt Oil Company of Romania, Băneasa Business Center, Sector 1, 013694 Bucharest, Romania. e-mail: etudor@huntoil.com

Keywords: miospores biostratigraphy, Paleozoic deposits, Țăndărei, Călărași and Vlașin formations.

Introduction

The Moesian Platform on the territory of Romania is divided in two major blocks (East and West Moesia) by the Intra-Moesian Fault. Its basement (crystalline rocks) is covered during the first sedimentary cycle by limestones, bituminous dolomites, sandstones and shales assigned to Țăndărei, Smirna, Călărași and Vlașin formations (Ionesi, 1994; Seghedi et al., 2005; Fig. 1). Micro- and macrofossil content of these deposits is diversified, the age of the formations listed above being established based on graptolites, brachiopods, bivalves (Iordan, 1990, 1999; Seghedi et al., 2005), as well as the palynological assemblages (Beju, 1971; Vaida and Verniers, 2005, 2006).

Methodology

Of the 5 wells located in the eastern part of the Moesian Platform (Fig. 1), 11 core samples for palynological analyzes were collected. All samples showed well to very-well preserved specimens and high taxonomic diversity.

Results

Palynological data. The identified palynological assemblage consists of chitinozoans and acritarchs (marine palynomorphs) and miospores (terrestrial palynomorphs). Some biostratigraphic marker taxa identified in the studied samples have allowed us to outline the following Devonian – Carboniferous miospore biozones proposed by Clayton et al. (1977) and Richardson and McGregor (1986) for the Western Europe:

- The *micrornatus–newportense* spore Zone (early Devonian, Lochkovian) is marked by the occurrence of *Emphanisporites micrornatus* taxon only in the PB-k sample of the BW-05 well. The occurrences of the chitinozoan *Eisenackitina* aff. *bohemica* in this sample, also supports the Lochkovian age.
- The *polygonalis–emsiensis* (upper part) up to *douglastownense–eurypterota* Zones (early–middle Devonian, Pragian–early Eifelian) are indicated by the first occurrences (FO) of the *Dictyotriletes subgranifer* taxon (PU-f sample) and last occurrences (LO) of the *Camarozonotriletes sextantii* (PU-e sample) in the UW-03 well.
- The *pusilla* Zone (early Carboniferous, late Tournaisian–early Visean) is outlined by the FO of the *Lycospora pusilla* and LO of *Schopfites claviger* taxon in the top of this biozone. These bioevents were recorded only in the IW-02 well (PI-d sample).
- The *vetustus–fracta* up to *carnosus–nitidus* Zones (early Carboniferous, late Visean–early Serpukhovian) can be established based on the FO of the *Tripartites vetustus* and LO of the *Raistrickia nigra* taxon in the PA-j sample (AW-04 well).
- The *kosankei–varioreticulatus* up to *nobilis–junior* Zones interval (late Carboniferous, early Bashkirian–early Moscovian) is indicated by few bioevents such as FO of the *Grumosisporites varioreticulatus* and LO of the *Cingulizonates bialatus*, *Savitrisporites nux* and *Schulzospora rara*. The palynological assemblage identified in the upper part of the Vlașin Formation (*i.e.*, PC-a, PI-b, PA-h and PA-g samples) indicates this biostratigraphic interval.

Palynofacies analysis and palaeoenvironmental reconstruction. The palynological organic matter content recorded from the studied interval exhibit a moderately to high abundance. The lower–middle Devonian deposits contain a large proportion of continental organic matter (opaque and translucent phytoclasts) indicating their sedimentation in a moderately distal oxic setting. A more inner neritic environment of the basin and oxidizing conditions, alternating with short dysoxic periods, are indicated by the Carboniferous organic matter identified in the Călăraşi and Vlaşin formations.

Conclusions

This study shows biostratigraphic data inferred based on miospores and chitinozoans bioevents, as well as the palynofacies content of a Devonian–Carboniferous sequence from the Eastern Moesian Platform. Two biozone intervals assigned to early–middle Devonian and three Carboniferous biozone intervals were revealed by palynological assemblages from the studied samples. Generally, the early–middle Devonian deposits shows a high content in continental organic matter. During the Carboniferous, some dysoxic conditions of the sedimentary basin can be outlined based on biodegraded organic matter, as well as amorphous organic matter of marine origin.

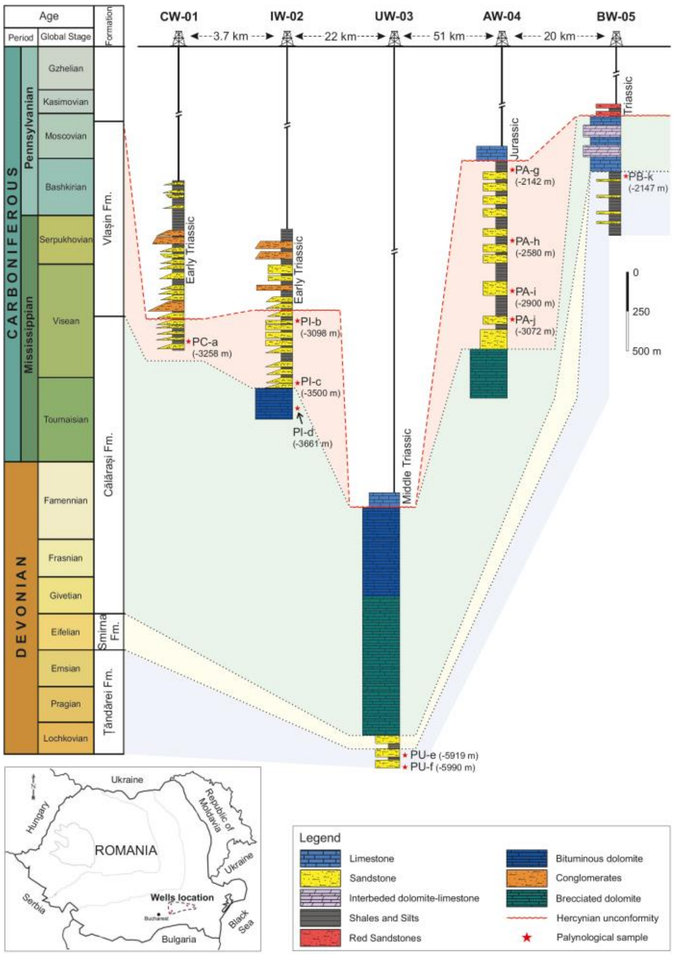

Fig. 1. Lithological logs of the Devonian–Carboniferous deposits in the studied wells, with the location of the analyzed samples.

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ORAL

New data about the Early Jurassic nautiloids of Prașca Klippe (Rarău Syncline, Eastern Carpathians, Romania)

Ţibuleac, P.

University of "Alexandru Ioan Cuza" Iași, Department of Geology, 20A Bd. Carol I, 700505 Iași, Romania, e-mail: paul.tibleac@uaic.ro

Keywords: *Cenoceras*, species, validity

Introduction

The paper updates the previous works on the Early Jurassic nautiloids of the Prașca Klippe (Rarău Syncline). It mainly aims to assess the validity of two nautiloid species.

Geological framework

The nautiloid specimens herein described were sampled from the upper part of the relatively large sedimentary block, which occurs in the area of Prașca Peak. It is either a klippe (following Dumitrescu et al., 1962; Rădulescu and Săndulescu, 1973; Săndulescu, 1984, etc.) either an olistolith (following Hoeck et al., 2009). Still accepting the former tectonic concept, the Rarău Syncline belongs to the Media Dacides or the informal Crystalline-Mesozoic Zone of the Eastern Carpathians (e. g., Săndulescu et al., 1984). The autochthonous Bucovinian nappes and the allochthonous Transylvanian ones are tectonically delineated within the syncline framework. The Transylvanian nappes consist of various-sized sedimentary and igneous klippen, scattered within the Early Cretaceous wildflysch.

Consequently, the Prașca block is considered herein a klippe of the Transylvanian nappes. It is located several kilometers south-west of Câmpulung Moldovenesc, being almost entirely embedded in the wildflysch. The dimensions of the klippe are not yet precisely assessed, but the diggings carried out so far reach over 60 m in length and over 7–8 m in height. It is built by red nodular limestone, mudstone, wackestone, and thin marl beds, yielding a reach fauna of ammonites, but also bivalves, coleoids, brachiopods, crinoids, and nautiloids, etc.

Methodology

The specimens were prepared with a mechanical tool following to reach the last septum and to expose the siphuncle foramen.

The systematic paleontology follows Kummel (1964). The suture line, the umbilicus opening, the siphuncle position, and the shape of the whorl section have been used as morphological keys for the taxonomical assessment. The biometrical parameters taking into account are Ds – the diameter of the shell/phragmocone; Du – the diameter of the umbilicus; H – the height of the last whorl section; W – the width of the last whorl section; the ratios Du/Ds; W/H, W/Ds.

Results

The Early Jurassic nautiloids mark new adaptative radiation after the end Triassic mas-extinction. Actually, only one steam (Family Nautilidae) crosses the Triassic-Jurassic boundary, and only one genus (*Cenoceras*) is documented at the beginning of the Jurassic period (Kummel, 1956). Many of the species are proposed without type-series and ontogenetic observations. Consequently, there are still issues of the nautiloid systematics of the Early Jurassic age, which could be improved.

The recent nautiloids specimens of Prașca Klippe call into question the validity of two morphospecies, *Cenoceras orbignyi* (Prinz, 1907), and *C. affinis* (Chapuis and Delwaque, 1854) in comparison with *C. intermedius* (Sowerby, 1816). The main morphological difference of both species compared to *C. intermedius* is the position of the siphuncle foramen near to the septum center as opposed to the latter that exhibits it near to venter. Between *C. orbignyi* and *C. affinis,* the whorl section outline slightly differs. The ontogenetic observations performed by Tintant (1985) on a large collection of *C. intermedius* and the sampling of specimens from the same lithological level have been also two other important reasons in the systematics assessment. Finally, the new observations point to the validity of *C. affinis*, which would be detrimental to *C. orbignyi*.

Conclusions

The recent nautilid specimens of Praşca Klipp call into question the validity of two Early Jurassic morphospecies, *Cenoceras orbignyi,* and *C. affinis* respectively. The morphological and metrical features and the previous research data point to the validity of *C. affinis*, which would be detrimental to *C. orbignyi*.

