



# **Environmental, Structural and Stratigraphical Evolution of the Western Carpathians**

## **Abstract book**



# **Faculty of Natural Sciences**

doc. Mgr. Natália Hudáčková, PhD.

Mgr. Andrej Ruman, PhD.

doc. RNDr. Michal Šujan, PhD.

**Editors**

## **Environmental, Structural and Stratigraphical Evolution of the Western Carpathians**

### **Abstract Book**



### **12<sup>th</sup> ESSEWECA Conference**

**8<sup>th</sup> – 9<sup>th</sup> December 2022**

**Bratislava, Slovakia**

**2022**

**Comenius University Bratislava**

**Conference is organized by:** Slovak Geological Society, Bratislava



*The conference is under financial support of the companies  
Nafta a.s., EQUIS, spol. s r.o. and BARZZUZ s.r.o.*



**Scientific guarantee:**

*Comenius University Bratislava, Faculty of Natural Sciences,  
Department of Geology and Paleontology*



COMENIUS  
UNIVERSITY  
BRATISLAVA



FACULTY  
OF NATURAL SCIENCES  
Comenius University  
Bratislava



**Scientific board:** prof. RNDr. Daniela Reháková, CSc.; prof. RNDr. Dušan Plašienka, DrSc.;  
prof. RNDr. Michal Kováč, DrSc.

**Organizing committee:** doc. Mgr. Natália Hudáčková, PhD.; doc. RNDr. Michal Šujan, PhD.;  
Mgr. Andrej Ruman, PhD.; Mgr. Michal Jamrich, PhD.;  
Mgr. Štefan Józsa, PhD.; RNDr. Monika Kováčiková

**Editors and reviewers:** doc. Mgr. Natália Hudáčková, PhD.; Mgr. Andrej Ruman, PhD.;  
doc. RNDr. Michal Šujan, PhD.

**Cover:** Collage of figures published in open access journals by the authors of the conference  
contributions, named in the technical imprint at the end of the abstract book.

**Figures:** © the authors

**License:** Creative Commons CC BY-SA 4.0



[https://stella.uniba.sk/texty/PRIF\\_esseweca\\_22.pdf](https://stella.uniba.sk/texty/PRIF_esseweca_22.pdf)

