NEW REMARKS ON THE LITHOLOGY AND BIOSTRATIGRAPHY OF THE CRETACEOUS DEPOSITS FROM ISTRIA DEPRESSION (BLACK SEA SHELF)

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ABSTRACT. The lithological and micropaleontological study of samples collected from several boreholes drilled in the Mesozoic deposits of Istria Depression (Black Sea shelf) allowed the characterization of intersected Cretaceous successions.

The Berriasian - Valanginian deposits are terrigenous, represented mainly by sandstones in the lower parts, and clays above. It is impossible to document the presence of Hauterivian-Aptian deposits in the succession. The Albian deposits are still terrigenous (predominantly clays, sometimes with sponge spicules). The Cenomanian transgressive deposits are coarser, and contain *Conicorbitolina conica* (d'Archiac), *Rotalipora cushmani* (Morrow) and *Hedbergella-Praeglobotruncana* sp. The following Turonian?-Campanian-Maastrichtian deposits are micritic limestones with planctonic foraminifera in specific successions: *Globotruncana* cf. *elevata* (Brotzen), *Globotruncana bulloides* (Vogler), *Globotruncana arca* (Cushman), *Globotruncana contusa* (Cushman), *Gansserina* sp. For these specific successions the assemblage indicates a Campanian-Maastrichtian age. The age of the most underlying deposits could be estimated only by comparisons with published data (Bănciulă et al., 1997).

KEYWORDS: Black Sea shelf, Cretaceous, lithology, biostratigraphy.

INTRODUCTION

Black Sea has represented an area of economic and scientific interest since the first data on the bore hole samples from the Romanian offshore. Since then hundreds of boreholes were drilled by Romanian and foreign companies, leading to a huge amount of geological data. The major geological units of the adjacent areas (North-Dobrogea Orogen, Babadag Basin and Moesic Platform) preserve their specific features also in the Romanian shelf area of the Black Sea (fig.1).

This study focused on core samples collected from reference and productive boreholes located on the northern sector of Istria Depression. This structural unit was defined as the depressionary area located between the northern and central branches of the Euxinic threshold (Pătruț et. al. 1974). This threshold was interpreted as a well-defined continental paleoslope working since the Upper Eocene, but which probably limited the extension of the shelf deposits already starting with the Upper Cretaceous.

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LITHOLOGICAL REMARKS

The studied samples were collected from three distinctive structures located on the northern (Egreta structure), northwestern (Lebă da West structure) and eastern (Unirea structure) borders of the Istria Depression.

The synthetic petrographical data are presented below:

1. The deposits from Egreta structure are mainly siliciclastic, represented in the lower and middle part by fine to coarse well-sorted sandstones, interlayered by siltic claystones/mudstones (Pl. I., fig. 2). Within the coarse deposits, normal grading is noticeable, while within the fine ones ripples and convolute lamination is currently present. The bioclasts occur only in the middle and upper part of the succession, represented by fragments of echinoderms, molluscs, and unidentified red algae.

The deposits from the upper part of the succession consist of coarse sandstones and microconglomerates with fragments of brachiopods, molluscs, echinoderms and forams (Pl. I, fig. 1,3,5). The Cenomanian age of these deposits at the top of the succession was established based on *Conicorbitolina conica* (D'ARCHIAC). Along the whole succession the autigenic minerals are represented by glauconite.

2. A relatively small number of samples from Lebă da West structure were studied, and they represent a short interval of about 50 meters. Lithologically, terrigenous limestones with reworked bioclasts (fragments of echinoderms, molluscs, red algae, forams) associated with siliciclastites (quartzite lithoclasts and quartz clasts) and autigenic minerals (phosphates and glauconite) were identified (Pl. I, fig. 4,6). In some samples the siliciclasts dominate, leading to the local development of bioclastic sandstones. These deposits are interlayered with fine bioclastic deposits mainly consisting of sponge spicules embedded into a claystone/mudstone matrix (Pl. II, fig.2). The Cenomanian age of these

Fig.1 – Black Sea shelf

deposits is documented by *Paraphylum amphiroaeforme* LEMOINE.

3. The deposits from Unirea structure are dominated by silty claystones/mudstones (Pl. II, fig. 2) sometimes interlayered with fine sandstones (Pl. II, fig. 4, 6). The fine layers are intensely bioturbated and contain sponge spicules, planctonic forams (Globotruncanidae), echinoderm fragments and silt-sized terrigenous components (Pl. II, fig. 1, 5). Phosphates and glauconite are commonly associated with these deposits. The Late Cretaceous age was established on the basis of planctonic forams species.

Interpretation: The fine-grained sediments with both biogenic and terrigenous components are hemipelagic deposits (Stow et al., 1996), associated with turbidite deposits. Phosphates are commonly associated with hemipelagites deposited in oxygen-deficient settings, while glauconites occur in more shallow-water hemipelagites (Stow et al., 1996).

THE MICROFOSSIL ASSEMBLAGES AND THEIR BIOSTRATIGRAPHICAL SIGNIFICANCE

Orbitolina (Conicorbitolina) conica (D'ARCHIAC), *Rotalipora cushmani* (MORROW) and *Hedbergella-Praeglobotruncana* sp. that were identified in Egreta structure are index species for the Cenomanian, the Late Cenomanian respectively (Schroeder & Neumann, 1985, ; Robaszinski et al., 1984).

