

Middle Miocene nannofossils in the Carpathian Foredeep, Czech Republic (state-of-the-art)

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Two different nannoplankton horizons were recognized in the Middle Miocene (Lower Badenian) deposits of the Carpathian Foredeep in the territory of the Czech Republic (southern and central Moravia, approximately in quadrangle of towns Znojmo – Mikulov – Přerov – Olomouc). Horizons were described by Švábenická (2002a, b) and their precise stratigraphic correlation is recently under discussion. Material was obtained during mapping and other geological works and was taken from the same samples as used for the foraminiferal study. No continuous section crossing the Karpatian-Badenian and the overlying Lower Badenian strata has been available yet.

I. Horizon with *Helicosphaera waltrans*

Nannofossil assemblages are characterized by presence of *H. waltrans* and by only occasional occurrence of *Sphenolithus heteromorphus*. They are represented by high number of helicoliths complemented by small placoliths of family Prinsiaceae (*Reticulofenestra pseudoumbilicus*, *R. haqii* etc.). Horizon should be subdivided into two parts:

1. co-existence of rare *H. waltrans* and *H. ampliaperta*, helicoliths and reticulofenestrids prevail,

2. *H. waltrans* relatively common; rare appearance of specimens of genera *Discoster*, *Umbilicosphaera*, *Pontosphaera* and *Calcidiscus*. Species *H. ampliaperta* is already absent.

Horizon was observed in clays and siliciclastic sediments of the Grund Formation and in the basal Lower Badenian deposits where planktonic foraminifers *Globigerinoides bisphericus*, *Praeorbulina ex gr. glomerosa* and *Orbulina suturalis* appear (Cicha, 2001). Sediments yield generally poorly preserved nannofossils of low species diversity. Reworked coccoliths from the Upper Cretaceous and Paleogene strata prevail, Miocene specimens form only 10-20% of taphocoenoses.

Character of nannofossil assemblage, especially the predominance of helicoliths indicates the shallow epicontinent sea (sensu Báldi-Beke, 1980, Nagymarosy, 1985).

II. Horizon with *Sphenolithus heteromorphus*

Nannofossil assemblages are characterized by high species diversity and show following attributes:

- presence of *Sphenolithus heteromorphus*,
- absence of *Helicosphaera waltrans*,
- genus *Helicosphaera* is represented by common *H. carteri*. Species *H. walbersdorfensis* if present has been observed in higher numbers
- high number of small placoliths of family Prinsiaceae including species *Reticulofenestra minuta*, *R. haqii* and *R. pseudoumbilicus* (forms <5µm and >5µm).

Assemblages are mostly complemented by species *Pontosphaera multipora*, *Umbilicosphaera rotula*, *Calcidiscus premacintyrei*, *C. macintyrei*, *C. leptoporus*, *Discoaster exilis*, *D. variabilis*, large forms of *Coccolithus miopelagicus* (>10µm in size), *Rhabdosphaera* ssp. (sensu Young 1998) including *R. sicca* etc.

In some deposits (probably going with the upper part of horizon), elliptical varieties of *Coronocyclus nitescens* appear, along with 5-rayed symmetrical discoasters and enigmatic specimens of genus ?*Catinaster*. The last mentioned specimens could be explained also as a central part of *Discoaster musicus*, nevertheless, this species has not been observed in studied material.

Calcareous nannofossils form a significant component in sediment and specimens are moderately well preserved. Compare to underlying deposits and horizon with *H. waltrans* respectively, taphocoenoses are characterized by increasing number of Miocene specimens forming about 50-70%. Reworked coccoliths are mostly of the Upper Cretaceous and Middle Eocene age. According to Cicha (2001), horizon was observed in the Lower Badenian basal and marginal siliciclastic sediments and clays („tegel“). They are characterized by the occurrence of benthonic species *Vaginulina legumen* and Lanzendorf microfauna (Čtyroká and Švábenická, 2000).

Influx of Miocene nannoflora and character of assemblage indicate the deepening of depositional area and open-sea conditions and reflect the transgression.

Paleoenvironmental notes:

High number of helicoliths indicates a shallow epicontinental sea and the occasional occurrence of other coccoliths probably a beginning of transgression.

The change in quality and quantity of nannofossil assemblages, that is enrichment in discoasters and coccoliths gives evidence for the open-sea conditions and reflects transgression in the Lower Badenian. This change probably coincides with the last occurrence (absence) of *Helicosphaera waltrans*.

References

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