7th International Workshop

Neogene of Central and South-Eastern Europe

ABSTRACTS BOOK

28–31 May 2017, Velika, Croatia

NEOGENE OF THE PARATETHYAN REGION

7th INTERNATIONAL WORKSHOP ON THE NEOGENE OF CENTRAL AND SOUTH-EASTERN EUROPE

RCMNS Interim Colloquium

ABSTRACTS BOOK

ORGANISING COMMITTEE
Koraljka Bakrač *(Croatian Geological Survey)*
Marija Bošnjak *(Croatian Natural History Museum)*
Marko Cvetković *(University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering)*
Ines Galović *(Croatian Geological Survey)*
Valentina Hajek-Tadesse *(Croatian Geological Survey)*
Morana Hernitz Kučenjak *(INA – Industrija nafte d.d., Exploration sector, Rock and Fluid Analysis Department)*
Marija Horvat *(Croatian Geological Survey)*
Marijan Kovačić *(University of Zagreb, Faculty of Science, Department of Geology)*
Vlasta Premec-Fuček *(INA – Industrija nafte d.d., Exploration sector, Rock and Fluid Analysis Department)*
Đurđica Pezelj *(University of Zagreb, Faculty of Science, Department of Geology)*
Bruno Tomljenović *(University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering)*
Goran Radonić *(Nature Park Papuk)*
Davor Vrsaljko *(Croatian Natural History Museum)*
Lara Wacha *(Croatian Geological Survey)*

EDITORS: Marija Horvat & Lara Wacha

Layout and design:
LASERplus, Brijunska 1a, 10 000 Zagreb, Croatia

Issued: May 2017, 110 copies

Published by the Croatian Geological Society
Sachsova 2, 10 000 Zagreb, Croatia
www.geologija.hr/
info@geologija.hr

Zagreb, 2017.

ISBN 978-953-59036-2-8

Cover: *Radix croatica* (GORJANOVIĆ-KRAMBERGER, 1890), locality: Gornje Vrapče, photo by: Šimun Aščić; logo design: Morana Hernitz-Kučenjak & Vlasta Premec Fuček

We recommend therefore the usage of a newly introduced regional stage Cernikian (MANDIC et al., 2015), constrained to the depositional cycle of the *Viviparus* beds. The latter reflects deposition of the freshwater Lake Slavonia and is bounded by discrete compressional events from the preceding Pannonian and the succeeding Pleistocene depositional intervals. The stage name derives from a type area located in NE Croatian municipality Cernik. The stage is threefold; the substage correlation is facilitated by the strongly radiating *Viviparus* lineages, delivering backbone for a biostratigraphic zonation. Hence, the Lower Cernikian correlates to *V. neumayri* and *V. kochanskyae* zones; the Middle Cernikian to *V. bifarcinatus*, *V. stricturatus* and *V. nothus* zones; and the Upper Cernikian to *V. sturi*, *V. hoernesi*, *V. zelebori* and *V. vukotinovici* zones. The boundary stratotype, located NE of Cernik displays Pannonian sand with cardiid bivalves overlain by Cernikian clay bearing *Viviparus neumayri*. The most instructive section, showing a complete succession of the *Viviparus* beds, is represented by the Gojlo antiform E of Kutina (NE Croatia). There, the 900-m-thick Cernikian interval is composed largely by greenish clay and fine-sand bearing abundant viviparids. The 200-m-thick Lower Cernikian and the 600-m-thick Upper Cernikian interval contain 0.1 to 2-m-thick coal seams.

Although representing an isolated lake environment, at least temporary southward outflow from the Pannonian Basin existed, allowing some species to migrate to the Dacian Basin. The partial faunal overlap facilitates a rough calibration of the Cernikian biostratigraphy to the Dacian and Romanian stages based on shared *Viviparus* zonal markers. It further allows an indirect correlation to the Geological Time Scale using the current bio-magnetostratigraphic age model for the Dacian Basin. According to this correlation, the Cernikian spans the interval from 4.5 Ma to 2.0 Ma. The lower boundary of the Middle Cernikian is correlated to 4.2 Ma, the base of the Upper Cernikian corresponds to 3.3 Ma, approximately coinciding with the onset of the Pliocene Climate Optimum (PCO). The period between 4.3 and 2.7 Ma represents a generally warm phase, culminating between 3.3 and 2.9 Ma, when polar temperatures increased by up to 10°C. The increase of shell sculpture in lineages of the Lake Slavonia viviparids coincides with that warming trend. In contrast, the *V. vukotinovici* zone succeeding the PCO event shows retreat of weakly sculptured phenotypes.