**Publisher:** Comenius University Bratislava, 2022

**ISBN: 978-80-223-5518-6 (printed version)**

**ISBN: 978-80-223-5519-3 (online version)**

## Contents

<b>Preface .....</b>	9
<b>Kishan Aherwar, Michal Šujan, Katarína Šarinová, Régis Braucher, Arjan de Leeuw, Andrej Chyba, Anton Matoshko, Peter Uhlík, Barbara Rózsová and Aster Team:</b> Understanding the variability of authigenic $^{10}\text{Be}/^{9}\text{Be}$ ratio: An example from deltaic to offshore facies of the Slanicul de Buzau section, Romania.....	13
<b>Richárd Gyula Albrecht:</b> In the search of the Jurassic – Cretaceous boundary in the lime kilns of Zengővárkony, Mecsek Mountains, Hungary .....	15
<b>Silvia Antolíková and Ján Soták:</b> Nannoplankton biostratigraphy and paleoecology of the Paleocene formations in K/Pg section near Žilina.....	16
<b>Jaroslava Babejová-Kmecová, Edit Király, Katalin Báldi and Natália Hudáčková:</b> Special preparation procedure for miliolids with preservation problem for Laser Ablation Inductively Coupled Plasma Mass Spectrometry analyses .....	18
<b>Marta Bąk and Krzysztof Bąk:</b> Climate change affecting the intraspecific variability of Saturnalidae, (Radiolaria) in the pre- and post-OAE2 periods .....	20
<b>Marta Bąk, Krzysztof Bąk and Zbigniew Górný:</b> Carbon-isotope stratigraphy and palaeoceanographic significance of the mid-Cretaceous deep-water sediments from marginal part of the Western Tethys.....	21
<b>Jakub Bazarnik, Piotr Lenik and Magdalena Pańczyk:</b> New U-Pb zircon geochronological data of Neogene andesites (Pieniny Klippen Belt, Poland) .....	22
<b>Pavel Bella, Pavel Bosák, Helena Hercman, Šimon Kdýr, Petr Mikyšek, Petr Pruner, Juraj Littva, Jozef Minár, Michal Gradziński, Wojciech Wróblewski and Marek Velšmid:</b> Morphotectonic evolution of the contact of the Malé Karpaty Mts. and Vienna Basin based on dating of cave levels in the Plavecký hradný vrch Hill .....	24
<b>Vladimír Bezák, Ján Vozár, Jozef Madzin and Lenka Ondrášová:</b> Different structure of the crust in western, central and eastern Slovakia from magnetotelluric results .....	26
<b>Miroslav Bielik, Dominika Godová, Hermann Zeyen and Pavla Hrubcová:</b> Carpathian-Pannonian lithosphere: geophysical study .....	28
<b>Melike Bilgin, Peter Joniak, Serdar Mayda, Pablo Pelaez-Campomanes, Fikret Göktaş and Lars Van Den Hoek Ostende:</b> Updated Early Miocene Biochronology of Anatolia .....	29
<b>Marija Bošnjak, Koraljka Bakrač, Jasenka Sremac, Sanja Japundžić and Tomislav Malvić:</b> A short note on the Middle Miocene (Badenian) brachiopods from the southwestern margin of the Central Paratethys, Croatia .....	31
<b>Jana Brčeková, Peter Uhlík, Peter Koděra, Marek Osacký, Jaroslav Lexa and Miroslav Pereszleny:</b> 3D resource modeling of selected mineral deposits in the Neogene Central Slovakia Volcanic Field, Western Carpathians .....	33
<b>Igor Broska, Michal Kubiš, Martin Ondrejka and Marek Vďačný:</b> Two geochemical types of West-Carpathian Permian felsic magmatism and their geotectonic implications.....	35
<b>Rostislav Brzobohatý, Barbara Zahradníková and Natália Hudáčková:</b> Paleoenvironmental characteristics of the Badenian locality Borský Mikuláš-Vinohrádky (Vienna Basin, Slovakia) based on study of fish otoliths and foraminifera .....	37
<b>László Bujtor:</b> First fossil representative of Sediment Hosted Vent ecosystems from Zengővárkony (Mecsek Mountains, Tisza Mega-unit, South Hungary, Early Cretaceous) .....	39
<b>Florentin Cailleux, Lars W. Van Den Hoek Ostende and Peter Joniak:</b> Distributional patterns of the Miocene Talpidae (Eulipotyphla) from the Western Carpathians .....	41

