



Microbial mat-related microstructures as proxies of depositional paleoenvironment in open marine clastic settings: case study from Silurian graptolitic shales (SGS), central Poland.

T. Ochmański

Institute of Geochemistry, Mineralogy and Petrology, Faculty of Geology, Warsaw University, Poland (e-mail: tomoch@uw.edu.pl)

Fossil microbial mats proved to be valuable indicators of some features of paleoenvironment, not only for carbonate rocks, but also for clastic rocks (summary in: Sakar et al., 2004; Schieber, 2004). Unfortunately, to date only proximal-to-land settings were documented in detail with respect to microbial mat-related microstructures. In this work, different open-marine microbial mat-related microstructures from SGS are illustrated and interpreted.

Examined rocks are exposed in Holy Cross Mountains (HCM) – a small range in Central Poland. Within HCM two regions can be distinguished: Łysogóry Region (ŁR) in the North, and Kielce Region (KR) in the South. SGS can be found in both regions, providing rare opportunity for direct comparison of identical (with respect to age and lithology) rocks deposited in spatially distant areas.

Among rocks known as SGS, in HCM, five different lithological types can be distinguished: (1) olive-green claystones with minor clayshales, (2) brownish to brownish-grey, laminated clayey mudshales and clayshales, (3) grey to dark grey, partly laminated calcareous mudshales and clayshales, (4) dark grey, laminated siliceous clayey mudshales and clayshales, and (5) dark grey to black, laminated bedded cherts. Total thickness of these sediments does not exceed 200 m, and is slightly greater in ŁR. Time span of their deposition is early Llandoveryan to middle Ludlowian (Tomczyk, 1962). All lithological types are thought to be deposited in basinal (Tomczyk, 1962) or open shelf, below storm wave base (Kremer & Kaźmierczak, 2005) settings.

Microstructures interpreted as remnants of microbial mats are the main biogenic structures in all laminated lithologies (types 2-4). Their microbial provenance was proven for cherts in lower part of section (Kremer & Kaźmierczak, 2005). Within distinguished lithological types they differ in following features: (I) continuity of laminae, (II) thickness of laminae, (III) appearance of laminae, (IV) appearance of particular fibres, (V) type, (VI) size of detritus material trapped in-between-, under-, or on- microbial meshwork, and (VII) macro- and microorganisms remains trapped in-between-, under-, or on- microbial meshwork.

Listed above features were interpreted to evaluate: (i) volume of sediment influx and tempo of deposition, (ii) distance from source area, (iii) level of energy of sedimentary environment, and (iv) ecosystems inhabiting water column and seafloor. These evaluations are important for reconstruction of paleogeography of Ł R and KR during early to middle Silurian.