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ORAL

Preliminary microfacies analyses on the Middle–Upper Jurassic transition in the Buila-Vânturarița Massif (Southern Carpathians, Romania)

Tîrlă, M.–L. [1], Lazăr, I. [1], Stoica M. [1], Grădinaru M. [1] & Mirea, I.–C. [2]

[1] *University of Bucharest, Faculty of Geology and Geophysics, Department of Geology, Laboratory of Palaeontology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania, e-mail: tirla@geo.unibuc.ro, iuliana.lazar@g.unibuc.ro, marius.stoica@g.unibuc.ro, mihaela.gradinaru@unibuc.ro*
[2] *Babes-Bolyai University, Faculty of Biology and Geology, Department of Geology, 1 Bd. M. Kogălniceanu, 400084 Cluj-Napoca, Romania, e-mail: ionut.cornel.mirea@gmail.com*

Keywords: Middle Jurassic, Upper Jurassic, mixed carbonate-siliciclastic deposits, microfacies, Southern Carpathians, Romania

Introduction
The Middle Jurassic sequences from the eastern and central parts of the Getic Domain (Median Dacides) are characterized by condensed units with different thickness and stratigraphic extensions, as well as by the presence of neptunian dikes, clastic dikes, and submarine syntectonic sedimentary breccias, generated during the contemporaneous extensional tectonics. The aim of this contribution is to report the preliminary results of the microfacies analyses performed on the mixed carbonate-siliciclastic deposits marking the Middle–Upper Jurassic transition in the Buila–Vânturarița Massif (Southern Carpathians, Romania).
The Buila–Vânturarița Massif is represented by a NE-SW-oriented calcareous ridge located in the Căpățânii Mountains (the central part of the Getic Domain). The Jurassic succession in this area is represented by mixed carbonate-siliciclastic Middle Jurassic (Bathonian–Callovian) rocks overlain by Oxfordian (limestones and radiolarites) and Kimmeridgian to Aptian carbonate platform deposits (Dragastan, 2010; Pleș, 2013). The Middle Jurassic sedimentary deposits of the Buila–Vânturarița Massif were briefly described by Boldur et al. (1968, 1970). They described a lithological succession for the Middle Jurassic composed of micaceous calcareous sandstones and marls (Upper Bathonian–Lower Callovian), followed by marly limestones and limestones (Middle and Upper Callovian) overlain by Oxfordian limestones and radiolarites. The lithological succession proposed by these authors was based on loose fragments of rocks observed on few valleys and on small, few isolated outcrops on the western slope of the Buila-Vânturarița Massif. The biostratigraphy of these deposits was based on ammonites *(Oecotraustes* sp., *Lytoceras* sp., *Grossouvria curvicosta, G. subtilis, Holcophylloceras mediterraneum, Ptychophylloceras feddeni)* and bivalves *(Bositra buchi)*. The litho– and biostratigraphy of the Kimmeridgian to Aptian carbonate platform deposits were studied in detail by Pleș (2013).

Methodology
We performed a detailed lithological description and the microfacies analysis of the Callovian-Oxfordian deposits observed in three sections located in the southern (Arnota), central (Ștevioara), and northern (Stogu) areas of the massif. Forty–two polished rock slabs and seventy thin sections were prepared and examined following the procedures of microfacies analysis (cf. Flügel, 2010). No datable paleontological evidences were sampled at this stage of the research; therefore, the age of the studied deposits is based on Boldur et al. (1968, 1970) results.

Results and interpretation
In the Stevioara section the metamorphic rocks are directly overlain by Middle Jurassic deposits represented by: in situ crackle breccia and mosaic breccia with angular metamorphic clasts and

carbonate matrix; the matrix is represented by peloidal bindstone, bioclastic packstone–floatstone and burrowed bioclastic packstone–wackestone; the next bed (1.5–meters thick) consists of oncoidal packstone to floatstone; this bed contains numerous ferruginous macro–oncoids; the nucleus of the macro–oncoids consists of reworked ammonite shells and lithoclasts, and the cortex is represented by ferruginous stromatolitic bindstone; this bed is overlain by crinoid packstone to floatstone and radiolarian wackestone–packstone followed by bivalve packstone and *Ammonitico Rosso* type of limestones (bioclastic wackestone–packstone).

In the Arnota section only the Callovian–(?)Oxfordian deposits are exposed, represented by bioclastic wackestone–packstone rich in radiolarians upgrading to bivalves– and foraminifera–bearing packstone.

In the Stogu section, the base of the Middle Jurassic deposits is represented by: lithoclastic grainstone, bioclastic sandstones and microconglomerates (~20–meters thick) followed by repetitive sequences (centimetre–thick) of lithoclastic–bioclastic grainstone–packstone and bioclastic packstone–wackestone rich in sponge spicules and radiolarians with local cherts intercalations (with a total thickness of 13 m).

During the Middle–Upper Jurassic transition two sedimentary areas with different evolution were outlined in the Buila–Vânturarița Massif, based on the interpretation of facies zones: Ștevioara–Arnota located in the central-southern part, and Stogu located in the northern part of the massif. The Ștevioara–Arnota zone corresponds to a deep-shelf to upper-slope environment with uneven morphology (e.g., submerged ridges) which experienced very low sedimentation rates, leading to formation of condensed deposits probably during the Bathonian–Callovian time interval. Contrastingly, the Stogu zone was constantly subjected to high rates of sedimentation during the Middle Jurassic, as indicated by the accumulation of microconglomerates and coarse bioclastic sandstones (probably in a deep-shelf environment) followed by allodapic limestones characterized by different bioclasts (bivalve shells, radiolarians, benthic foraminifera) mixed with quartz, cherts and extraclasts. The beds show erosional base and fractionation of grains/clasts, suggesting deposition by turbidity currents in a slope environment.

Conclusions

This is the first microfacies study of the Callovian–Oxfordian mixed carbonate-siliciclastic deposits in the Buila–Vânturarița Massif. The sedimentological and microfacies features of the studied successions from Buila–Vânturarița Massif could be correlated with other Middle Jurassic condensed stratigraphic successions from the Southern Carpathians (e.g., Rucăr–Bran zone and Bucegi Mountains) and allow also large-scale correlation with coeval condensed succession from other northern peri–Tethyan areas (e.g., the Central Alps, the Betic Cordillera).

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ORAL

Preliminary data on the Late Pleistocene-Holocene herpetofaunal fossil assemblages from Stoieni Cave (Mehedinți Mountains, Romania)

Vasile, Ș.[1, 2], Drăgușin, V.[3], Petculescu, A.[4], Constantin, S.[3], Sava, T.B.[5] & Sava, G.O.[5, 6]

[1]*University of Bucharest, Department of Geology, 1 Nicolae Bălcescu Ave., 010041 Bucharest, Romania, e-mail: yokozuna_uz@yahoo.com*
[2]*University of Bucharest Research Centre for the Geology of Coal Deposits and Environment Protection, Faculty of Geology and Geophysics, 1 Nicolae Bălcescu Ave., 010041 Bucharest, Romania*
[3]*Romanian Academy, "Emil Racoviță" Institute of Speleology, Center for Geochronology and Paleoclimate, 31 Frumoasă St., 010986 Bucharest, Romania, e-mails: virgil.dragusin@iser.ro, silviu.constantin@iser.ro*
[4]*Romanian Academy, "Emil Racoviță" Institute of Speleology, 13-15 Calea 13 Septembrie, 050711 Bucharest, Romania, e-mail: alexpet@gmail.com*
[5]*"Horia Hulubei" National Institute for Physics and Nuclear Engineering, 30 Reactorului St., 077125, Măgurele, Ilfov, Romania, e-mails: tiberiu.sava@nipne.ro, gabriela.sava@nipne.ro*
[6]*University "Politehnica" of Bucharest, 313 Splaiul Independenței, 060042 Bucharest, Romania*

Keywords: ectothermic vertebrates, amphibians, reptiles, Quaternary

Palaeontological excavations performed in the sedimentary infill from Stoieni Cave (Isverna, Mehedinți County) yielded abundant fossil remains belonging to a fairly diverse assemblage that included carnivores (ursids, canids, mustelids, felids), herbivores (medium and large bovids), as well as numerous rodent and insectivore taxa (Drăgușin et al., 2017; Torcărescu et al., 2018).
The samples of sediment screenwashed to test for the presence of small mammals also yielded ectothermic vertebrate remains. The topmost four depth intervals sampled yielded rare indeterminate fish vertebrae, but more abundant amphibian material, inclusing vertebrae, limb bones and ilia assigned to a bufonid (likely *Bufotes viridis*). Numerous lacertid vertebrae and jaw assigned to *Lacerta viridis* and *Lacerta agilis*, were also found, along with some possible anguid vertebrae. Snakes are represented mostly by viperid vertebrae (*Vipera* cf. *ammodytes*), other rare vertebrae suggesting colubrids (? *Elaphe*) and natricids (? *Natrix tessellata*) were also present.
Radiocarbon dating of bone samples collected from the topmost five depth intervals shows the succession documents the transition from the Last Glacial Maximum to the early Holocene. Depth interval 4 (dated to 15,742–5,291 calibrated years BP) yielded a single lacertid vertebra, whereas interval 3 (14,776–14,056 calibrated years BP) was the richest in numbers of specimens, followed closely by intervals 2 (12,117–11,766 calibrated years BP) and 1 (early Holocene).
The local taxonomical composition of the herpetofaunal does not seems to have changed since the end of the Last Glacial Maximum: bufonid toads, lacertid lizards, and viperid snakes, present in depth intervals 3 to 1, are part of the present local herpetofaunal as well (Cogălniceanu et al., 2013 a, b).

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Field trip guide

Paleogene bioclastic carbonates from Cuciulat-Letca quarries (northwestern Transylvanian Basin)

Pleş, G., Săsăran, E. & Bucur, I. I.

Stop 1

Introduction

Along the Someș River valley, near Jibou town (Sălaj County), several quarries exist on the right side of the the district road DJ1C connecting Răstoci, Letca, Cuciulat, Băbeni, Jibou and Prodăneşti localities (Fig. 1). The carbonate deposits which crop out in these quarries represent a large part of what was described as the Cozla Formation (Eocene-Oligocene) (Popescu, 1976; Săsăran & Bucur, 2011). This sedimentary succession is composed of marly limestones, bioclastic nummulitic carbonates and coralgal bioconstructions (Săsăran & Bucur, 2011; Król et al., 2017).