---

<b>Kamil Cichostępski and Jerzy Dec:</b> Mélanges of the Pieniny Klippen Belt in the shallow Seismic Refraction Tomography Image.....	43
<b>Vlasta Čosović, Đurdica Pezelj, Igor Pejnović, Marina Čančar, Damir Bucković, Dražen Kurtanjek, Nenad Tomašić, Željko Ištuk, Dunja Aljinović, Ines Galović, Marija Horvat and Stjepan Čorić:</b> The multidisciplinary approach of studying the Middle Eocene warming episodes in Dinaric foreland basin: new data or unfulfilled promises? .....	45
<b>Zoltán Cseri, Emő Márton, Márton Palotai, Mátyás Hencz, Tamás Biró and Dávid Karátson:</b> Integrating field volcanology, paleomagnetism and structural geology to correlate a poorly preserved Miocene succession in the East Mátra Mts. (Hungary) .....	47
<b>Tamás Csibri, Ľubomír Sliva, Andrej Ruman, Natália Hlavatá Hudáčková, Michal Jamrich, Katarína Šarinová and Michal Kováč:</b> Deltaic coarse-grained deposits of the northern Vienna Basin: (re)interpretation of older data and cross-border correlation.....	49
<b>Rastislav Demko, Marián Putiš, Lukáš Ackerman, Qiu-Li Li, David Chew and Ondrej Nemec:</b> Miocene volcanism in the Slovenský Raj Mts.: Magmatic, space and time relationships in the Western Carpathians.....	51
<b>Nela Doláková, David Krejčíř, Torsten Utescher, Marianna Kováčová, Vladimír Gryc and Jakub Sakala:</b> Comparison of pollen spectra and fossilized woods from the Oligocene and Middle Miocene sediments of Central Paratethys area – southern part of the Czech Republic (Moravia) - palaeoecological case studies .....	53
<b>David Miloš Droppa, Rastislav Vojtko, Jozef Hók, Katarína Kriváňová, Alexander Lačný and Silvia Gerátová:</b> Geological structure and structural evolution of the Tatic Unit in the Devínska Kobyla massif (Malé Karpaty Mts.) .....	55
<b>László Fodor, Éva Oravecz and Attila Balázs:</b> Scale-dependent definition of syn-rift and post-rift phases during the extension of the Pannonian Basin: inferences from numerical modelling, stratigraphic and tectonic data .....	57
<b>Dominika Godová, Miroslav Bielik, Ján Vozár, Jaroslava Pánisová, Jana Dérerová and Vladimír Bezák:</b> Preliminary 3D integrated geophysical model of the Tatra Mts and its surroundings .....	59
<b>Jan Golonka and Anna Waśkowska:</b> The paleogeography of the Zlatne Basin (Pieniny Klippen Belt).....	60
<b>Valentina Hajek Tadesse, Lara Wacha, Marija Horvat, Ines Galović, Koraljka Bakrač, Anita Grizelj, Oleg Mandić and Bettina Reichenbacher:</b> Do we have enough evidence to prove the oldest environmental change in the area of the Papuk mountain (North Croatian Basin) in the Early Miocene? .....	62
<b>Mathias Harzhauser, Matthias Kranner, Oleg Mandic, Stjepan Čorić, Arthur Borzi, Werner E. Piller, Philipp Strauss, Rudolf Dellmour and Wolfgang Siedl:</b> The Pannonian of the Vienna Basin – from Paleo-Danube Delta to post-Pannonian erosion .....	64
<b>Katarína Holcová, Filip Scheiner, Lukáš Ackerman, Rastislav Milovský, Natália Hudáčková, Mihovil Brlek and Danuta Peryt:</b> Strontium Isotope Stratigraphy in epicontinental basins – possibilities and restrictions – a case study from the Middle Miocene of the Central Paratethys .....	65
<b>Eva Hoppanová, Viera Šimonová, Štefan Ferenc and Richard Kopáčik:</b> Brezno-Za dolinou – occurrence of Fe-Cu-Sb-As mineralization and its relationship to the Alpine tectonics .....	67
<b>Marija Horvat, Lara Wacha, Anita Grizelj, Valentina Hajek Tadesse, Ines Galović, Koraljka Bakrač, Oleg Mandić and Bettina Reichenbacher:</b>	

