MIDDLE MIOCENE FORAMINIFERA FROM THE MEDVEDNICA MT. (NW CROATIA) – A KEY TO UNDERSTAND THE PALAEOENVIRONMENTAL CONDITIONS IN THE CENTRAL PARATETHYS

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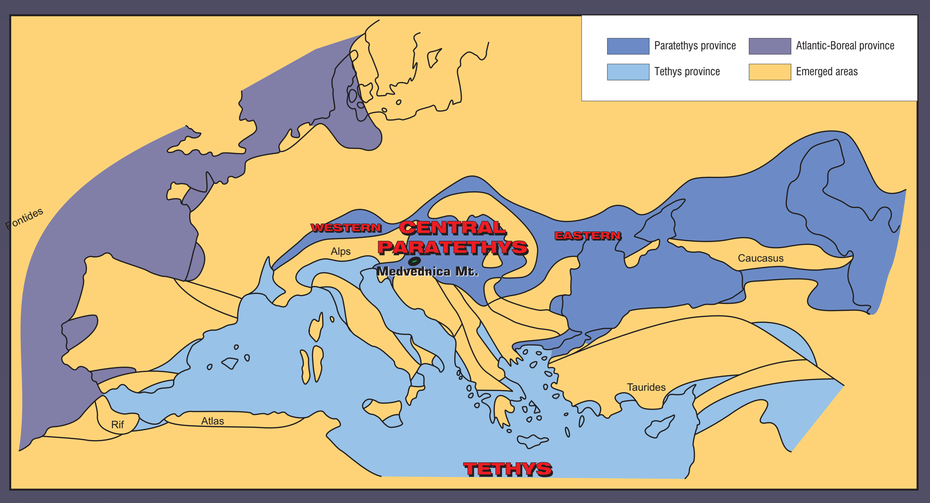
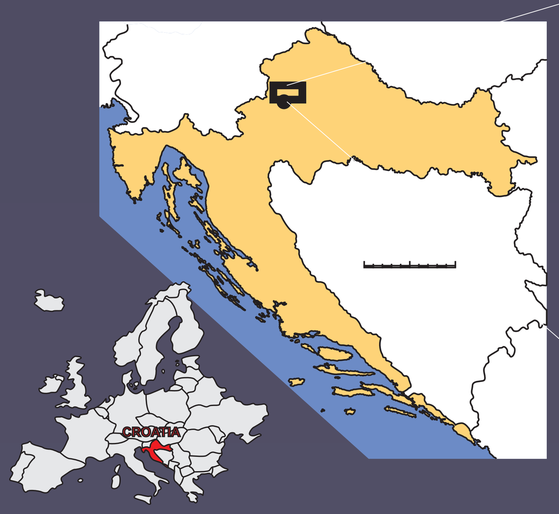


Figure 1.Simplified sketch map showing the distribution of the Middle Miocene marine deposits in the region (modified after Rögl & Steininger, 1984).



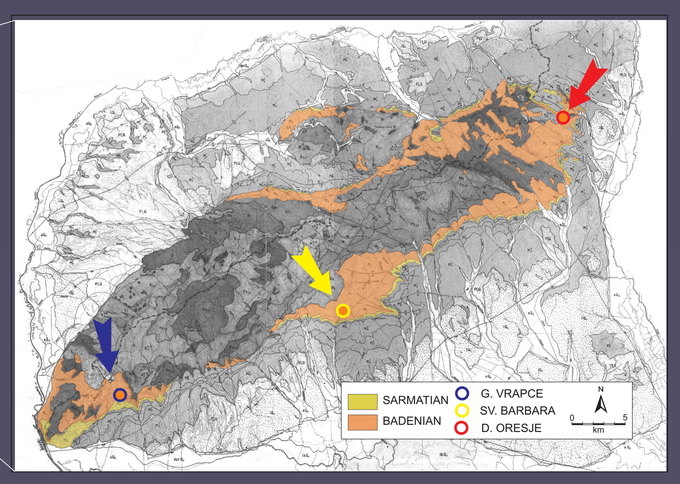


Figure 2. Simplified geological map of the Medvednica Mt. with geographic range of the Middle Miocene sediments. Analyzed profiles are marked with ring and arrow (modified after Sikic, 1997).