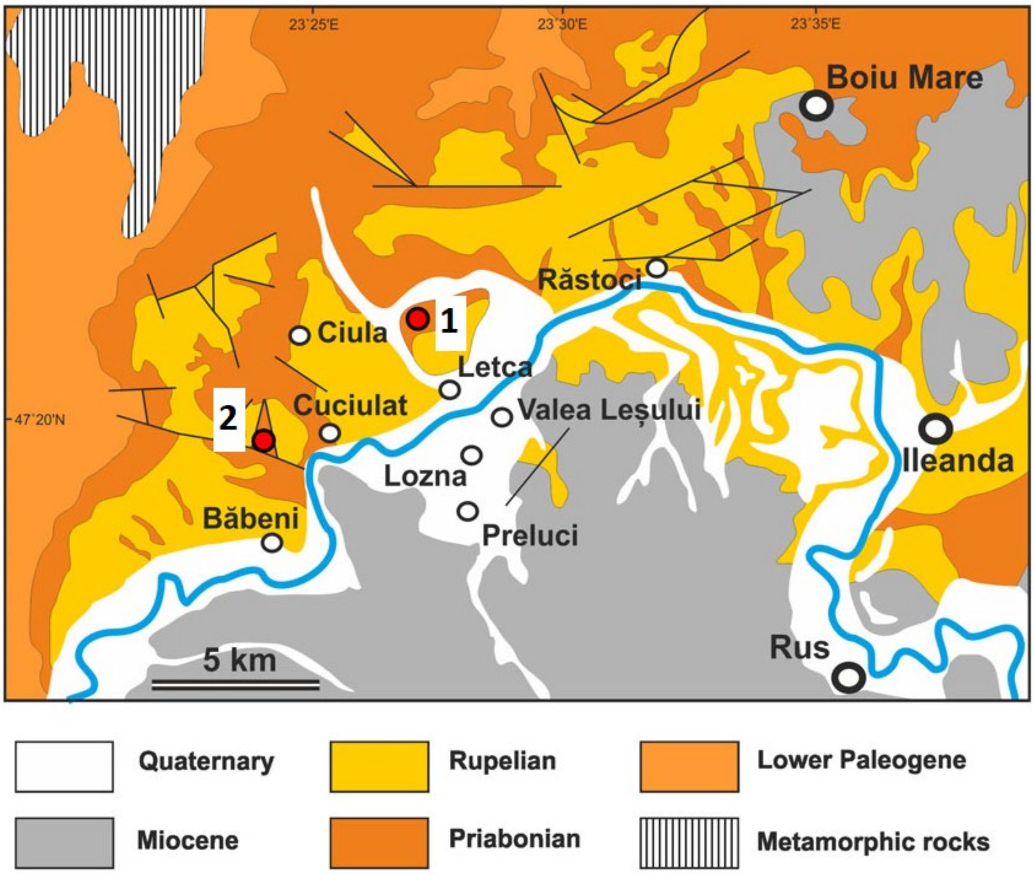

Fig. 1. Geological map of the area between Băbeni and Ileanda (modified after Gherasi et al., 1967, Saulea et al., 1968 and Król et al., 2017)

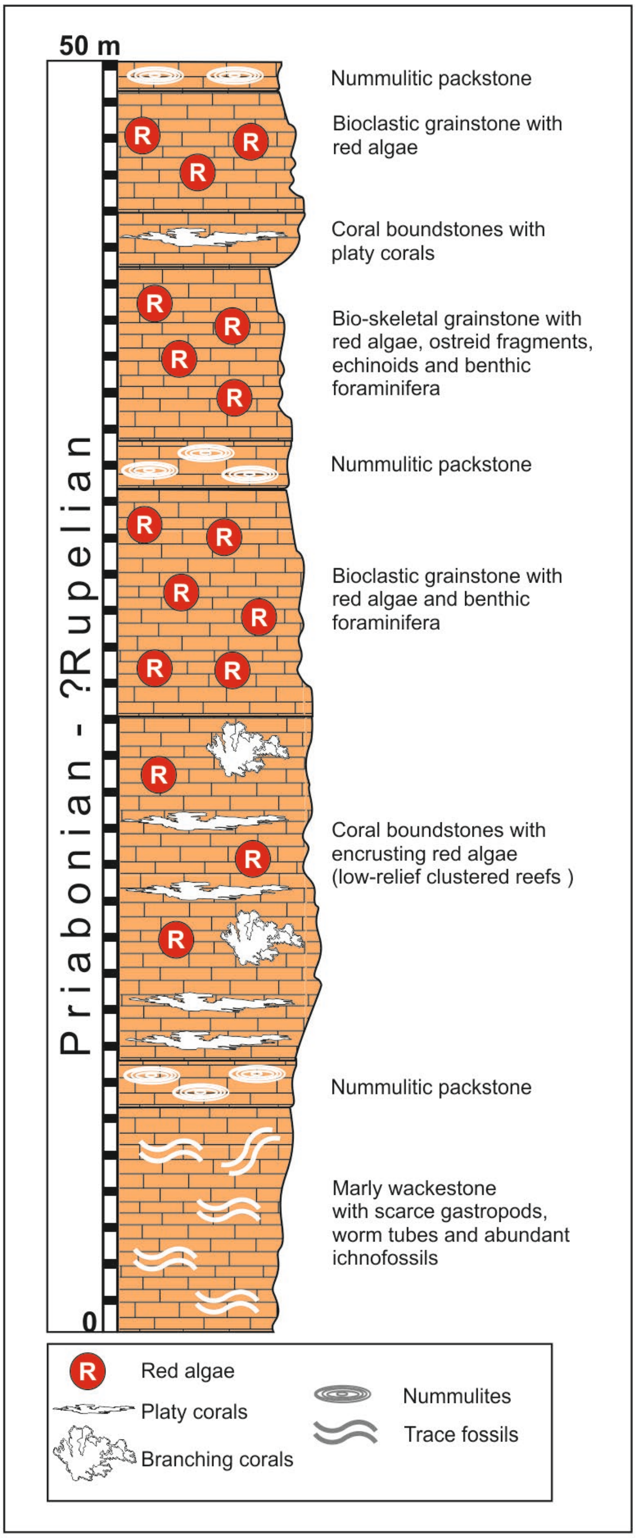

Fig. 2 - Lithological column of the carbonate succession from Letca quarry (based on Król et al., 2017)

Location

The Letca limestone quarry located approximately 1.5 km NW of the Letca village (Fig. 1).

Main facies types

Several main facies types were distinguished within these carbonates by Król et al. (2017): marly wackestones with scarce gastropods, worm tubes and abundant ichnofossils; nummulitic packstones with numerous *N. fabianii* tests and abraded fragments, small benthic foraminifera and echinoids; bio-skeletal grainstones defined mostly by calcareous red algae (sporolithacean/ peysonneliacean), ostreids, bryozoans, foraminifera and rare dasycladalean green algae; coral boundstones with encrusting red algae and micritic matrix classified as low-relief clustered matrix-supported reefs.

Biotic content

Concerning the macro- and micropaleontological assemblages from this quarry the following features can be noticed. The bioconstructed levels are dominated by scleractinian corals with different growth patterns. The most commonly observed are branching and ramose colonies (*Acropora* and *Goniopora,* Fig 4), phaceloid (*Euphyllia*, Fig. 4) and foliaceous collonies (*Leptoseris* and *Bacarella*) (Kroll et al., 2017). Massive forms are rare. Beside corals, encrusting red algae (*Polystrata alba* and *Sporolithon*) are also common within these carbonates. Borings and perforations assigned to the ichnogenus *Gastrochaenolites* or *Trypanites* are frequent within the coral framework. *Nummulites fabianii* dominates the micropaleontological content of the nummulitic limestone levels. Such carbonates are composed mostly of *N. fabianii* tests, abraded fragments and possibly other nummulite forms of the *N. fabianii* lineage (Król et al., 2017). Small textulariids, rare red alge fragments and ostreids can sometimes be observed in these carbonates. Regarding the bioclastic packstones/grainstones the coralline, sporolithacean and peysonneliacean red algae represent the main bioclasts. These algae can develop encrusting patterns resulting in small to medium sized, occasionally superimposed, crusts on coral fragments. Other skeletal bioclasts from this facies are represented by small coral fragments, ostreids, benthic foraminifera, bryozoans and rare dasycladalean green algae.

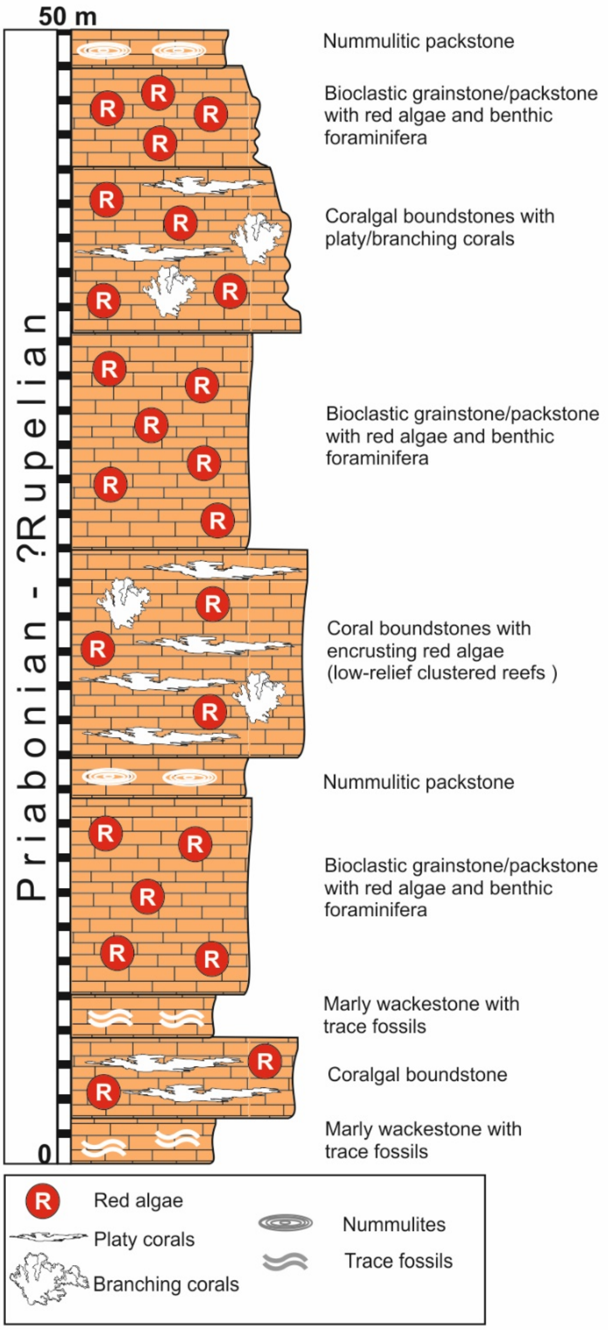

Fig. 3 - Lithological column of the carbonate succession from Cuciulat quarry (based on Król et al., 2017 and Săsăran & Bucur, 2011)