---

Mineralogical and geochemical proxies of the Lower Miocene sediments of Mtn. Papuk – Poljanska and Mala sections (Northern Croatia) .....	69
<b>Natália Hudáčková, Katarína Šarinová, Michal Jamrich and Andrej Ruman:</b> Mineral selectiveness in agglutinated foraminifera from the Middle Miocene Hámor site (Novohrad-Nógrád Basin).....	71
<b>Matúš Hyžný, Samuel Rybár, Natália Hudáčková, Andrej Ruman, Michal Jamrich, Katarína Holcová, Eva Halássová and Kamil Zágoršek:</b> New fossil association of the Badenian open coast tidal flats from the Novohrad-Nógrad Basin (Slovakia).....	73
<b>Milan Kohút:</b> Where are the roots of the Western Carpathians? – Provenance and detrital zircon study of the Tatic Unit basement .....	75
<b>Michal Kováč, Eva Halássová, Jozef Hók, Natália Hudáčková, Matúš Hyžný, Tomáš Klučiar, Michal Jamrich, Peter Joniak, Marianna Kováčová, Silvia Ozdínová, Petronela Nováková, Andrej Ruman, Samuel Rybár, Martin Sabol, Ján Schlögl, Ľubomír Sliva, Ján Soták, Lenka Šamajová, Katarína Šarinová, Michal Šujan, Viktória Šubová, Adam Tomašových, Tomáš Vlček, Rastislav Vojtko and Colleagues from Austria, Bulgaria, Croatia, Czech Republic, Hungaria, Netherlands, Poland and Romania:</b> The Western Carpathians back-axis basins sedimentary record: new geochronological, biostratigraphical and multiproxy data, results of sedimentology, structural geology and geophysics.....	77
<b>Matthias Kranner, Mathias Harzhauser, Oleg Mandić, Werner E. Piller, Philipp Strauss and Wolfgang Siedl:</b> Paleoenvironmental evolution of the Vienna Basin during the Miocene .....	84
<b>Katarína Kriváňová, Rastislav Vojtko, David Miloš Droppa and Silvia Gerátová:</b> Geological structure of the junction zone between the Tatic and Veporic units in the Nízke Tatry Mts. (Western Carpathians) .....	85
<b>Tomislav Kurečić and Marijan Kovačić:</b> Modal composition of clastic sediment as an indicator of tectonic and climatic events during the post-rift development of the Pannonian Basin System; the example from the North Croatian Basin, Republic of Croatia.....	87
<b>Juraj Littva, Pavel Bella, Ľudovít Gaál, Laura Dušeková and Pavel Herich:</b> Preliminary results from the geological and geomorphological research of the cave with blue and green speleothems (Low Tatras, Western Carpathians) .....	89
<b>Jozef Madzin and Dušan Plašienka:</b> Provenance study of the Upper Cretaceous – Paleocene turbiditic deposits of the Pupov Formation (Pieniny Klippen Belt, Terchová-Zázrivá area).....	91
<b>Imre Magyar:</b> Clinoforms as paleogeographic tools: the late Neogene evolution of Lake Pannon .....	93
<b>Elżbieta Machaniec, Renata Jach, Ewa Malata, Maciej Kania and Mateusz Szczęch:</b> The Eocene – Oligocene boundary along the northern margin of the Tatra Mts in the Central Carpathian Paleogene Basin in Poland - a problem to be solved .....	95
<b>Elżbieta Machaniec and Alfred Uchman:</b> A new agglutinated benthic foraminifera <i>Remesella varians</i> – <i>Rectoprotomarssonella rugosa</i> Zone for the latest Maastrichtian .....	97
<b>Oleg Mandic, Karin Sant, Mădălina-Elena Kallanxhi, Stjepan Čorić, Dörte Theobalt, Patrick Grunert, Arjan De Leeuw and Wout Krijgsman:</b> Integrated bio-magnetostratigraphy of the Badenian reference section Ugljevik - implications for the Paratethys history .....	100
<b>Emő Márton, Vlata Čosović and Gábor Imre:</b> The mechanism accounting for the geometry of offshore External Dinarides .....	102
<b>Jozef Michalík, Silviya Petrova and Diana Ölvecká:</b> Calpionellids on the Jurassic / Cretaceous boundary and their lorica ultrastructure .....	103

