EARLY SARMATIAN SERPULID-MICROBIALITE CARBONATE BUILDUPS OF THE MIODOBORY REGION (WESTERN UKRAINE)

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Abstract: The Early Sarmatian serpulid-microbialite buildups from the Miodobory region (Ukraine) show unusual facies, biotic and isotopic characteristics, just as earlier studied analogous buildups from the Roztocze region in SE Poland. The growth of the buildups took place in non-marine water typical of the Sarmatian Paratethys, however, at the same time, the water was evaporated, highly supersaturated in respect to calcium carbonate and characterized by anomalous chemistry.

Key words: Carbonate buildups, Early Sarmatian, Paratethys, Ukraine

Carbonate buildups showing unusual facies, biotic and geochemical features have been known in the Early Sarmatian (Volhynian) Paratethys basin in Poland, the Ukraine and Moldova since a long time (*see* Pisera, 1996 for review). In the Ukraine, the buildups form a ca 130 km long, narrow zone spread over the area between Ternopil to the north and Kamianets Podilskyi surroundings to the south (Korolyuk, 1952). The Miocene in that region consists of the normal marine Upper Badenian and restricted marine or lacustrine Sarmatian deposits. The major component of the Upper Badenian are coralline algae-vermetid reefs that form a ridge strongly marked in the today's relief, known as the Miodobory Hills. The Lower Sarmatian limestones cover the reef hills as well occur in the fore reef area forming discrete up to ca 20 metres thick mounds which by local people are called *tovtra*. The *tovtra* mounds are usually arranged in linear rows that are more or less perpendicular to the Miodobory or, in other places, the mounds are rather randomly distributed forming widespread mound fields.

The Lower Sarmatian deposits covering the Miodobory ridge are quite variable. The main facies is serpulid-microbialite boundstone that is composed of serpulid tubes (occasionally also bryozoan skeletons) and micrite. Serpulids and bryozoans, which make up a few percent of the rock volume only, are overgrown with micritic peloidal microbialites that are the major component. The microbialites and the serpulid and bryozoan skeletons make together a porous framework usually filled up with abundant synsedimentary fibrous cements and peloidal or dense micrite internal sediments. The serpulid-microbialite limestone covers SW slopes and more rarely tops of the Badenian reef hills. Besides the serpulid-microbialite boundstone at the reefal hilltops occur also coralline algae and bryozoan incrustations (often forming 1 metre or so large hemispheroidal bodies), bivalve coquinas, bedded bioclastic limestones, conglomerates, marls, and clays.

The sub-Sarmatian surface of the Badenian reefs is usually very uneven. Its relief may reach few or even more than 10 metres (across few tens of metres). In places, there are vertical walls of the Badenian reefal limestone, which are at least few metres high. Additionally, the Badenian reefs are cut by vertical or oblique fissures that are filled up with detrital Sarmatian deposits (including thin-shelled articulated Sarmatian bivalve fauna). Walls of the fissures are frequently incrusted with micritic microbialites and skeletal organisms (foraminifers, bryozoans).

The Sarmatian deposits forming the *tovtra* mounds are generally not so variable as those from the Miodobory ridge are. The dominant facies is serpulid (or bryozoan)-microbialite boundstone, the same as described above. Masses of such limestone may be overgrown in places with thin (10 cm or so) stromatolitic layers. Except for some outcrops where bivalve coquinas occur, the *tovtra* mounds practically lack other facies. The internal large-scale structure is usually massive although in some places the buildups exhibit a concentric internal construction, suggesting relatively regular outward growth that initiated from a central core.

The biota of the Lower Sarmatian buildups is taxonomically very poor but usually rich in individuals. Besides the serpulids and few species of bryozoans, other skeletal organisms encompass encrusting coralline algae (one species of the genus *Titanoderma*), sessile foraminifers (nubeculariids), molluscs, ostracods and benthic foraminifers (miliolids, elphidids). The bivalves may form mass accumulations but are represented by three genera only: cockle *Obsoletiforma* (several species) as well

mytilids *Modiolus* and *Mytilaster*. The gastropods consist mainly of ceritids and very small-shelled representatives of the genera *Hydrobia* and *Mohrensternia*.

Paleontological data (taxonomically extremely poor opportunistic biota) indicate clearly that the Lower Sarmatian deposits in the Miodobory region originated in the environment very distant from normal marine conditions. Such non-marine conditions are typical of the entire Sarmatian Paratethys Sea and were caused by its isolation from the world ocean at the latest Late Badenian/Konakian time (Studencka at al., 1998; Rögl, 1998). The current study on the Sarmatian serpulid-microbialite buildups from the Miodobory region as well earlier investigations of similar buildups in the Roztocze region in SE Poland (Jasionowski, 1998) indicate that the carbonates did not formed just in brackish diluted marine water. The domination of carbonate precipitates (such as microbialites and synsedimentary cements) in the buildups is indicative of water highly supersaturated in respect to calcium carbonate. Oxygen stable isotopes in synsedimentary precipitates as well molluscs' shells of the Roztocze region buildups indicate crystallization from water with elevated $\delta\ ^{18}O$ (+1-+3 ‰ SMOW), thus enriched by evaporation (Jasionowski, 1998). First isotopic analyses of the precipitates and bivalve shells from the Miodobory region buildups gave similar results (although it seems that the evaporation here might be slightly lower). The abundance of calcitic precipitates in the Lower Sarmatian buildups and their geochemical characteristic confirm strongly earlier suggestions concerning anomalous chemistry of the Early Sarmatian Parathetyan water (Pisera, 1996 - high alkalinity waters).

The research was financially supported by the Polish Committee for Scientific Research (Grant No P04D 064 20).

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