Age of the succession

According to Popescu (1976), Filipescu (2011) and Săsăran & Bucur (2011) the age of the Cozla Formation is Priabonian–Rupelian. This age was established based on the presence within this sedimentary succession of two important biohorizons: the *Nummulites fabianii* horizon (Priabonian) and "*Pycnodonte*" *gigantica* horizon which was considered a marker for the boundary between Eocene and the Oligocene (Priabonian and Rupelian). However, according to Król et al. (2017) in both quarries from Letca and Cuciulat the "*Pycnodonte*" *gigantica* black clay horizon was not identified. It crops out only in a nearby quarry (Răstoci). The main arguments for supporting a Priabonian age for the analysed carbonates were the numerous *N. fabianii* specimens. The question if the Rupelian stage is present in these quarries still remains open for research.

Stop 2

Location

The Cuciulat "Marble" quarry. This quarry is situated approximately 1 km from Băbeni village, on the left side of the district road DJ1C connecting Jibou town and Prodănești (Fig.1).

Main facies types

According to Săsăran & Bucur (2011) the sedimentary succession from this quarry is made of bioaccumulated and bioconstructed levels similar in terms of microfacies with the Letca quarry succession. Bioclastic packstones/grainstones with red algae, echinoid fragments and nummulites represent the main microfacies types for the bioaccumulated levels. The bioclastic packstones are dominating the uppermost part of the quarry succession (Fig. 3). Ocasionally, beside nummulites and red algae, coral fragments, echinoids, bivalve and gastropod fragments can be observed within these microfacies types. In the middle part of the quarry succession bioclastic grainstones with echinoid plates and spines, nummulites and bryozoan fragments are developed, sometimes interlayered with smaller micritic levels (bioclastic wackestones with gastropods and trace fossils) or with the coralgal bioconstructions (Săsăran & Bucur, 2011). The lower part of the quarry is dominated by the presence of bioconstructed levels sometimes interlayered with bio-skeletal grainstones/packstones. In terms of microfacies these levels consist mostly of coralgal boundstones. According to Săsăran & Bucur (2011) two types of corals were distinguished: flat and dendriform. The dendriform colonies are frequently encrusted by red algae and serpulids.

Biotic content

The calcareous algae are ubiquously distributed in the Cuciulat quarry succession. The main identified species are *Lithoporella melobesioides* (Fig. 6: 1), *Polystrata alba*, *Lithothamnion*-type mellobesioid corallines (Fig.6: 2-7) and *Sporolithon* sp. (Fig. 6: 7, 8). Rare levels of rhodoids were sometimes noticed. *Acropora, Goniopora, Leptoseris* and *Bacarella* represent the main scleractinian corals from the bioconstructed levels as similar with the ones from Letca quarry (Król et al., 2017).

Age of the succession: Priabonian-?Rupelian

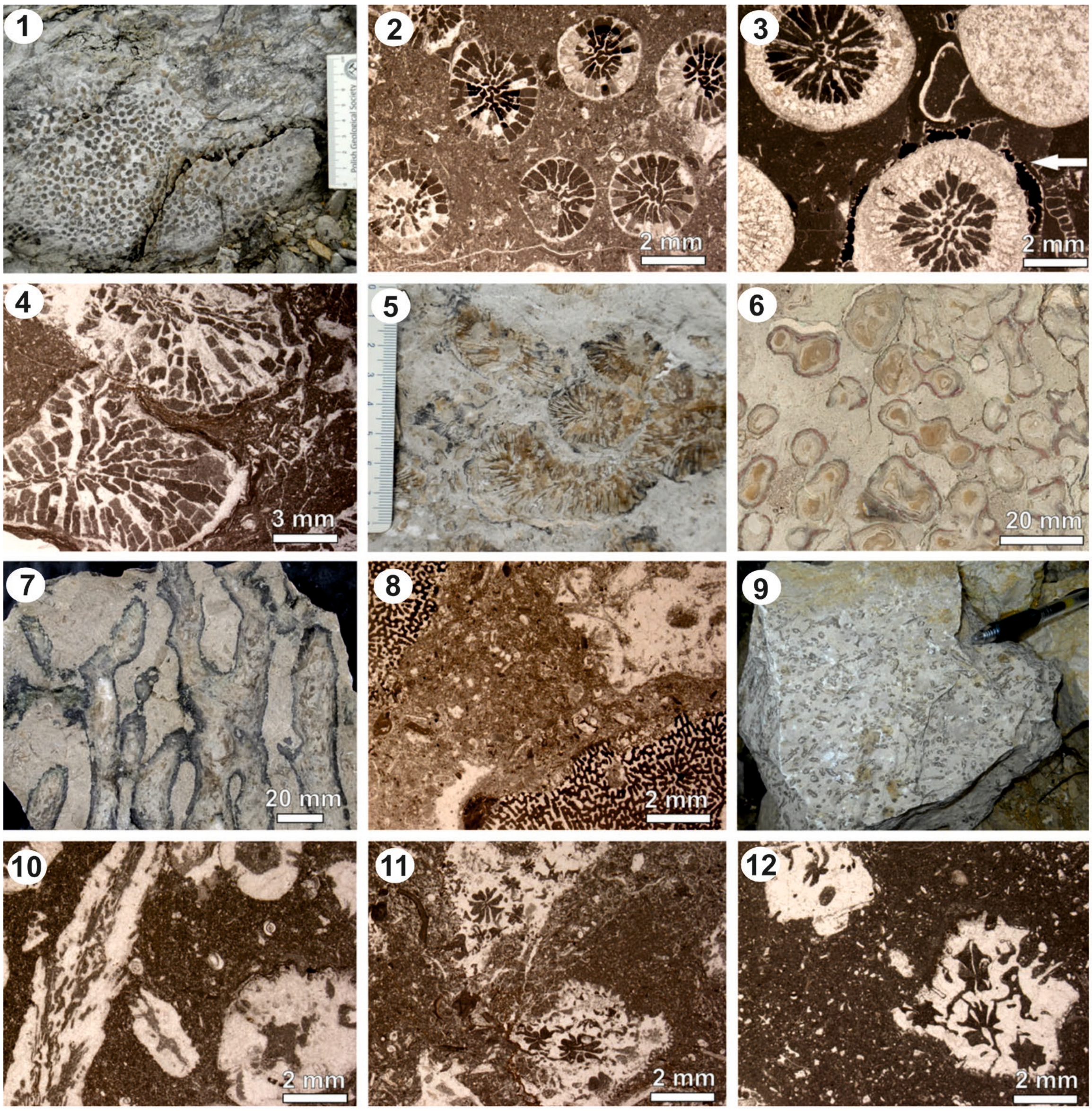

Fig. 4. **Coral bioconstructions from Cuciulat-Băbeni and Letca quarries (from Król et al., 2017). 1**, **4** – phaceloid corals (*Caulastraea*); notice in **3** (arrow) the encrusting foraminifer *Miniacina multiformis*; **5** – *Euphyllia crassiramosa*; **6, 7, 8** – branching collonies of *Actinacis rollei*; **9, 10, 11, 12** – *Acropora* specimens wihin a micritic matrix.