---

<b>Marína Molčan Matejová and Dušan Plašienka:</b> Age of the radiolarian assemblage from the Šariš Unit near Zázrivá (Pieniny Klippen Belt) ....	104
<b>Franz Neubauer, Xiaoming Liu, Yunpeng Dong, Shuyun Cao and Isabella Merschdorf:</b> Opening and closure of the Penninic ocean basin at the Alpine-Carpathian transition: new structural data and U-Pb zircon ages .....	106
<b>Mariusz Paszkowski, Robert Anczkiewicz, Przemysław Gedl, Artur Kędzior, Stanisław Mazur and Mateusz Mikolajczak:</b> Reinterpretation of the Outer Carpathian paleogeography based on the study of the exotic blocks from the turbidite series ...	108
<b>Ivica Pavičić, Ivan Dragičević, Ida Pavlin, Filip Šegović and Vladislav Brkić:</b> 3D geological model of the bauxite-bearing district Bnižnica (Posušje, BiH): A powerfull tool from 3D visualization of geological structures to geological prospecting .....	109
<b>Radovan Pipík, Dušan Starek, Rastislav Milovský, Juraj Šurka, Peter Uhlík, Stanislava Milovská, Marina Vidhya, Lucia Žatková, Ramachandran Dhavamani, Roberta Prokešová, Tímea Chamutiová, Ladislav Hamerlík and Peter Bitušík:</b> From valley to valley – heterochronous paleoclimatic and paleoecologic evolution of the Tatra Mts. as inferred from lacustrine deposits .....	110
<b>Daniel Pivko:</b> Evolution of the Dreveník and the Spiš Castle travertine plateaus in Slovakia (Late Pliocene to Holocene) .....	112
<b>Dušan Plašienka, Przemysław Gedl, Štefan Józsa, Ján Soták and Marína Molčan Matejová:</b> Structure of the Čergov segment of the Western Carpathian Klippen Belt (north-eastern Slovakia).....	114
<b>Slawomir Porzucek and Monika Loj:</b> Pieniny Klippen Belt in the reference to the gravity image of the Outer and Inner Carpathians.....	116
<b>Tomáš Potočný, Marián Putiš and Jiří Sláma:</b> Metarhyolites of Meliatic Bôrka Nappe: Zircon U-Pb LA-ICP-MS dating of Triassic volcanism, Western Carpathians, Slovakia .....	118
<b>Weronika Pratkowiecka, Patrycja Wójcik-Tabol, Alfred Uchman and Marta Oszczypko-Clowes:</b> Petrological composition of organic matter in the Oligocene Dynów Marl Member (Menilit Formation, Skole Unit, Polish Outer Carpathians) in Tarnawka and its implication in basin salinity interpretations .....	120
<b>Luca Reato, Monika Huraiová, Patrik Konečný and Vratislav Hurai:</b> Protolith identification of skarnoid xenoliths from Southern Slovakia: New insights from geochemical and isotopic data .....	122
<b>Boštjan Rožič, Alfred Uchman, Luka Gale and Timotej Verbovšek:</b> Possible fossil medusae in the Eocene flysch from the Slovenian coast .....	124
<b>Krisztina Sebe and Michal Šujan:</b> Pleistocene aeolian erosion and wind system in Slovakia.....	125
<b>Krisztina Sebe, Levente Laisz and Szabolcs Harangi:</b> Miocene andesite volcanism in the Mecsek Mts, SW Hungary .....	127
<b>Filip Scheiner, Martina Havelcová, Katarína Holcová, Nela Doláková, Slavomír Nehyba, Lukáš Ackerman, Jakub Trubač, Torsten Utescher, Šárka Hladilová and Jan Rejšek:</b> Multiproxy reconstruction of a gradual prodeltaic evolution during the Miocene Climate Optimum .....	129
<b>Ján Schlägl, Martin Košťák, Dirk Fuchs, Milan Havrla, Tea Kolar-Jurkovšek, Attila Vörös and Juraj Šurka:</b> Rare Middle Triassic coleoids from the Western Carpathians .....	131
<b>Ján Schlägl, Adam Tomašových, Natália Hudáčková and Stanislava Milovská:</b> Peculiar microstructure of the outer shell wall in the Lower Miocene Aturia from the Central Paratethys (Vienna Basin, Western Carpathians, Slovakia) .....	132
<b>Vladimír Šimo, Adam Tomašových, Ján Schlägl and Duarte Luís Vítor:</b> Trace fossil association within Sinemurian/early Pliensbachian carbonate	

