

**BIOSTRATIGRAPHIC AND PALAEOECOLOGIC EVALUATION
OF THE KARPATIAN DEPOSITS IN THE BOREHOLE NOSISLAV-3 BASED ON THE
STUDY OF FORAMINIFERS
(CARPATHIAN FOREDEEP, CZECH REPUBLIC).**

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Abstract: The biostratigraphic data and palaeoecologic interpretations of the Karpatian deposits, Carpathian Foredeep, were obtained by means of the statistical evaluation of microfauna. Rich fauna alternates reduced fauna, euryoxybiont foraminifers are dominant. Three stratigraphic horizons with *Uvigerina* div. sp. and overlying horizon with *Pappina breviformis* (Papp & Turn.) were found.

Key words: Carpathian Foredeep, Karpatian, Foraminifers, Biostratigraphy, Palaeoecology, Statistical methods.

The borehole Nosislav-3 is situated in the southern part of the Carpathian Foredeep closed to village Nosislav (Fig. 1). The sediments have been already broadly studied by Adamová et al. (1992), Brzobohatý (1992), Kropáček & Malkovský (1992a, b) etc.

Methods

Microfauna was analysed using the statistical evaluation. Next phenomena were studied: genera diversity after Shannon-Wiever index, the ratio plankton/benthos, similarity after Jaccard index, percentage of foraminifera genera, constance, frequency of the occurrence of agglutinated, shallow-water, euryoxybiont foraminifers etc.

Results

Foraminifers and other microfauna are relatively well preserved, partly in fragments. Tests of foraminifera are locally rather small, especially in the lower part of the profile. The assemblages comprise foraminifers, clasts of sponge spicules (especially in the interval from 187,4 m to 67,6 m), teleostei-bone and scale fragments, clasts of spines of urchins, tests of ostracodes, molluscs and bryozoas, radiolarians and often pyritised diatoms.

Following types of the microfauna taphocoenoses were recognized: 1. teleostei bones exclusively, 2. depleted foraminifera tests (often with pyrit tests), 3. abundant and non-diversified foraminifera assemblages and 4. abundant and diversified foraminifera assemblages (Petrová, 1998).

Frequency of benthic genera in assemblages attains usually between 15-20. The maximum value, 29 genera has been observed in the depth of 219,6 m. The constance of foraminifera genera is documented on Fig. 2: specimens of genera *Globigerina*, *Bolivina*, *Bulimina*, *Hanzawaia*, *Heterolepa*, *Hansenisca*, *Praeglobobulimina*, *Elphidium* and *Uvigerina* form about 90-100 % of assemblages.

Palaeoecological interpretation

Generally, the palaeoenvironmental conditions were probably not well-balanced in the depositional area, the juxtaposition assemblages are often different.

According to study of microfauna, next intervals were recognized in the Nosislav-3 profile:

340,0 – 280,3 m: reduced microfauna is characterized by high number of fragments of teleostei bones, teeth, scales and otoliths. Local occurrence of small pyritized globigerinas indicates anoxic environment.

280,3 – 263,5 m: common occurrence of teleostei-bone fragments continues up to 255,7 m. Concerning foraminifera assemblages, taxa *Melonis pompilioides* (Ficht. & Moll), *Neugeborina longiscata* (d'Orb.), *Siphonodosaria scabra* (Rss.), *Stilostomella* div. sp., *Lenticulina* div. sp. and *Globigerina* div. sp. predominate. Reduced conditions continue.

263,5 – 168,2 m: frequency of teleostei bone fragments took a massive drop. As occurrence of foraminifers, the ratio plankton/benthos decreases (Fig. 3), genus diversity increases, supply of oxygen is low. Deposits of barren microfossils were observed here.

Three horizons of *Uvigerina* div. sp. (*U. graciliformis* Papp & Turn., *U. acuminata* Hos., *U. peregrina* Cush., *U. multicostata* LeRoy etc.) were found in the depths of 259,3 m, 232,2 m and 200,8 m. The occurrence of *Elphidium* div. sp. and *Pararotalia caunui* (Cush.) indicates the local shallow-water sedimentation in the depth of 219,6 m. Palaeoenvironmental conditions were probably not equal: the pelitic sedimentation alternated the psammitic one in depth of 257,0 m. The change of psammitic to aleuritic-pelitic development in depth of 170,0 m corresponds to the change in foraminiferal assemblages where euryoxybiont foraminifers dominate.

168,2 – 69,8 m: microfauna shows high diversity (foraminifers, fragments of ostracodes, molluscs and bryozoas, clasts of spines of urchins, teleostei bone fragments, radiolarians), clasts of sponge spicules dominate. The number of agglutinated foraminifers reaches up to 2-3 %. The number of euryoxybiont foraminifers dramatically increases from the depth of 111,7 m, mainly such as *Bulimina* div. sp. and *Pappina breviformis* (Papp & Turn.) – rather different section than underlying one.

Two intervals (subsections) can be recognized on the base of euryoxybiont foraminifers:

- 168,2 – 111,7 m – equal environment with higher number of planktonic foraminifers and low number of euryoxybiont ones
- 111,7 – 69,8 m – strong rising of the number of euryoxybiont taxa (*Bulimina elongata* d'Orb., *B. striata* d'Orb., *B. schischinskayae* (Sam.), *Pappina breviformis* (Papp & Turn.) etc.).

67,6 m – number of shallow-water foraminifers increases and high value of diversity documents the improvement of environmental conditions and stability of the oxygen supply.

Discussion and conclusions:

Development of environment in Karpatian in the borehole Nosislav-3 started under the influence of anoxic conditions (Brzobohatý, 1992). Later more abundant microfauna alternates depleted one, euryoxybiont taxa predominate and they represent environment of infralittoral to circalittoral, locally even upper bathyal. These data are in agreement with the sedimentological conclusions by Adamová et al. (1992) who suppose the intensive water flow in the depositional area.

The oxygen supply was relatively low. Three stratigraphic important horizons with *Uvigerina* div. sp. (*U. graciliformis* Papp & Turn., *U. acuminata* Hos., *U. peregrina* Cush., *U. multicostata* LeRoy etc.) in the depth interval 263,5-168,2 m are found. Horizon with *Pappina breviformis* (Papp & Turn.) corresponds with the depth interval 168,2-69,8 m. In the uppermost part of profile we can observe shallow-water assemblages.

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Fig. 1.: Schematic map showing localization of the borehole Nosislav-3 (Carpathian Foredeep).

Fig. 2.: The values of constance for individual genera of foraminifers in the borehole Nosislav-3 (Karpatian, Carpathian Foredeep).

Fig. 3.: The values of the ratio p/b of foraminifers in the borehole Nosislav-3 (Karpatian, Carpathian Foredeep).