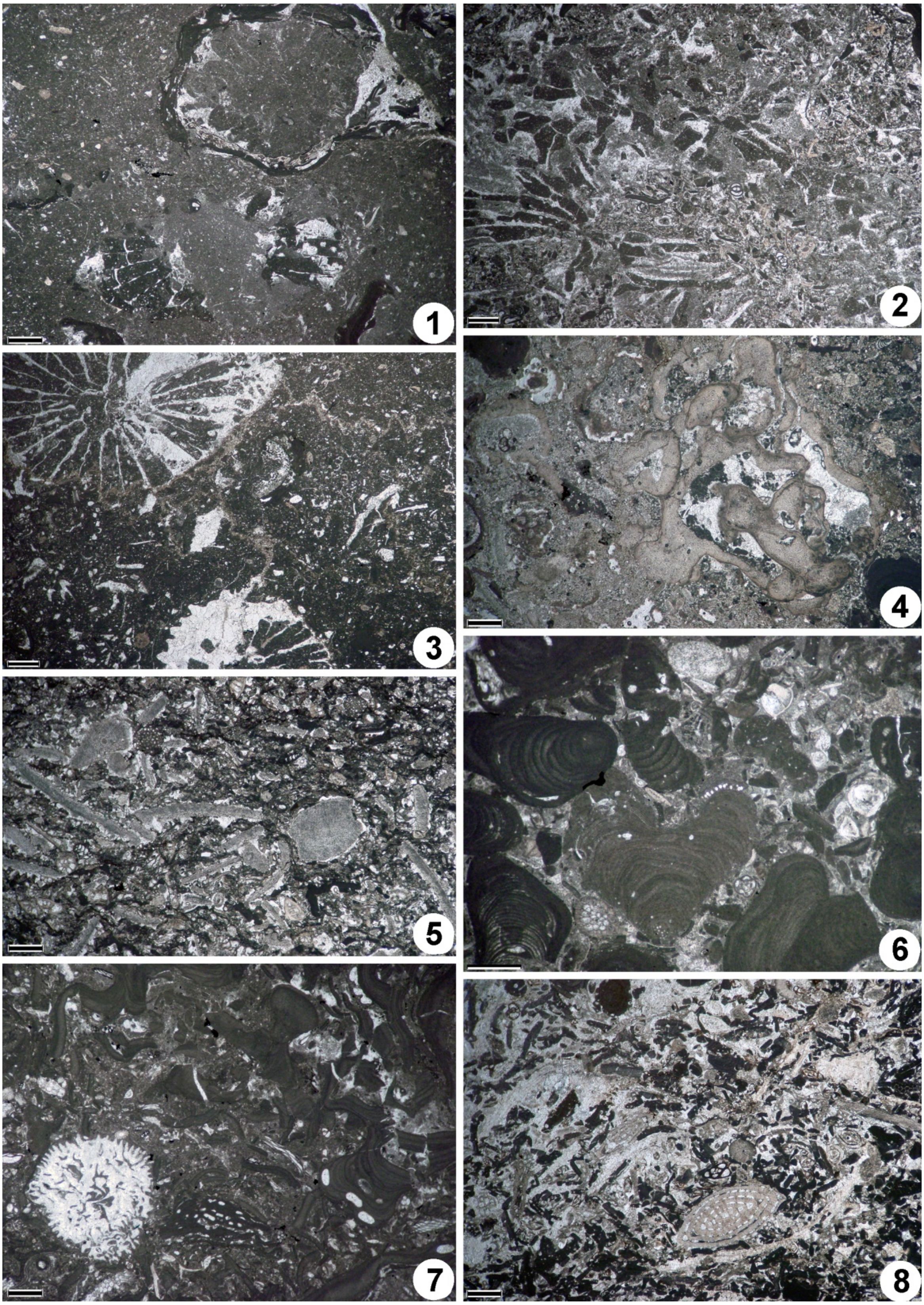

Fig. 5. **Microfacies and microfossils from the Cuciulat quarry (from Săsăran & Bucur, 2011)**. **1**, **3** – phaceloid corals encrusted by red algae; **2** – coral boundstone; **4** – partly dolomitized carbonates with *Polyatrata alba* crusts; **5** – bioclastic grainstone/packstone with echinoid fragments; **6**, **7** – packstone with red algae (*Lithothamnion*); 8 – bioclastic grainstone with *Nummulites fabianii*. Scale-bar is 1 mm.

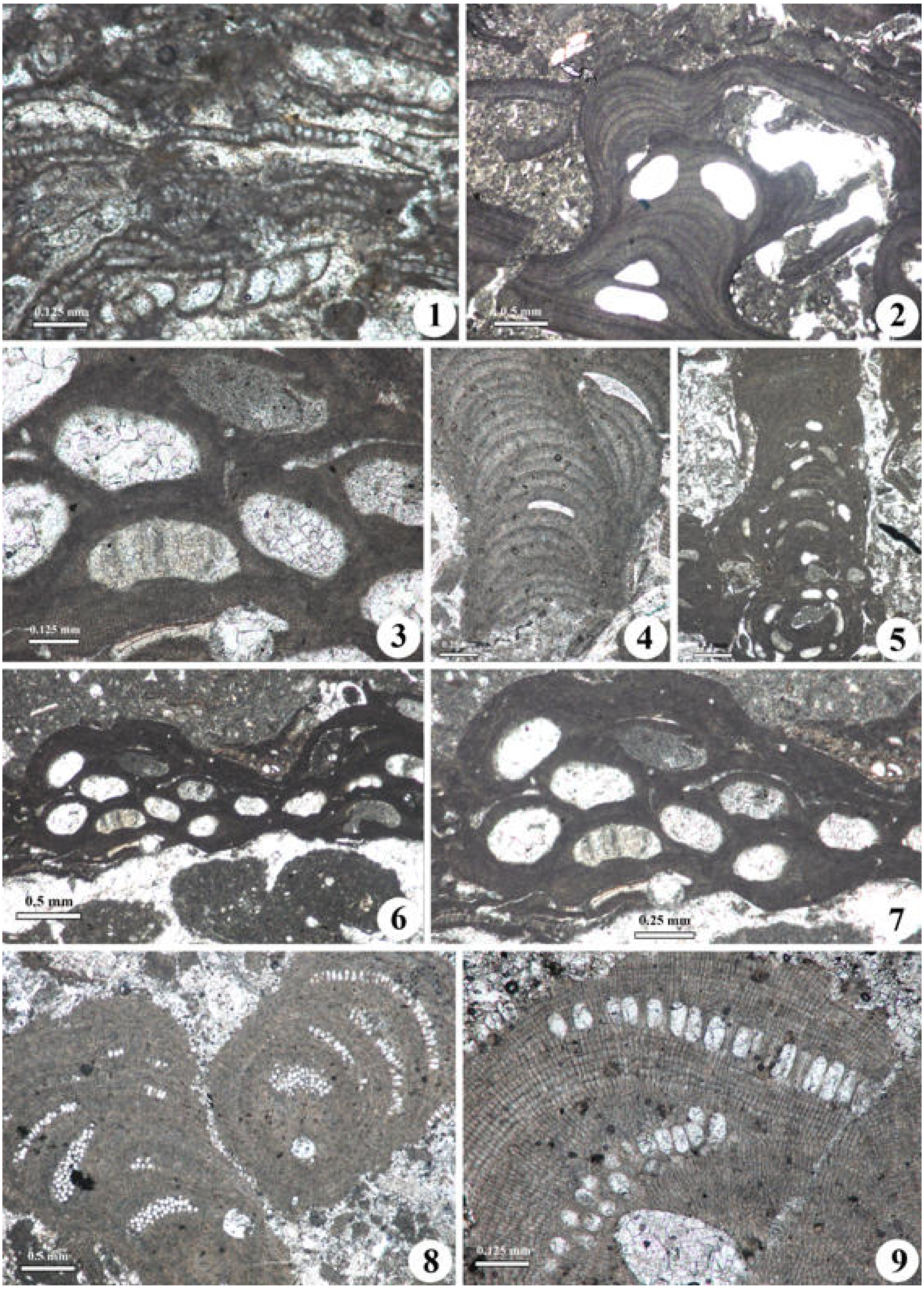

Fig. 6. **Red algae from Cuciulat quarry (from Săsăran & Bucur, 2011)**. **1** – *Lithoporella melobesioides*; **2** – **7** – melobesioid corallinaceans of *Lithotamnion* group; **8, 9** – *Sporolithon* sp..

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Jibou botanical garden

Mircescu, C.V.

Stop 3

Location

Jibou botanical garden is located in the north-western part of Jibou town, in the vicinity of the Wesselényi Castle, on the left bank of the Someș River.

This tourist attraction started to develop as a botanical garden between 1959-1968. It was transformed by Professor Vasile Fati, from a common park into a botanical garden. Its development continued between 1968-1982 when the most important greenhouses were built. They contain a large variety of plants. The most important sectors are divided in different cathegories based on the origin and usage of plant species. Such cathegories include the ornamental, phytogeographic, systematic, dendrological and echonomical greenhouses. Another part of the garden contains mediteranean, tropical and subtropical species. The phytogeographic sector contains various species from Romania (Banat, Oltenia, Carpathians) and abroad (Caucasus, Alps, Northern America, Australia). Some of the tropical and subtropical species are represented by various types of palmtrees (*Phoenix dactylifera*, *Phoenix canariensis*, *Arcantophoenix*, *Washingtonia*, *Trahycarpus*). The mediteranean collection contains species of orange trees and lime trees. The australian collection is renowned for its *Eucaliptus* species and various arborescent ferns (*Alsophyla australis*). The last two greenhouse compartments contain over 750 species of cactus representatives from Africa and Mexico. The main buliding of the Botanical Institute contains a Botanical Museum and the Herbarium. The former contains over 1500 sheets with spontaneous and culture plants.

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Grădina Zmeilor (Garden of dragons)

Săsăran, E., Pleș, G. & Bucur, I. I.

Stop 4

The Grădina Zmeilor protected area is known for its geological and landscape value within the Sălaj County. It has a total surface of 3 ha and includes an assemblage of irregular shaped rocks which were formed by erosional processes and gravitational landslides.

Location

The outcrops are located in the vicinity of national road DN1H which forms the main link between the Zalău municipality and Jibou town. This protected area is located at a distance of aproximately 9 km from the Jibou locality, in the western part of Gâlgău Almașului village (Fig. 1).