---

sequence of the São Pedro de Moel section (Lusitanian Basin, Portugal) in relation to changes in sedimentary environment .....	134
<b>Lucija Slapnik, Boštjan Rožič, Luka Gale, Petra Žvab Rožič and Anna Waškowska:</b> Red infills of megalodontid bivalves in the Pod peski Valley in Krn mountain range .....	136
<b>Ján Soták and Marína Molčan Matejová:</b> Backstop thrusting, inverted duplexes and mélange formations in the Peri-Klippen and Central Carpathian units in northern Slovakia.....	137
<b>Ján Soták and František Tetčák:</b> Tracing of greenhouse-icehouse transition in the Paratethyan basins: a case study from the turbiditic sequences of the Central-Carpathian Paleogene basin.....	139
<b>Ján Soták, Tiiu Elbra, Petr Pruner, Silvia Antolíková, Petr Schnabl and Šimon Kdýr:</b> Cretaceous/Paleogene boundary events in the Western Carpathians: proxy record of biotic crisis, recoveries, environments and sea-level changes .....	141
<b>Michal Šujan, Ľubomír Sliva, Katarína Šarinová, Régis Braucher, Oleg Mandic, Andrej Chyba, Natália Hudáčková, Michal Jamrich, Marianna Kováčová, Mathias Harzhauser, Nadja Ognjanova-Rumenova, Kishan Aherwar, Aster Team and Michal Kováč:</b> A multiproxy study reveals spatial and temporal changes in paleoenvironments from demise of the Sarmatian Sea to the Lake Pannon flooding, central Vienna Basin, Slovakia .....	143
<b>Lilian Švábenická, Andrea Svobodová, Daniela Reháková, Miroslav Bubík, Petr Skupien, Lucie Vaňková, Martin Košťák, Tiiu Elbra, Petr Pruner, Jan Geist and Martin Mazuch:</b> Tithonian–Berriasian boundary: biostratigraphy, stable isotopes and paleomagnetism in the Silesian Unit, Western Carpathians .....	145
<b>Orsolya Sztanó:</b> Milestones in understanding Lake Pannon depositional systems.....	147
<b>Gábor Tari, Gábor Bada, János Csizmeg, Michal Kováč, Dušan Plašienka and Michal Šujan:</b> The connection between the Alps and the Carpathians beneath the Pannonian Basin: a case for negative structural inversion .....	149
<b>Adam Tomašových, Diego A. García-Ramos, Rafał Nawrot, James H. Nebelsick and Martin Zuschin:</b> Disarticulation rates and time averaging of Holocene bathyal brachiopods in the southern Adriatic Sea.....	151
<b>Csaba Tóth:</b> Deinotheres (Proboscidea, Mammalia) of Slovakia: Biochronological overview .....	152
<b>Peter Uhlík, Ondrej Pelech, Ena Topalović, Darko Tibljaš and Ľubica Puškelová:</b> Illite crystallinity as indicator of geological processes – three examples .....	154
<b>Marina Vidhya, Radovan Pipík, Dušan Starek and Rastislav Milovský:</b> Two glacial lakes and two different paleoecological paths during the Late Pleistocene and Holocene as reflected by diatoms (Tatra Mts., Slovakia) .....	156
<b>Rastislav Vojtko, Alexander Lačný, Tomáš Potočný and Marína Molčan Matejová:</b> Structure and deformation pattern of the Bôrka thrust sheets and Gemicic cover sequence in the Slovenské rudohorie Mts.: insights from geometric and kinematic analyses .....	158
<b>Lucia Žatková, Rastislav Milovský and Radoslav Pipík:</b> Biomarkers in the sediments of Tatra Mts. lakes recorded the changes in the Holocene vegetation cover.....	160
<b>Nadja Zupan Hajna, Pavel Bosák, Petr Pruner, Helena Hercman, Ivan Horáček, Jan Wagner, Stanislav Čermák, Jacek Pawlak, Paula Sierpień, Šimon Kdýr, Lucie Juřičková, Astrid Švara and Andrej Mihevc:</b> Račiška pečina sedimentary sequence: 3.4 Ma long record in cave sediments .....	162