MANDIC, O., KUREČIĆ, T., NEUBAUER, T.A. & HARZHAUSER, M. (2015): Stratigraphic and palaeogeographic significance of lacustrine molluscs from the Pliocene *Viviparus* beds in central Croatia. Geologia Croatica, 68/3, 179–207.

AMAZING BIODIVERSITY OF MIOCENE "REEFS"

Jasenka Sremac

INVITED LECTURER

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

jasenka.sremac@geol.pmf.hr

During the Middle Miocene a number of bioconstructions developed along the shelves of the Paratethys Sea (RIEGL & PILLER, 2000, HARZHAUSER & PILLER, 2007; SREMAC et al., 2016). Heterogeneity of carbonate-producing biota and architecture of boundstone bodies reflect the complex tectonic and climatic history, as well as the changes in seawater chemistry. Build-ups are sometimes preserved in situ, but in many cases we recognize their biodiversity from fragments in the surrounding bioclastic deposits.

Badenian stage is characterized with the climax of the Paratethyan carbonate production. Early Badenian deposits comprise fairly diverse reefs, including the coral patch-reefs, particularly in southern Paratethyan basins (HARZHAUSER & PILLER, 2007).

Red algae are important bioconstructors throughout the Badenian, but their acme is linked with the second Badenian transgressive cycle, particularly in western parts of the Central Paratethys (HARZHAUSER & PILLER, 2007, SREMAC et al., 2016). They occur as free-living rhodoliths or attached, within coralligenous hard bottom communities. Rhodolith beds are known as ecosystems of high biodiversity and act as important carbonate "factories". They generally indicate shallow waters (<150 m) subjected to episodic disturbance, or develop after the reef erosion, as seen in some modern habitats (PILLER & RASSER, 1996). In Pannonian Basin System they often occur at the base of Miocene transgression(s). Rhodolith-forming species originate from all three major coralline groups (Sporolithales, Corallinales and Hapalidiales). The same rhodalgal groups occur in coralligene assemblages, associated with abundant and diverse bryozoans and other benthic biota. Large oysters can form their own reefs which can occur since early phases of transgressive cycles (HARZHAUSER et al., 2016; SREMAC et al., 2016). On the contrary, bryopsidalean algae occur to a lesser extent, probably in sheltered bays (SREMAC et al., 2016).

During the late Badenian, algal-bryozoan-coral bioconstructions in northern parts of the Paratethys were replaced with algal-serpulid-vermetid "reefs" and/or coral carpets developing along detached islands (PISERA, 1996; HARZHAUSER & PILLER, 2007).

Badenian/Sarmatian turnover reflects the strongest biotic crisis of the Paratethys. Mixed carbonate-siliciclastic deposition is only sporadically represented with carbonate build-ups formed by polychaetes and bryozoans, common in the Carpathian fore-deep (PISERA, 1996; HARZHAUSER & PILLER, 2007).

During the late Sarmatian, following the shift from siliciclastic to carbonate deposition, a new type of build-ups dominated by nubeculariids and microbial crusts occured, representing the last reef-like structures before the final isolation and desalination of the Paratethys.

HARZHAUSER, M. & PILLER, M.W.E. (2007): Benchmark data of a changing sea – Palaeogeography, Palaeobiogeography and events in the Central Paratethys during the Miocene. Palaeogeography, Palaeoclimatology, Palaeoecology, 253, 8–31. doi:10.1016/j.palaeo.2007.03.031

HARZHAUSER, M., DJURICIC, A., MANDIC, O., NEUBAUER, T., ZUSCHIN, M. & PFEIFER, N. (2016): Age structure, carbonate production and shell loss rate in an Early Miocene reef of the giant oyster Crassostrea gryphoides. Biogeosciences, 13, 1223–1235.

PILLER, W.E. & RASSER, M. (1996): Rhodolith formation induced by reef erosion in the Red Sea, Egypt. Coral Reefs, 15, 191–198.

PISERA (1996): Miocene reefs of the Paratethys: a review. SEPM Conc. Sediment. Paleont., 5, 97–104.

RIEGL, B. & PILLER, W.E. (2000): Reefs and coral carpets in the Miocene Paratethys (Badenian, Leitha Limestone, Austria). Proceedings 9th International Coral Reef Symposium, Bali, Indonesia, 23–27.

SREMAC, J., BOŠNJAK MAKOVEC, M., VRSALJKO, D., KARAICA, B., TRIPALO, K., FIO FIRI, K., MAJSTOROVIĆ BUŠIĆ, A. & MARJANAC, T. (2016): Reefs and bioaccumulations in the Miocene deposits of the North Croatian Basin – Amazing diversity yet to be described. The Mining-Geology-Petroleum Engineering Bulletin, 31/1, 19–29.