During the Neogene, central and northern regions of Croatia were situated near the south-western margins of Central Paratethys sea (Fig.1). Prominent palaeorelief of Medvednica Mt., during the deposition of Middle Miocene sediments (Fig. 2), was the base for the diversification of environmental conditions and microfossil communities. The correlation of three profiles (Fig. 3) has allowed the reconstruction of a continuious marine succession, which belongs to the Central Paratethys Bulimina-Bolivina Zone marking the upper part of the regional chronostratigraphic stage Badenian (Fig. 4).

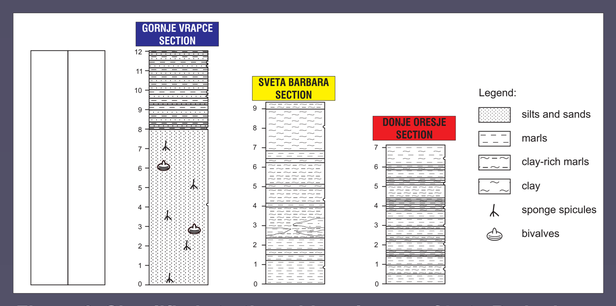


Figure 3. Simplified stratigraphic columns of Late Badenians sediments from Gornje Vrapce, Sveta Barbara and Gornje Oresje sections.

Interpretation of paleoenvironment was based upon the quantitative analysis of fossil communities. Four diversity indices: Fisher index, Shannon-Wiener index, Equitability and Dominance, number of species of benthic foraminifera and Benthic Foraminiferal Oxygen Index trends suggest gradual changes (with occasional fluctuations) in the benthic ecosystem during the deposition of the Late Badenian sediments. Associating the changes in planktonic / benthic ratio and taxonomical diversity to the benthic foraminiferal distribution, four fossil environments can be identified: inner shelf, middle shelf, outer shelf and upper bathyal environment (Fig. 5).

Oscillation in depth of the depositional basin, fluctuations of the bottom water oxygen concentration, and the nutrient availability are the most important factors that influenced the distribution of the microfossil faunas in the Late Badenian environments of Medvednica Mt.

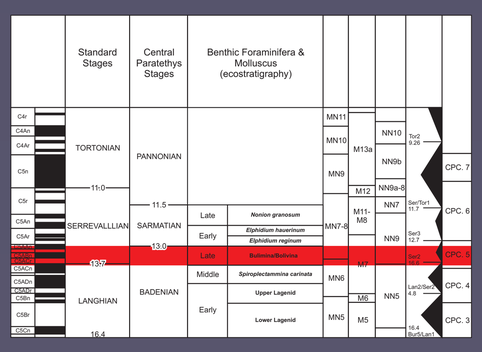
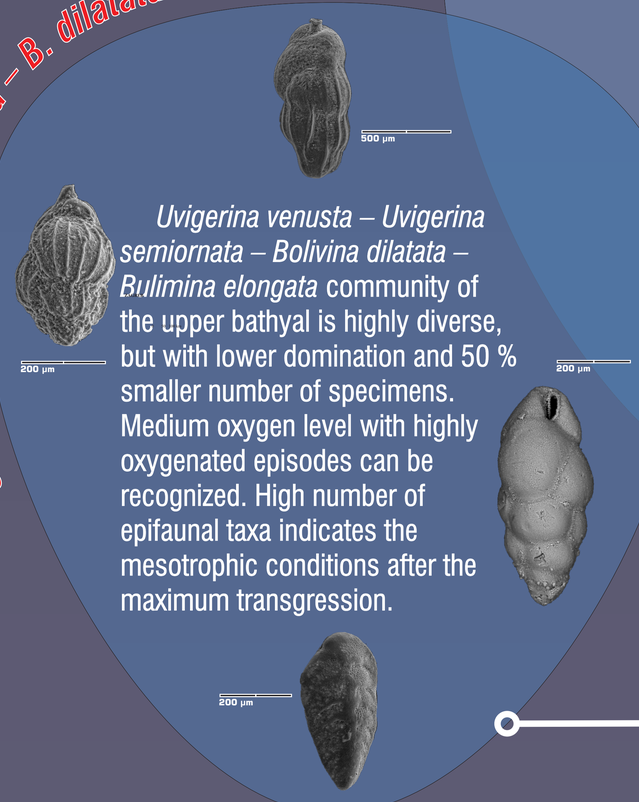


Figure 4. Middle to Late Miocene geochronology and biostratigraphy (modified after Harzhauser and Kowalke, 2002).

