

Palaeoecological evaluation of the Karpatian sediments in the southern part of the Carpathian Foredeep using trend analysis

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The objectives of the abstract include characteristics of foraminifers in Karpatian sediments in the southern part of the Carpathian Foredeep, Moravia, the trend analysis of the assemblages and application of statistical methods to reconstruct the palaeoecological evolution of the depositional area. In the resulting model the palaeogeographical and biostratigraphic aspects are also addressed.

Majority of the foraminiferal assemblages characterized by abundance of uvigerinas and pappinas (*U. graciliformis* Papp & Turn., *P. breviformis* (Papp & Turn. etc.) belong to the „lower part“ of the Laa Formation (Rögl, 1969). Nevertheless, few assemblages with *Globigerinoides bisphericus* Todd have been recorded and compared with the „upper part“ of the Laa Formation. Sediments of the Grund Formation with abundant *Globigerinoides bisphericus* Todd lying unconformable on sediments of the Laa Formation (Rögl et al., 2002) were not recorded in the area under study.

Generally, the palaeoecological conditions were not equal in the Karpatian deposits in Moravia. The juxtaposed assemblages are often different. Alternation of the depleted foraminiferal assemblages with the richness as well as alternation of assemblages with dominance of planktonic genera and benthic ones indicate unbalanced environment. This phenomenon has been already observed by Nehyba & Petrová (2000).

Based on study of foraminiferal microfauna and correlation of the boreholes, the following model is proposed for development of Karpatian basin. Two transgressions within Karpatian sediments has been recognized.

1. The transgression of Karpatian sea reached the southern part of the Carpathian Foredeep from Mediterranean. During the first period of the transgression covered the area of nowadays Mikulov, Pohodělice and Nový Přerov villages and documents the maximum thickness of Karpatian sediments. Later, during the Savian orogeny, these strata were overthrust by the nappes of the Carpathian Flysch Belt. Microfaunistic assemblages indicate anoxic conditions at beginning of the transgression. Locally, foraminiferal microfauna with *Siphonodosaria* div. sp. and *Valvulineria complanata*

d'Orb. was recorded. Horizons with agglutinated foraminifers (NP-1, NP-2, Břez-2 boreholes) characterized by genera *Bathysiphon*, *Haplophragmoides* and *Cribrostomoides*, were recognized in the wide environs of Mikulov and Laa an der Thaya towns. Their presence reflects the cold deeper water conditions from lower littoral to upper bathyal.

2. Next transgression proceeded in direction of the western part of the Carpathian Foredeep and overlaps the sediments of the Eggenburgian-Ottangian (?) age alike in the eastern part. In the lowermost part of these sediments, anoxic conditions appear. Later, euryoxybiont taxa such as *Bolivina* div. sp., *Bulimina* div. sp., *Praeglobobulimina* div. sp., *Uvigerina* div. sp. predominate and document the improvement of the palaeoenvironmental conditions, stability of the oxygen supply and subsidence of the basin.

In the overlying deposits, number of reduced horizons decreases, horizons with euryoxybiont foraminifers (in the Nos-3, HV-304, HV-306 boreholes) alternate those with high number of planktonic specimens. The sudden alternations of depleted horizons that characterize reduced environment with the euryoxybiont ones with locally shallow-water fauna can be explained by upwellings accompanied by oscillation of sea level, probably with restricted water circulation. This explanation is further evidenced by lithological analyses.

Depleted microfauna is observed in the majority of boreholes in the Upper Karpatian and reflects an aggravation of the living conditions. In the uppermost part of borehole profiles the shallow-water assemblages were observed with exception of HV-301, HV-305 and Zn-12 boreholes. Palaeogeographically, the conditions of sedimentation in the Karpatian in the southern part of the Carpathian Foredeep can be compared with conditions of anoxic silled basins with positive water balance and so-called estuarine type water circulation.

The syndimentary tectonic deformations are documented within the terminal shallow-water sedimentation and especially in its overlying strata that were deposited W of the front of the Ždánice Unit. Based on foraminiferal study, two blocks can be delimited in the studied area and in cross-sections. The western block is limited by the normal fault that is closing in the Karpatian. The increasing of thickness of Karpatian sediments may result

from the overthrust fault tectonics in the eastern block. According to seismic profile interpretations the overthrust fault tectonics has character of sinistral faults (Čížek, personal comm.). The changing thickness of Karpatian sediments in the western block where the final shallow-water sediments are missing (HV-301, HV-305, Zn-12) is due to the post-Badenian erosion.

Tectonic movements were formerly interpreted on the seismic profiles (Adámek, personal comm.). The present study of foraminiferal assemblages provides a model that further documents existence of the tectonic deformations.

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