---

*(page intentionally left blank)*

---

## A short note on the Middle Miocene (Badenian) brachiopods from the southwestern margin of the Central Paratethys, Croatia

MARIJA BOŠNJAK<sup>1</sup>, KORALJKA BAKRAČ<sup>2</sup>, JASENKA SREMAC<sup>3</sup>,  
SANJA JAPUNDŽIĆ<sup>1</sup> and TOMISLAV MALVIĆ<sup>4</sup>

1 – Croatian Natural History Museum, Demetrova 1, Zagreb, Croatia; e-mail: marija.bosnjak@hpm.hr

2 – Croatian Geological Survey, Sachsova 2, Zagreb, Croatia

3 – University of Zagreb, Faculty of Science, Department of Geology, Horvatovac 102a, Zagreb, Croatia

4 – University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Pierottijeva 6, Zagreb, Croatia

Fossil brachiopods are recorded in the Middle Miocene (Langhian/Serravalian – Badenian) deposits in Northern Croatia, Medvednica Mt. near Zagreb, which paleogeographically belonged to the southwestern margin of the Central Paratethys (e.g., Rögl 1998; Kováč et al. 2007; Piller et al. 2007; Sremac et al. 2022). The Badenian brachiopods from Northern Croatia are for the first time mentioned in Gorjanović-Kramberger (1908), and described by Kochansky (1944) and Kochansky-Devidé (1957). Since then, there have been no papers on the Badenian brachiopods from Croatia, except one unpublished Master Thesis by K. Bakrač (Sinković 1994). Specimens described in the above-mentioned papers are today housed in the Croatian Natural History Museum and we decided to conduct their revision.

A revision is based on the taxonomical review and biometry of the brachiopod specimens. In this paper we present preliminary results of this ongoing study. Brachiopods are represented by the class Rhynchonellata, with more than 700 specimens from the orders Rhynchonellida and Terebratulida, and the latter one prevails. Brachiopod assemblage from Northern Croatia shows similarity with the Miocene terebratulid record from Slovenia (e.g., Mikuž 2011 and references therein), and also comprises the species *Megerlia truncata* (Linnaeus, 1767), common in the Miocene deposits of the Central Paratethys (e.g., Bitner & Dulai 2004 and references therein). Several other brachiopod species, from the terebratulid family Megathyrididae, common in the Miocene of the Central Paratethys, e.g., *Argyrotheca cuneata* (Risso, 1826), *Megathiris detruncata* (Gmelin, 1790) and *Joania cordata* (Risso, 1826) (after e.g., Bitner & Dulai 2004 and references therein; Bitner et al. 2013 and references therein) are not recorded so far from the Miocene deposits of Northern Croatia. Study of the here presented brachiopod fauna could give further insight into the brachiopod biogeographical provinces and open marine connections in this area of the Central Paratethys during the Badenian Stage.

**Acknowledgement:** This research is part of the project “Mathematical researching in geology VII“ (PI: Professor T. Malvić, University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering) and the Croatian Science Foundation Project IP-2019-04-7042 (Sedimentary paleobasins, water corridors and biota migration, PI: Professor M. Kovačić, University of Zagreb, Faculty of Science).

### References:

- Bitner, M.A. & Dulai, A. 2004. Revision of Miocene brachiopods of the Hungarian Natural History Museum, with special regard to the Meznerics collection. *Fragmenta Palaeontologica Hungarica*, 22, 69–82.  
Bitner, M.A., Zágoršek, K. & Hladilová, Š. 2013. Deep-water brachiopod assemblage from the Middle Miocene of Kralice nad Oslavou, Moravia, southeastern Czech Republic. *Comptes Rendus Palevol*, 12, 81–89.