The globotruncanidae association that is present in the deposits from Unirea structure including *Globotruncanita* sp. cf. *Globotruncanita elevata* (BROTZEN), *Globotruncana bulloides* (VOGLER), *Globotruncana arca* (CUSHMAN), *Contusotruncana contusa* (CUSHMAN), *Globotruncana* sp., *Globotruncanella* sp. *Gansserina* sp. cf. *Gansserina wiedenmayeri* (GANDOLFI) and *Gansserina* sp. was previously described from Campanian-Maastrichtian deposits (Robaszinski et al., 1984). It established the stratigraphical limits of the studied successions. The successions lacking these species can be dated only in comparison with previous information (Băncilă et al., 1997).

CONCLUSIONS

The lithological-petrographical and micropaleontological study of the samples collected from several boreholes drilled in Istria Depression (Black Sea plateau) lead to a brief characterization of some Cretaceous successions.

The Upper Jurassic deposits are mainly limestones based on the reworked fragments that were found in the Lower Cretaceous turbidites. They were overlaid by siliciclastic deposits during Berriasian-Valanginian, that are mainly sandstone-rich (proximal turbidites) in the lower part and clay-rich (distal turbidites) in the upper part. The Hauterivian-Aptian interval can be hardly documented based on the studied samples. The Albian deposits are dominated by hemipelagites, sometimes interlayered with pelagites containing sponge spicules. The transgressive feature of the Cenomanian deposits is given by the coarse sediments that formed during this stage. They are followed by ?Turonian-Campanian-Maastrichtian micritic limestones, often clay-rich, containing planctonic forams.

Only the Cenomanian and the Late Cretaceous samples provided index micropaleontological assemblages that were used for documenting the age of the hosting deposit.

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PLATES

Plate I

Fig.1, 3, 5 - Coarse sandstones and microconglomerates with fragments of brachiopods, molluscs, echinoderms and forams. 1- sample IV-1-FLV; 3-sample 14E-CM5-E1; 5-sample 822-LW-CM5.

Fig. 2 - Siltic claystones/mudstones. Sample 35U-CM10-E3.

Fig. 4 - Terrigenous limestones with reworked bioclasts. Sample 14E-CM7-E5.

Fig. 6 - Siliciclastites (quartzite lithoclasts and quartz clasts) and autigenic minerals (phosphates and glauconite). Sample 14E-CM-E1.

Scale-bar = 0,6 mm.

Plate II

Fig. 1, 5 - fine layers with sponge spicules, planctonic forams (Globotruncanidae), and silt-sized terrigenous components. 1-sample 35U-CM5; 5-sample 822-LW-CM2.

Fig. 2 - Siltic claystones/mudstones. Sample 14E-CM9-E4.

Fig. 3 - Sponge spicules embedded into a claystone/mudstone matrix. Sample 35U-CM7.

Fig. 4, 6 - Sandy claystones/mudstones. Sample 60P-CM2 (6=N+).

Scale-bar = 0,6 mm (1, 3, 5) and 1,1 mm (2, 4, 6).

Plate III

Fig. 1 – *Conicorbitolina conica* (D'ARCHIAC). Sample 14E-CM5-E1, x 35.

Fig. 2 – *Rotalipora cushmani* (MORROW). Sample CM15, x 70.

Fig. 3 – *Hedbergella*?-*Praeglobotruncana*? sp. Sample CM15, x 70.

Fig. 4-6 – *Globotruncana bulloides* VOGLER, x 70.

4-sample 35U-CM5; 5-sample 35U-CM7; 6-sample 35U-CM6.

Fig. 7 – *Globotruncana* sp. Sample 35U-CM5, x 70.

Fig. 8 – *Globotruncana* cf. *elevata* (BROTZEN). Sample 63P-CM5, x 70.

Fig. 9-12 – *Globotruncana arca* (CUSHMAN), x 70.

9-sample 35U-CM5; 10, 11-sample 63P-CM5; 12-sample 60P-CM5.

Plate IV

Fig. 1, 2 – *Ganserina* cf. *wiedenmayeri* (GANDOLFI), x 70.

1-sample 60P-CM5; 2-sample 35U-CM5.

Fig. 3 – *Ganserina* sp. Sample 63P-CM5, x 70.

Fig. 4 – *Globotruncana contusa* (CUSHMAN). Sample CM9, x 70.

Fig. 5-8 – *Globotruncanidae* indet., x 70.

5-sample 60P-CM5; 8, 9, 10-sample CM8.

Fig. 9 – *Hedbergella* sp. Sample 63-CM5, x 70.

Fig. 10, 11 – *Heterohelix* sp., x 70.

10-sample 35U-CM6; 11-sample 60P-CM5.

PLATE I

CRETACEOUS DEPOSITS FROM ISTRIA DEPRESSION (BLACK SEA SHELF)

PLATE II

PLATE III

CRETACEOUS DEPOSITS FROM ISTRIA DEPRESSION (BLACK SEA SHELF)

PLATE IV