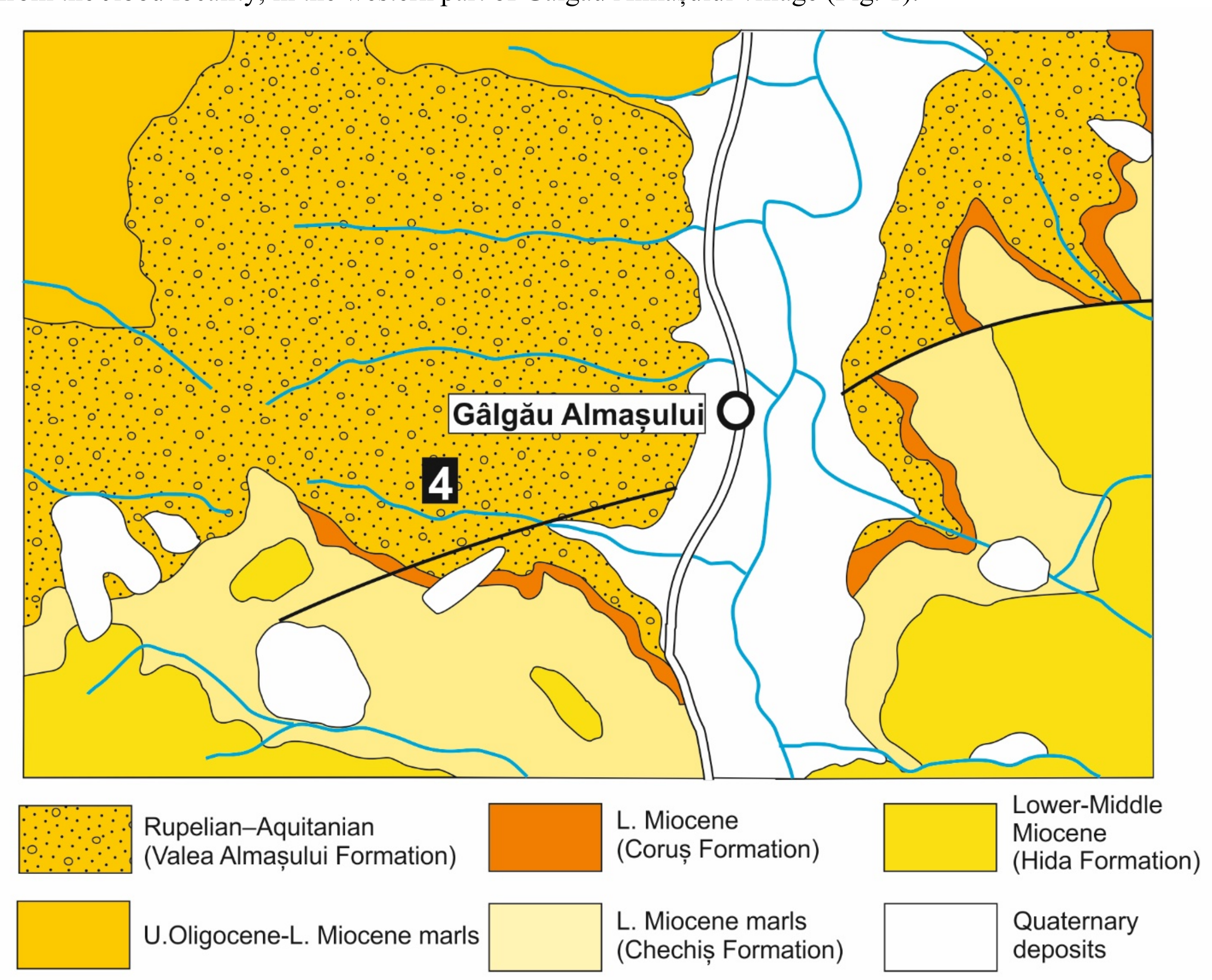

Fig. 1. Geological map of the Gâlgău Almașului area (modified from Rusu & Popescu, 1975)

Age: Rupelian–Aquitanian (Upper Oligocene–Lower Miocene)

Succession and facies

Based on the existing literature, the sedimentary deposits from Grădina Zmeilor belong to the Valea Almașului Formation (Răileanu & Saulea, 1956; Petrescu, 1968; Petrescu et. al., 1987). The Valea Almașului Formation has a siliciclastic nature and it contains conglomerates/microconglomerates, sandstones and clays/marls. A coal rich layer is present in the basal part of the sedimentary succession (Vasile, 2018). It was exploited by galery mining methods (Fig. 3). Clays and poorly cemented sandstones are associated with such coal beds. The basal deposits are overlain by decimeter to meter thick banks of sandstones interbedded with microconglomerates/conglomerates.

These beds contain erosional structures, cross and parallel bedding and lamination. Rounded clasts are common. Gravel sized clasts are imbricated on the bedding/lamination planes (Fig. 4). The identified sedimentary structures and the morphology of the sedimentary bodies suggest deposition in an estuary-delta type depositional environment or more precisely in a shallow-water delta front setting.

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Fig. 3 – The entrance of a mine gallery from the Grădina Zmeilor area (photo made by Tudor Vasile).

Fig. 4 – Cross-and parallel bedding in the sedimentary deposits from the Grădina Zmeilor protected area (photo was made by Călin Pavăl).

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LIST OF CONTRIBUTORS

AKKEMIK, Ü.
Istanbul University-Cerrahpasa, Forestry Faculty, Forest Botany Department, 34473 Bahceköy – Sarıyer, Istanbul, Turkey.
e-mail: uakkemik@istanbul.edu.tr

ANTON, M. E.
National Institute of Marine Geology and Geo-ecology, 23-25 Dimitrie Onciul Street, RO-024053 Bucharest, Romania.
e-mail: antoneliza@geoecomar.ro

ANTONIADE, C.
OMV Petrom S.A. – ICPT Câmpina, Formation Characterization and Geochemistry Laboratory, 29 Culturii Blvd., Câmpina, Romania.
e-mail: claudia.antoniade@gmail.com, gheorghitaclaudia.antoniade@petrom.com

AROLDI., C.
Babeş-Bolyai University, Departament of Geology, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania.
e-mail: carlo.aroldi@ubbcluj.ro

BADEA, D.-D.
University "Al. I. Cuza", Department of Geology, 20 B Carol I Avenue, 700505, Iași, Iași County.

BARABÁS, E.
Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania.
e-mail: bemese96@yahoo.com

BARANYI, V.
Croatian Geological Survey, Department of Geology, Sachsova 2, 10000 Zagreb, Croatia.
e-mail: vbaranyi@hgi-cgs.hr

BARTHA, I. R.
Eötvös Loránd University, Department of Geology, Pázmány Péter sétány 1/C, 1117 Budapest, Hungary.
e-mail: isti.bartha@gmail.com

BARTOLINI, A.
Museum National d'Histoire Naturelle, Département Histoire de la Terre, UMR CNRS, 8 rue Buffon, Paris, France.

BĂLC, R.
Faculty of Environmental Science and Engineering, Babeş-Bolyai University, Fântânele 30, 400294 Cluj-Napoca, Romania.
Interdisciplinary Research Institute on Bio-Nano-Sciences, Babeş-Bolyai University, Treboniu Laurian 42, 400271 Cluj Napoca, Romania.
e-mail: ramona.balc@ubbcluj.ro

BELHADJI, A.
Laboratoire de Paléontologie Stratigraphique et Paléoenvironnements, Université d'Oran 2 – BP 1015 Oran El Mnaouer, 31000 Oran, Algeria.
e-mail: ahmedbelhadji2010@gmail.com

BELKEBIR, L.
Laboratoire de Paléontologie Stratigraphique et Paléoenvironnements, Université d'Oran 2 – BP 1015 Oran El Mnaouer, 31000 Oran, Algeria.

BERCEA, R.-I.
SNGN ROMGAZ, C.I. Motas 4, Mediaș, Romania.
e-mail: razvan_ionut_bercea@yahoo.com

BESSEDIK, M.
Laboratoire de Paléontologie Stratigraphique et Paléoenvironnements, Université d'Oran 2 – BP 1015 Oran El Mnaouer, 31000 Oran, Algeria.

BIA, T.
Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, 1 M. Kogălniceanu str., 400084 Cluj-Napoca, Romania.

BINDIU HAITONIC, R.
Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania.
e-mail: raluca.bindiu@ubbcluj.ro

BOTKA, D.
Eötvös Loránd University, Department of Palaeontology, Pázmány Péter sétány 1/C, 1117 Budapest, Hungary.
e-mail: botkadani@gmail.com

BOZUKOV, V.
Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Akad. G. Bonchev Str, bl. 23, 1113 Sofia, Bulgaria.
e-mail: vladimir_bozukov@yahoo.com

BRAUCHER, R.
Aix-Marseille Univ., CNRS-IRD-Collège de France-INRA, CEREGE, 13545 Aix-en-Provence, France.
e-mail: braucher@cerege.fr

BRÂNZILĂ, M.
Carol I Avenue, No. 20A, Iaşi – 700506, Alexandru Ioan Cuza University of Iaşi, Faculty of Geography and Geology, Department of Geology, Romania.
e-mail: mib@uaic.ro

BRUSATTE, S. L.
School of GeoSciences, University of Edinburgh, Grant Institute, James Hutton Road, Edinburgh EH9 3FE, UK.
e-mail: Stephen.Brusatte@ed.ac.uk

BUCUR, I. I.
Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, 1 M. Kogălniceanu str., 400084 Cluj-Napoca, Romania.
e-mail: ioan.bucur@ubbcluj.ro

CAVIN, L.
Earth Sciences Department, Natural History Museum, CP 6434, 1211 Geneva 6, Switzerland.
e-mail: lionel.cavin@ville-ge.ch

ÇELIK, H.
Istanbul University-Cerrahpasa, Forestry Faculty, Forest Botany Department, 34473 Bahceköy – Sarıyer, Istanbul, Turkey.
e-mail: uakkemik@istanbul.edu.tr

CHELARIU, C.
University "Alexandru Ioan Cuza" of Iasi, Department of Geology, 20 A, Carol I Street, RO-700505, Iasi, Romania.
e-mail: ciprian.chelariu@uaic.ro

CHIRA, C. M.
Babeş-Bolyai University, Departament of Geology, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania.
e-mail: carmen.chira@ubbcluj.ro

CHOI, S.
School of Earth and Environmental Sciences, Seoul National University, Seoul, 08826, South Korea.
e-mail: seung0521@snu.ac.kr

COCIUBA, I.
Geological Institute of Romania, Cluj-Napoca Branch, Romania.
e-mail: ioan_cociuba@yahoo.com

CONSTANTIN, S.
Romanian Academy, "Emil Racoviță" Institute of Speleology, Center for Geochronology and Paleo-climate, 31 Frumoasă St., 010986 Bucharest, Romania.
e-mail: silviu.constantin@iser.ro

COPILAȘ-CIOCIANU, D.
Nature Research Centre, Laboratory of Evolutionary Ecology of Hydrobionts, Akademijos 2, 08412 Vilnius, Lithuania.
e-mail: denis.copilas-ciocianu@gamtc.lt

ĆORIĆ, S.
Geological Survey of Austria, Department of Sedimentary Geology, Neulinggasse 38, 1030 Vienna, Austria.
e-mail: stjepan.coric@geologie.ac.at

CRIHAN, I. M.
Universitatea Petrol-Gaze din Ploiesti, Bd. Bucuresti nr. 39, Ploiesti.
e-mail: crihanim@upg-ploiesti.ro

CRUSOVEANU (RUSU), S.
University of Bucharest, Department of Geology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania. IGR-National Geological Museum, 2 Bl. Kiseleff, sector 1, Bucharest, Romania.
e-mail: rusu.mona82@gmail.com

CSIKI-SAVA, Z.
Laboratory of Paleontology, Faculty of Geology and Geophysics, University of Bucharest, 1 Nicolae Bălcescu Avenue, 010041 Bucharest, Romania.
e-mail: zoltan.csiki@g.unibuc.ro

CSOMA, V.
Eötvös Loránd University, Department of Palaeontology, Pázmány Péter sétány 1/C, 1117 Budapest, Hungary.
e-mail: csoma.vivien7@gmail.com

DAVER, G.
PALEVOPRIM, UMR 7262 CNRS INEE, Laboratoire Paléontologie, Evolution Paléoécosystèmes, Paléoprimatologie, Université de Poitiers, , Bat. B35, TSA 51106, 6 rue M. Brunet, 86073 Poitiers, Cedex 9, France.
e-mail: guillaume.daver@univ-poitiers.fr