- Gorjanović-Kramberger, D. 1908. Geologiska prijegledna karta k. Hrvatske i Slavonije. Tumač geologiskoj karti Zagreb (Zona 22, Col. XIV) [Geologische Übersichtskarte des königreiches Kroatien-Slavonien. Erläuterungen zur geologischen Karte von Agram (Zone 22, Col. XIV)]. *Naklada Kr. zemaljske vlade, Odjela za unutarnje poslove, Zagreb*.
- Kochansky, V. 1944. Fauna marinskog miocena južnog pobočja Medvednice (Zagrebačke gore) [Miozäne marine Fauna des südlichen Abhanges der Medvednica, Zagreber Gebirge]. *Vjestnik Hrv. drž. geol. zav. i Hrv. drž. geol. muz.* II/III, 171–280 (in Croatian with German summary).
- Kochansky-Devidé, V. 1957. O fauni marinskog miocena i o tortonskom “šliru” Medvednice (Zagrebačke gore) [Ueber die Fauna des marinen Miozäns und über den tortonischen “Schlier” von Medvednica, Zagreber Gebirge]. *Geol. vjesnik* X (1956), 39–50 (in Croatian with German summary)
- Kováč, M., Andreyeva-Grigorovich, A., Bajraktarević, Z., Brzobohatý, R., Filipescu, S., Fodor, L., Harzhauser, M., Oszczypko, N., Nagymarosy, A., Pavelić, D., Rögl, F., Saftić, B., Ľubomír, S. & Studencka, B. 2007. Badenian evolution of the Central Paratethys Sea: Paleogeography, climate and eustatic sea-level changes. *Geologica Carpathica*, 58, 579–606.
- Mikuž, V. 2011. Brachiopods from Miocene beds near Šentilj in Slovenske Gorice, Northeast Slovenia. *Folia Biologica et Geologica*, 52, 3, 29–46.
- Piller, W.E., Harzhauser, M. & Mandic, O. 2007. Miocene Central Paratethys stratigraphy—Current status and future directions. *Stratigraphy*, 4, 151–168.
- Rögl, F. 1998. Palaeogeographic Considerations for Mediterranean and Paratethys Seaways (Oligocene to Miocene). *Ann. des Nat. Mus. Wien*, 99A, 279–310.
- Sinković, K. 1994. Karpatski sedimenti i fosili na lokalitetu Plaz (jugoistočna Medvednica) [Karpatian sediments and fossils at the Plaz locality (southeastern part of the Medvednica Mt.)]. University of Zagreb, Faculty of Science and Faculty of Mining, Geology and Petroleum Engineering, Master Thesis, unpubl., 1–21.
- Sremac, J., Bošnjak, M., Velić, J., Malvić, T. & Bakrač, K. 2022. Nearshore pelagic influence at the SW margin of the Paratethys sea – examples from the Miocene of Croatia. *Geosciences*, 12, 120.

doc. Mgr. Natália Hudáčková, PhD.  
Mgr. Andrej Ruman, PhD.  
doc. RNDr. Michal Šujan, PhD.

**Editors**

**Environmental, Structural and Stratigraphical  
Evolution of the Western Carpathians**

**Abstract Book**

Published by the Comenius University Bratislava, 2022

**Graphic design:** doc. RNDr. Michal Šujan, PhD.

**Cover graphics:** Collage of figures published in open access journals  
by the following authors (in alphabetical order):

Marija Bošnjak, Tamás Csibri, Jerzy Dec, László Fodor, Jan Golonka,  
Mathias Harzhauser, Natália Hudáčková, Peter Joniak, Michal Kováč,  
Elžbieta Machaniec, Imre Magyar, Oleg Mandic, Marína Molčan Matejová,  
Franz Neubauer, Daniel Pivko, Tomáš Potočný, Luca Reato, Ján Schlögl,  
Krisztina Sebe, Ján Soták, Jasenka Sremac, Michal Šujan

164 pages, first edition, 115 copies,  
released as an electronic publication

**ISBN: 978-80-223-5518-6 (printed version)**

**ISBN: 978-80-223-5519-3 (online version)**

**ISBN 978-80-223-5519-3**