U. venusta – U. semiornata – B. dilatata – B. elongata

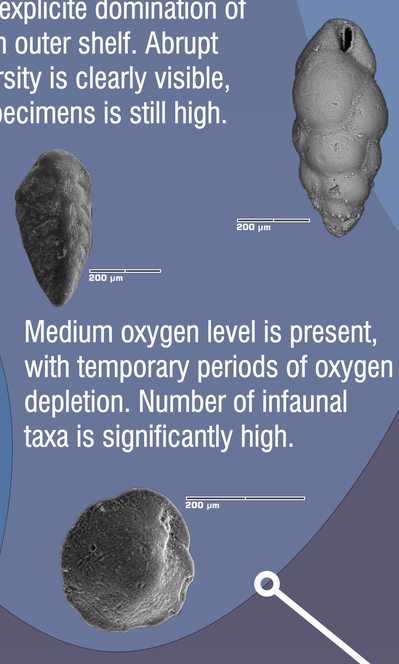
Uvigerina venusta – Uvigerina semiornata – Bolivina dilatata – Bulimina elongata community of the upper bathyal is highly diverse, but with lower domination and 50 % smaller number of specimens. Medium oxygen level with highly oxygenated episodes can be recognized. High number of epifaunal taxa indicates the mesotrophic conditions after the maximum transgression.



B. dilatata – C. laevigata – B. elongata

Bolivina dilatata – Cassidulina laevigata – Bulimina elongata community with explicite domination of B. dilatata lived in outer shelf. Abrupt decrease of diversity is clearly visible, but number of specimens is still high.

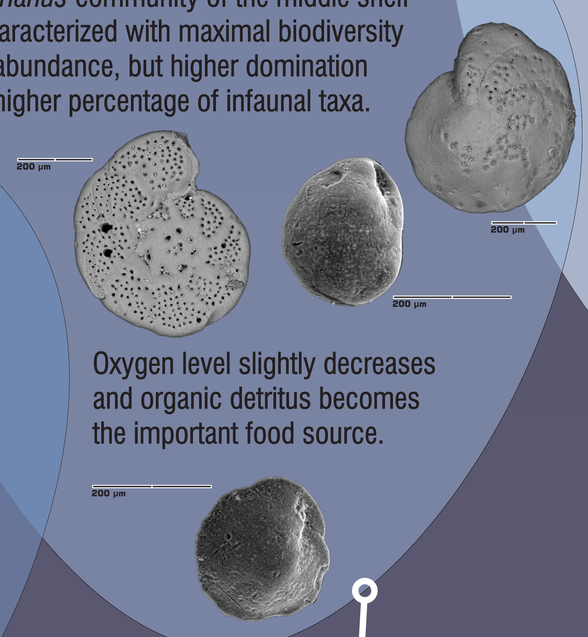
Medium oxygen level is present, with temporary periods of oxygen depletion. Number of infaunal taxa is significantly high.



C. laevigata – G. oblonga – C. pseudoungerianus

Cassidulina laevigata – Globocassidulina oblonga – Cibicidoides ungerianus community of the middle shelf is characterized with maximal biodiversity and abundance, but higher domination and higher percentage of infaunal taxa.

Oxygen level slightly decreases and organic detritus becomes the important food source.



E. crispum – A. planorbis – E. macellum

Elphidium crispum – Asterigerinata planorbis – Elphidium macellum community lived at the inner shelf. High oxygen level and plentiful food supplies resulted with abundant, diverse community with average domination.

