Bryozoan-rich stromatolites (“bryoliths”) from the Silurian of Gotland and their relation to climate-related perturbations of the carbon cycle

Anna Lene Claussen¹, Axel Munnecke¹, and Andrej Ernst²

¹FAU Erlangen-Nürnberg, Geozentrum Nordbayern, Germany (anna.lene.claussen@fau.de, axel.munnecke@fau.de)
²Institut für Geologie, Universität Hamburg, Germany

A small but rather unique reef type occurs in the Silurian of Gotland mainly composed of encrusting bryozoans and microbial crusts, forming a complex intergrowth, which can be characterized as bryozoan-rich stromatolites, so-called “bryoliths”. The alternation of bryozoans and microbes is assumingly driven by a repeated change of hostile and more favorable conditions for metazoan growth. The surfaces of the reef bodies are composed of characteristic cauliflower structures, created by bryozoans, which are performing a finger-like growth in every direction. Other common features are bioerosion (mostly by bivalves), enigmatic encrusting echinoderms, a high abundance of organophosphatic fossil remains such as bryozoan pearls and discinid brachiopods, a high abundance of epi- and endobionts, vadose silt, and gypsum pseudomorphs.

Altogether, ten of these special reefs have been identified on Gotland so far. All of them were formed during periods of strong positive δ¹³C excursions at the Ireviken and Lau isotope excursions in the early Wenlock and late Ludlow, respectively. The unusual features of the bryoliths as well as their occurrence exclusively during strong positive δ¹³C excursions indicate very specific environmental requirements. This leads to the assumption, that whatever caused the isotope excursions also has affected these reef systems. Hence, investigating the bryoliths will hopefully increase our knowledge to what has happened during the – still enigmatic – Silurian stable isotope excursions.