DIACONU, A.-C.
Department of Geology, Babeş-Bolyai University, Kogălniceanu, 1, 400084 Cluj-Napoca, Romania.
e-mail andreicosmind@yahoo.com

DRAGOŞ, A.-G.
National Institute for Marine Geology and Geo-ecology, 23-25 Dimitrie Onciul Street, RO-024053, Bucharest, Romania.
e-mail: d.andreigabriel@geoecomar.ro

DRĂGUȘIN, V.
Romanian Academy, "Emil Racoviță" Institute of Speleology, Center for Geochronology and Paleoclimate, 31 Frumoasă St., 010986 Bucharest, Romania.
e-mail: virgil.dragusin@iser.ro

DROMERESCHI, P.
Babeş-Bolyai University, Departament of Geology, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania.
e-mail: pavel.1mai@yahoo.com

DUCEA, M. N.
University of Bucharest, Department of Mineralogy, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania.
University of Arizona, Department of Geosciences, Tucson, AZ 85721, USA.
e-mail: ducea@email.arizona.edu

DUMITRIU, S.-D.
CGG Robertson, Llandudno, North Wales LL30 1SA, United Kingdom.
e-mail: siminadumitriu@gmail.com

DYKE, G.
Babeş-Bolyai University, Faculty of Biology and Geology, 44 Gheorghe Bilaşcu Street, RO-400015, Cluj-Napoca, Romania.
University of Southampton, UK.
e-mail: garethdyke@gmail.com

FERRANTE, C.:
Earth Sciences Department, Natural History Museum, CP 6434, 1211 Geneva 6, Switzerland.

FEURDEAN, A.
Department of Geology, Babeş-Bolyai University, Kogălniceanu, 1, 400084 Cluj-Napoca, Romania.
e-mail: angelica.feurdean@senckenberg.de

FILIPESCU, S.
Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania.
e-mail: sorin.filipescu@ubbcluj.ro

GAŁKA, M.
Department of Geobotany and Plant Ecology, Faculty of Biology and Environmental Protection, University of Lodz, 12/16 Banacha Str., Lodz.
e-mail: gamarga@wp.pl

GAWLICK, H.-J.
Montanuniversität Leoben, Chair of Petroleum Geology, Peter Tunner Strasse 5, 8700 Leoben, Austria.
e-mail: Hans-Juergen.Gawlick@unileoben.ac.at

GHIONEA, Ș.
Babeș-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu, 400 084 Cluj Napoca, Romania.
e-mail: stefania.ghionea@yahoo.com

GŁOWNIAK, E.
University of Warsaw, Faculty of Geology, Żwirki i Wigury 93, 02-089 Warsaw, Poland.
e-mail: eglownia@uw.edu.pl

GRABOWSKI, J.
Polish Geological Institute - National Research Institute, Rakowiecka 4, 00-975 Warsaw, Poland.
e-mail: jgra@pgi.gov.pl

GRANIER, B.
Dépt. STU, Fac. Sci. Tech., UBO, 6 avenue Le Gorgeu, CS 93837, 29238 Brest cedex 3, France.
e-mail: bgranier@univ-brest.fr

GRĂDIANU, I.
Natural Sciences Museum Piatra Neamț, Petru Rares¸, No. 26, 610119 Piatra Neamț, Romania.
e-mail: igradianu@hotmail.com

GRĂDINARU, E.
Department of Geology, Faculty of Geology and Geophysics, University of Bucharest, Bd.Bălcescu Nicolae 1, 010041 Bucharest, Romania.
e-mail: egradinaru@gmail.com

GRĂDINARU, M.
University of Bucharest, Department of Geology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania.
e-mail: mihaela.gradinaru@unibuc.ro

GRINDEAN, R.
Department of Geology, Babeş-Bolyai University, Kogălniceanu, 1, 400084 Cluj-Napoca, Romania.
e-mail: roxana.grindean@ubbonline.ubbcluj.ro

GUY, F.
PALEVOPRIM, UMR 7262 CNRS INEE, Laboratoire Paléontologie, Evolution Paléoéco-systèmes, Paléoprimatologie, Université de Poitiers, Bat. B35, TSA 51106, 6 rue M. Brunet, 86073 Poitiers, Cedex 9, France.

HAIDUC, B.-S.
Carol I Avenue, No. 20A, Iaşi – 700506, Alexandru Ioan Cuza University of Iaşi, Faculty of Geography and Geology, Department of Geology, Romania.
e-mail: haiduc.bogdan91@gmail.com

HOAN, D. T.
Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, 1 M. Kogălniceanu str., 400084 Cluj-Napoca, Romania.
e-mail: daotrunghoan@gmail.com

IAMANDEI, E.
Geological Institute of Romania (GIR), 1st Caransebeş Street, 012271 – Bucharest, Romania,
e-mail: iamandei@gmail.com

IAMANDEI, S.
Geological Institute of Romania (GIR), 1st Caransebeş Street, 012271 – Bucharest, Romania,
e-mail: iamandei@gmail.com

ILIEȘ, I. A.
Babeș-Bolyai University, Department of Geology and center for Integrated Geological Studies, Mihai Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania.
e-mail: iliesiuliaandreea@gmail.com

IONESI, V.
„Alexandru Ioan Cuza" University of Iași, Faculty of Geography and Geology, Department of Geology, Carol 1 Bd. 700505, Iași, Romania.
e-mail: vioion@uaic.ro

IONIŢĂ , C.
OMV Petrom S.A, Upstream – Development & Reservoir Engineering, ICPT, 29 Culturii Blvd., 105600 Câmpina, Prahova, Romania.
email: corina.ionita@petrom.com

IVANOV, D.
Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Akad. G. Bonchev Str, bl. 23, 1113 Sofia, Bulgaria.
e-mail: dimiter@gbg.bg

JAKAB, A.
Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania.
e-mail: anna.jaxi@gmail.com

JOVANOVIC, D.
Geological Survey of Serbia, Rovinjska 12, 11000 Beograd, Serbia.
e-mail: djdivna@gmail.com

JURAVLE, D. T.
"Alexandru Ioan Cuza" University, Faculty of Geography and Geology, 20 A, Carol I Street, RO-700505, Iaşi, Romania.
e-mail: jdorut@yahoo.com

JURAVLE, V.
S.C. DAFLOG, Medias, Romania.
e-mail: juravlevalentin@yahoo.com

KÖVECSI, S.-A.
Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania.
e-mail: szabolcs.kovecsi@ubbcluj.ro

LAURENT, C.
Babeş-Bolyai University, Faculty of Biology and Geology, 44 Gheorghe Bilaşcu Street, RO-400015, Cluj-Napoca, Romania.
University of Southampton, UK.
e-mail: christian_laurent@live.com

LAZĂR, I.
University of Bucharest, Department of Geology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania.
e-mail: iuliana.lazar@g.unibuc.ro

LÁZÁR, B.
Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania.
e-mail: lazarboty@gmail.com

LEE, Y.-N.
School of Earth and Environmental Sciences, Seoul National University, Seoul, 08826, South Korea.
e-mail: ynlee@snu.ac.kr

LENDVAI, A.
Babeş-Bolyai University, Faculty of Biology and Geology, 44 Gheorghe Bilaşcu Street, RO-400015, Cluj-Napoca, Romania.
Evolutionary Zoology, University of Debrecen, Debrecen, Hungary.

LESS, GY.
University of Miskolc, Department of Geology and Mineral Resources, 3515, Miskolc-Egyetemváros, Hungary.
e-mail: foldlgy@uni-miskolc.hu

LOGHIN, S.
„Alexandru Ioan Cuza" University of Iași, Faculty of Geography and Geology, Department of Geology, Carol 1 Bd. 700505, Iași, Romania.
e-mail: sergiu_loghin@yahoo.com

MAGYAR, I.
MOL Hungarian Oil and Gas Plc., Október huszonharmadika utca 18, 1117 Budapest, Hungary.
MTA-MTM-ELTE Research Group for Paleontology, Ludovika tér 2, 1083 Budapest, Hungary.
e-mail: immagyar@mol.hu

MARE, S.
S.C. Geologic Worldwide Services S.R.L. Bucharest, Romania.
e-mail: silvia_mare@yahoo.com

MATEI, C.
„Alexandru Ioan Cuza" University of Iași, Faculty of Geography and Geology, Department of Geology, Carol 1 Bd. 700505, Iași, Romania.
e-mail: cristinelmatei111@gmail.com

MELINTE-DOBRINESCU, M. C.
National Institute of Marine Geology and Geo-ecology, 23-25 Dimitrie Onciul Street, RO-024053 Bucharest, Romania.
e-mail: melinte@geoecomar.ro

MENG, J.
Division of Paleontology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024, USA.
e-mail: jmeng@amnh.org

MIRCESCU, C. V.
Babeș-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu, 400 084 Cluj Napoca, Romania.
e-mail: cristianvictormircescu@hotmail.com

MIREA, I.–C.
Babes-Bolyai University, Faculty of Biology and Geology, Department of Geology, 1 Bd. M. Kogălniceanu, 400084 Cluj-Napoca, Romania.
e-mail: ionut.cornel.mirea@gmail.com

MORENO-AZANZA, M.
Geobiotec, Departamento de Ciências da Terra, Universidade Nova de Lisboa, Caparica, 2829-526, Portugal.
e-mail: mmazanza@fct.unl.pt

NORELL, M. A.
Division of Paleontology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024, USA.
e-mail: norell@amnh.org

OLTEAN, G.
Babeş-Bolyai University, Department of Geology and center for Integrated Geological Studies, Mihai Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania.
e-mail: geluoltean8@gmail.com

OPRIȘA, A.
„Babeş-Bolyai" University, Faculty of Biology and Geology, Department of Geology, Str. M. Kogălniceanu 1, 400084, Cluj-Napoca, Romania.
e-mail: oprisaalin@gmail.com

PANAIT, A.
Department of Geology, Babeş-Bolyai University, Kogălniceanu, 1, 400084 Cluj-Napoca, Romania.
e-mail: pnt_andrei@yahoo.com

PAPAZZONI, C. A.
University of Modena and Reggio Emilia, Department of Chemical and Geological Sciences, Via Campi 103, 41125 Modena, Italy.
e-mail: papazzoni@unimore.it