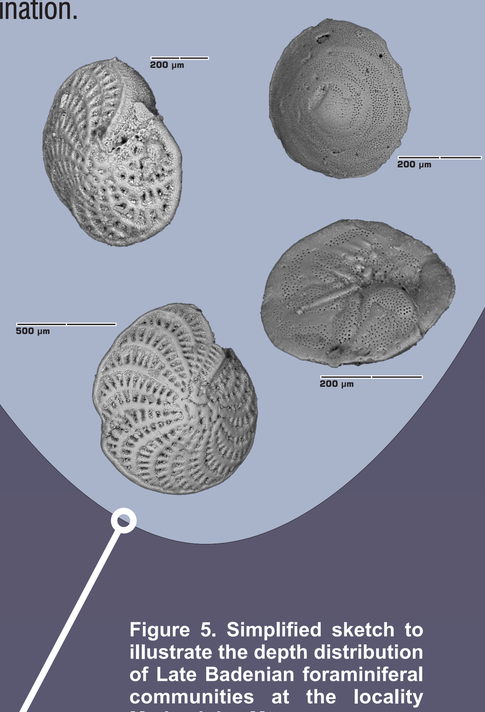
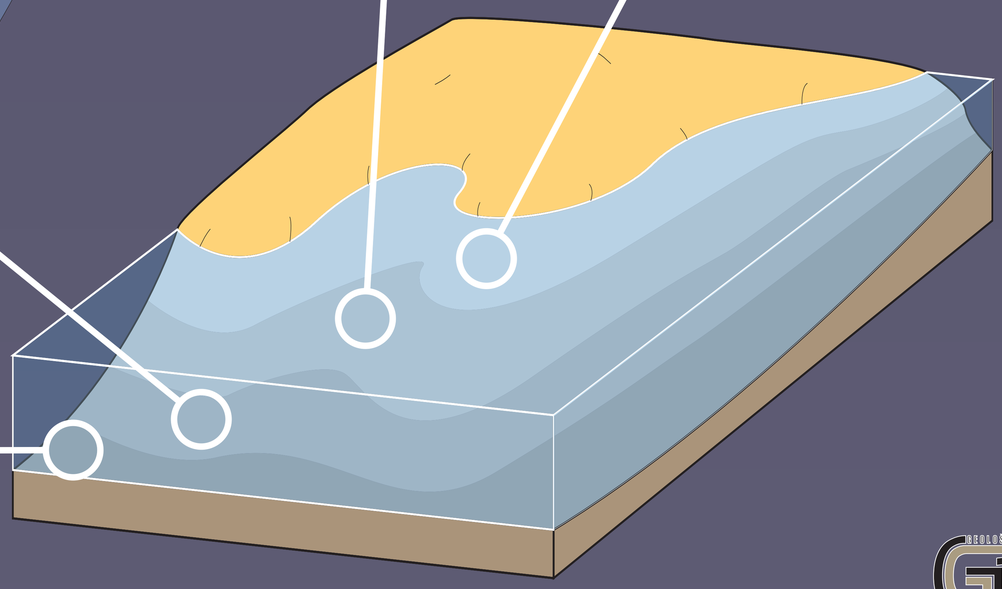


Figure 5. Simplified sketch to illustrate the depth distribution of Late Badenian foraminiferal communities at the locality Medvednica Mt.



References
HARZHAUSER M. & KOWALKE T. 2002: Sarmatian (Late Middle Miocene) Gastropod assemblages of the Central Paratethys. Facies, 46, 57-82.
KAIHO, K. (1994): Benthic foraminiferal dissolved-oxygen index and dissolved-oxygen levels in the modern ocean. - Geology, 22, 719-722.
RÖGL F. & STEININGER F.F. 1984: Neogene Paratethys Mediterranean and Indo-Pacific Seaways. In: Branchley P. (Ed.) Fossils and Climate. Wiley, Chichester, 171-200.
SIKIC, K. (1995): Prikaz geološke građe Medvednice (Geological composition of the Medvednica Mt. - in Croatian). - In: ŠIKIĆ, K. (ed.): Geološki vodič Medvednice. Inst. geol. istraž., Zagreb, 7-30.