Evolution of Marine Middle Miocene (Badenian) in the Carpathian foredeep (Ukrainian Carpathians)

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Foraminiferal assemblages of Miocene deposits from Carpathian foredeep have been studied. Planktonic components of Foraminifera clearly indicate the extent of marine sedimentation in the region from the Orbulina suturalis Zone up to the Ammonia galiciana Zone (Badenian). The analisis of the paleoenviroment in the studied basins proceedeed principally from quantitative evaluation of the foraminiferal assemblages. Percentage of species, P/B – ratio and foraminiferal number (number of forms in 1 g of dry weight of sediment, have been quantified.

Variations in ratio plankton/benthos allowed to distinguish 6 orictocenoses:

I - Planktonic one coresponds to the most part of Lower Badenian (Orbulina suturalis zone). Planktonic forarninifer form 75%. Subtropical groups are dominated in it: Orbulina suturalis Bronn., Globigerinoides quadrilobatus Banner et Blow., G. trilobus (Reuss), Globoquadrina altispira Bolli. Warm-loved species Orbulina suturalis maximum in some samples reach 30% (and sometimes more than that). The part of other "warm" species reaches 56%. Besides the above mentioned species, there are Globorotalia scitula, G. mayeri, Globigerina nepenthes, G. bulloides. All the mentioned species preferred the warmest (18-20°) part of the basin of normal salinity, so this orictocenose can be regarded as subtropical type.

Benthic species Cibicides ungerianus, Melonis soldanii, Heterolepa dutemplei, Bulimina buchiana, Uvigerina asperula in this orictocenose are not numerous - 10%. All these species are characteristic for the relatively deep-water parts of the basin (lower part of the shelf).

II - orictocenose - benthic-planktonic - is distinguished in the upper part of Lower Badenian (Uvigerina asperula zone). Besides the dominated Uvigerina asperula (to 30-40%) there are Bulimina buchiana (15-20%), Bolivina hebes (10%), Cibicides ungerianus (15-20%). These species are present in the paleocenose in relatively equall quantities. Planktonic species Orbulina suturalis and Globigerinoides trilobus are of subordinate meaning (15-20%). Quantitative maxima of these genera are characteristic for boreal area, for the depth below 500 m.

III - planktonic orictocenose. Planktonic forms 85-95% at the bottom of the Globigerina decoraperta zone and gradually reduces up the sequens. Cold-loved species -Globigerina bulloides, Globigerina quinqueloba are the maximum of development (40-60%). There are several other planktonic species of no importance by average content in some samples: Globigerina concinna - 3%, G. falconensis - 2%, G. foliata - 10%, Globorotalia mayeri - 5%. These species are less enduring than Globigerina bulloides because they prefer warm waters.

Up the sequence a number of planktonic foraminifer sharply diminishes. The general composition of benthic complexes is uniform: Bolivinidae - 2%, Bulimidae - 15-20%, Uvigerinidae - 10%, Cassidulinidae - 10-40%. All these groups are characteristic for relatively deep-water areas of sea basins of normal salinity (lower part of shelf-upper part of bathial zone). Agglutinated foraminifer (10 species from 5 genera) are not significant in the section (2% of the whole benthic complex). But in the upper Prutian beds their number is 10-30% and even 50% (south-eastern Bilche-Volytsa zone of the Carpathian foredeep).

The next benthic orictocenoses are determined by the relative domination of those or other genera shells.

IV orictocenose is benthic, contains 2 genocenoses: Bulimina-Bolivina and Hyperammina-Haplophragmoides.

Relatively high content of the Bulimina shells characterizes borealic tropical, subtropical and natal areas. The most percent content of secretional foraminifer shells is observed in tropical and natal areas at the depths to 4500 m by 2-3° temperature and 34.6-34.2% salinity (Saidova, 1976).

Hyperammina-Haplophragmoides genocenose is the deepest-water of all benthic taxocenoses. If can exist by the temperatur of waters below 2°.

V orictocenose - benthic, is represented by Cassidulina-Bulimina genocenose. In this cenose the shells of genus Cassidulina form nearly 40%, Bulimina - 20-22%. Besides these 2 genera are Bolivinidae - 5%, Rotaliidae - 3%, rare agglutinated forms - 2%. These assemblages prefer cold water/from the first degrees till 8-10° / and 20-24% salinity.

VI orictocenose - benthic - is composed by mixed complex of shallow water foraminifer that prefer warm hyposaline basins. The shells of Ammonia (30-40%), Elphidium (20%), Discorbis (10-15%) are numerous (in the Mediterranean Sea the similar cenose is developed at the depths lower than 100 m in hyposaline waters).

Palaeoecological interpretation of groups of taxa reveals Subdivision of the Badenian basin of environments showing steep gradients of physical and chemical parameters. The recognized Foraminifera groups represent Habitats from brakish nearshore strip of inner shelf. Biostratigraphic standard of Parathethys based on planktonic foraminifera has been used. Planktonic forms are arranged in two depth-controlled assemblage in the studied area. First – coresponds to the most part of Lower Badenian (Orbulina suturalis Zone). Second – lower part of Upper Badenian (Globigerina decoraperta Zone).

Lower Badenian (Moravian substage) is well documented by abundant Orbulina suturalis and numerous taxa of Globigerinoides at all foredeep. The presence of Globigerina decoraperta, G. druryi indicates that marine sedimentation in studied region continued throughout the most part of Upper Badenian.