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The Evidence of Deeper-Water Hiatal Stromatolites from the Jurassic of Central Russia

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Abstract Stromatolites are widespread type of microbiales throughout the Phanerozoic (Riding, 2003); however, deeper-water hiatal (DWH) ones are much less common than their shallow-water counterparts. DWH stromatolites are known from the entire European segment of the northern Tethyan margin in Bathonian-Callovian (Radwansky-Szulczewski, 1962), Oxfordian (Gygi, 1992) and Aptian to Cenomanian age (Föllmi et al, 2011). We have discovered their analogues in the phosphatic clay deposits of Oxfordian age in the Central Russia (Moscow district). In what time, relatively cold-water epicontinental sea (Middle Russian Sea) existed here. Studies of the stromatolites have shown that they are composed entirely of fluorapatite. They occur preferentially on top of reworked pebbles (phosphatic oolites and intraclasts) and fossils and show variable morphologies, ranging from isolated laminae (“films”) to internally laminated columns and crusts. They reach thicknesses up to 15 cm. The microstructure of the samples was examined using a scanning electron microscope. Numerous bacterial biofilms ranging in size from 1-2 to 10 microns were found in the samples. Spherical forms of bacteria with a diameter of up to 1-1.5 microns are found. In the layer with them, there is an absence of macrofossils. Also, they are clearly marked the gap in sedimentation, as more than ammonite zone is missing below DWH level. All these indicate their DWH type. Apparently, Jurassic DWH stromatolites grew close to the upper boundary of the zone with minimal oxygen content like their Tethyan analogs. Furthermore, it is important to emphasize that Boreal stromatolites, unlike Tethyan ones, grew under conditions of terrigenous sedimentation, rather than carbonate or mixed carbonate-siliciclastic sedimentation (in the presence of terrigenous input). The latter emphasizes their afacial in relation to the prevailing sedimentation regime in shallow water. They may represent ecosystems of relatively deep parts of Subboreal sea, the study of which requires close attention. Their appearance along the hiatal surface makes even such small stromatolite buildups important for regional stratigraphy.

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Key words stromatolites, Phosphates, Jurassic, Oxfordian, Central Russia