PAPP, D.
Geological Institute of Romania, Cluj-Napoca Branch, Romania.
e-mail: deliapapp@yahoo.com

PAŞCALĂU, P.
Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania.
e-mail: maria.patricia64@yahoo.com

PĂUN, E.-I.
Carol I Avenue, No. 20A, Iaşi – 700506, Alexandru Ioan Cuza University of Iaşi, Faculty of Geography and Geology, Department of Geology, Romania.
e-mail: elenaionelapaun@gmail.com

PETCULESCU, A.
Romanian Academy, "Emil Racoviță" Institute of Speleology, 13-15 Calea 13 Septembrie, 050711 Bucharest, Romania.
e-mail: alexpet@gmail.com

PETRESCU, L.
University of Bucharest, Department of Mineralogy, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania.
e-mail: lucpet@geo.edu.ro

PLEȘ, G.
Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania.
e-mail: george.ples@ubbcluj.ro

POLAVDER, S.
Rudarski institut, Batajnički drum 2, 11080 Beograd-Zemun, Serbia.
e-mail: svetlana.polavder@ribeograd.ac.rs

POPA, G. L.
Babeș-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu, 400 084 Cluj Napoca, Romania.
e-mail: george.popa.leonard@gmail.com

POPA, M. V.
Babeş-Bolyai University, Departament of Geology, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania.
e-mail: mirela.popa@ubbcluj.ro

POPESCU, A.
Museum of Oltenia Craiova, Department of natural Sciences, 8 Popa Sapca str. 200244 Craiova, Romania.
e-mail: aurelian_popescu@yahoo.fr

POPESCU, G.
Str. Arhitect Antonescu Petre, Bucharest, Romania.
e-mail: gippopescu@yahoo.com

POSMOȘANU, E.
Țării Crișurilor Museum, Department of Natural Science, 1A Str.. Armatei Române, 410087 Oradea, Romania.
e-mail: eposmosanu@gmail.com

PRONDVAI, E.
MTA-MTM-ELTE Research Group for Paleontology, Budapest, 1083, Hungary.
e-mail: edina.prondvai@gmail.com

RASHIDI, K.
Department of Geology, Yazd University, 89195-741 Yazd, Iran.
e-mail: kooroshrashidi@yazd.ac.ir

RAUSCH. L.
University of Bucharest, Department of Geology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania.
Department of Animal Ecology & Systematics, Justus Liebig University, Heinrich-Buff-Ring 26–32 IFZ, 35392 Giessen, Germany.
e-mail: leanrausch@gmail.com

RĂŢOI, B. G.
Carol I Avenue, No. 20A, Iaşi – 700506, Alexandru Ioan Cuza University of Iaşi, Faculty of Geography and Geology, Department of Geology, Romania.
e-mail: bog21rat@gmail.com

RIDING, R.
University of Tennessee, Department of Earth and Planetary Sciences, 1621 Cumberland Avenue, Knoxville TN 37996-1526, USA.
e-mail: rriding@utk.edu

RUSKAL, A.
Department of Geology, Babeş-Bolyai University, Kogălniceanu, 1, 400084 Cluj-Napoca, Romania.
e-mail: agnes.ruskal@gmail.com

SAINT MARTIN, J.-P.
Museum National d'Histoire Naturelle, Département Histoire de la Terre, UMR CNRS, 8 rue Buffon, Paris, France.
e-mail: jpsmart@mnhn.fr

SANT, K.
Utrecht University, Paleomagnetic Laboratory Fort Hoofddijk, Budapestlaan 17, 3584 CD Utrecht, the Netherlands.
e-mail: karin.sant@gmail.com

SAVA, G. O.
"Horia Hulubei" National Institute for Physics and Nuclear Engineering, 30 Reactorului St., 077125, Măgurele, Ilfov, Romania.
University "Politehnica" of Bucharest, 313 Splaiul Independenței, 060042 Bucharest, Romania.
e-mail: gabriela.sava@nipne.ro

SAVA, T. B.
"Horia Hulubei" National Institute for Physics and Nuclear Engineering, 30 Reactorului St., 077125, Măgurele, Ilfov, Romania.
e-mail: tiberiu.sava@nipne.ro

SĂSĂRAN, E.
Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, 1 M. Kogălniceanu str., 400084 Cluj-Napoca, Romania.
e-mail: emanoil.sasaran@ubcluj.ro

SĂSĂRAN, L.
Babeş-Bolyai University, Faculty of Biology and Geology, Department of Geology, Mihail Kogălniceanu Street 1, 400084, Cluj-Napoca, Romania.
e-mail: liana.sasaran@ubbcluj.ro

SCHLAGINTWEIT, F.
Lerchenauerstr. 167, D-80935 München, Germany.
e-mail: felix.schlagintweit@gmx.de

SESERMAN, A.
"Alexandru Ioan Cuza" University of Iași, Faculty of Geography and Geology, Department of Geology, Carol 1 Bd. 700505, Iași, Romania.
e-mail: anca.seserman@uaic.ro

SILYE, L.
Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania.
e-mail: lorand.silye@ubbcluj.ro

SINGHEL, C.-V.
OMV Petrom S.A, Upstream – Development & Reservoir Engineering, ICPT, 29 Culturii Blvd., 105600 Câmpina, Prahova, Romania.
e-mail: victor.singhel@petrom.com

STOICA, M.
University of Bucharest, Department of Geology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania.
e-mail: marius.stoica@g.unibuc.ro

SUDAR, M. N.
Serbian Academy of Sciences and Arts, Knez-Mihailova 35, 11000 Beograde, Serbia.
e-mail: milan.sudar1946@gmail.com

SZEKELY, F. S.
Babeş-Bolyai University, Department of Geology and Center for Integrated Geological Studies, Mihail Kogălniceanu Street 1, 400084 Cluj-Napoca, Romania.
e-mail: szekelyflavius@gmail.com

ŠUJAN, M.
Comenius University, Department of Geology and Palaeontology, Ilkovičova 6, 842 15 Bratislava, Slovakia.
e-mail: miso@equis.sk

TANȚĂU, I.
Department of Geology, Babeş-Bolyai University, Kogălniceanu, 1, 400084 Cluj-Napoca, Romania.
e-mail: ioan.tantau@ubbcluj.ro

TĂMAȘ, A.
Department of Earth Sciences, Durham University, Durham, United Kingdom.
e-mail: alexandra.tamas@durham.ac.uk

THAJBAKHSH, G. R.
Department of Geology, Yazd University, 89195-741 Yazd, Iran.
e-mail: tajbakhsh@yazd.ac.ir

TÓTH, E.
Eötvös Loránd University, Department of Palaeontology, Pázmány Péter sétány 1/C, 1117 Budapest, Hungary.
e-mail: tothemoke.pal@gmail.com

TUDOR, E.
Hunt Oil Company of Romania, Băneasa Business Center, Sector 1, 013694 Bucharest, Romania.
e-mail: etudor@huntoil.com

ȚABĂRĂ, D.
"Al. I. Cuza" University of Iași, Department of Geology, 20A Carol I Blv., 700505 Iași, Romania.
e-mail: dan.tabara@yahoo.com

ȚIBULEAC, P.
University of "Alexandru Ioan Cuza" Iași, Department of Geology, 20A Bd. Carol I, 700505 Iași, Romania.
e-mail: paul.tibleac@uaic.ro

TÎRLĂ, M.–L.
University of Bucharest, Faculty of Geology and Geophysics, Department of Geology, Laboratory of Palaeontology, 1 Bd. Nicolae Bălcescu, 010041 Bucharest, Romania.
e-mail: tirla@geo.unibuc.ro

ȚUȚUIANU, M.
Babeş-Bolyai University, Faculty of Biology and Geology, Department of Geology, Mihail Kogălniceanu Street 1, 400084, Cluj-Napoca, Romania.
e-mail: marcela.tutuianu@yahoo.com

UNGUREANU, R.
Department of Geology, Babeş-Bolyai University, Str. M. Kogălniceanu 1, 400084 Cluj-Napoca, Romania
e-mail: navzar22@yahoo.com

URSACHI, L.
Vasile Pârvan" Museum of Bârlad, Natural Sciences Branch, 235 Republicii Street, 731070, Bârlad, Vaslui County, Romania.
e-mail: ursachi_laur@yahoo.com

URSU, A.
University "Alexandru Ioan Cuza" of Iasi, Department of Geography, 20 A, Carol I Street, RO-700505, Iasi, Romania.
e-mail: ursu_v_adrian@yahoo.com

VASILE, Ș.
University of Bucharest, Department of Geology, 1 Nicolae Bălcescu Ave., 010041 Bucharest, Romania. University of Bucharest Research Centre for the Geology of Coal Deposits and Environment Protection, Faculty of Geology and Geophysics, 1 Nicolae Bălcescu Ave., 010041 Bucharest, Romania.
e-mail: yokozuna_uz@yahoo.com

VAŠÍČEK, Z.
Institute of Geonics, Academy of Sciences of the Czech Republic, Studentska 1768, CZ-708 00 Ostrava-Poruba, Czech Republic.
e-mail: zdenek.vasicek@ugn.cas.cz

VECIUNCA, A.
Babeş-Bolyai University, Department of Geology, 1 Mihail Kogălniceanu Street, 400084 Cluj-Napoca, Romania.
e-mail: alynaa72@yahoo.com

VELITZELOS, D.
National and Kapodistrian University of Athens, Faculty of Geology and Geoenvironment, Athens, Greece.
e-mail: veljim@geol.uoa.gr

VELITZELOS, E.
National and Kapodistrian University of Athens, Faculty of Geology and Geoenvironment, Athens, Greece.

VREMIR, M.
Department of Natural Sciences, Transylvanian Museum Society, 2-4 Napoca Street, 400009 Cluj-Napoca, Romania.
e-mail: vremirmatyi@gmail.com

WIERZBOWSKI, H.
Polish Geological Institute - National Research Institute, Rakowiecka 4, 00-975 Warsaw, Poland.
e-mail: hubert.wierzbowski@pgi.gov.pl

ZÁGORŠEK, K.
Department of Geography, Technical University of Liberec, 229 Studentská 2, 461 17 Liberec, Czech Republic.
e-mail: kamil.zagorsek@gmail.com