

Mineral and chemostratigraphy of Toarcian grey shale (Úrkút, Hungary)

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The Úrkút black shale is better defined as a grey shale and its dominant mineralogical assemblage is authigenic. The basin of deposition was a starved basin during accumulation of the grey shale and the interbedded Mn carbonate ores. The high organic matter content and the anoxic-like features of the grey shale resulted from the rapid accumulation of microbial organic matter, and the high rate of accumulation of authigenic minerals (clay minerals and proto-ore minerals), and not from the formation of anoxic bottom waters. The driver of grey shale formation was most likely the generation of submarine rift system. The Transdanubian Range, and other regions of the Tethyan realm, supported formation of black shales under this complex set of processes. The black shale-hosted Mn-carbonate deposits reflect the conditions that accompanied the formation of ancient failed rift systems.

The grey shale that hosts the Úrkút Mn microbialite is dominated by authigenic minerals (smectite, celadonite, rhodochrosite), which occur very close to the contact zone of the footwall. Quartz, dolomite, K-feldspar, plagioclase and calcite biodebris show higher amounts in some laminae. Pyrite occurs commonly as the result of diagenetic anoxic microbial sulphate reduction. Geochemical proxies support oxic depositional conditions, moderate productivity, and enrichment factors of >5 for Te, Co, S, As, Mn, Mo, Ca and 2.3 for REE and element excess of >70% for Te, Co, S, As, Mn, Mo, Ca, P and 56% for REE relative to Av. Shale [2].

[1] Polgári *et al.* (2012) *OGR* **47**, 87-109; [2] Wedepohl KH. (1971) *In: Ahrens LH., Press F., Runcorn SK., Urey HC. (Eds.), Physics and Chemistry of the Earth*, **8**, Pergamon, Oxford, 307– 331.