

## A stratigraphic approach to the study of the growth history of a mud mound in the Viséan (Mississippian, Carboniferous) of Derbyshire, UK

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Mississippian carbonate platforms were predominantly ramps characterized by a widespread development of shallow to deep water mud mound bioconstructions (e.g. Lees & Miller, 1995). The Viséan carbonate platform of Derbyshire hosts several of these mud mounds, such as the Ricklow Dale mound, near Monyash, which offer a window to unravel mud mounds' growth history and stratigraphic relationships. The investigated mud mound overlies bioturbated bioclastic wackestone and packstone beds grading upward into bioclastic grainstone representing middle ramp deposits of the Monsal Dale Limestone Formation. The mud mound is a composite and complex structure which reflects the juxtaposition of several smaller mounds comprising a complex set of core-, flank- and intermound facies. The mound cores consist predominantly of clotted peloidal and leiolitic micrite with bryozoans, rare fistuliporid bryozoans, brachiopods, crinoids and abundant early marine radiaxial fibrous calcite cement filling primary growth cavities. Brachiopods are very diversified and abundant in the core facies, and occur also in neighbourhood assemblages in the well bedded flank-facies, which are otherwise dominated by large crinoids. Brachiopods from the core and flank facies are similar and comprise free-living seminafaunal productids, pedicle-attached terebratulids and rhynchonellids and free-living spiriferids. Seminafaunal productids are dominant and reach a larger size than the other taxa, suggesting sparse food resources. The stratigraphic ranges of the most important brachiopod genera in the mound span the middle-upper Viséan. The mud mound shows evidence of subaerial exposure prior to the deposition of the overlying beds of the Eyam Limestone Formation (Gutteridge, 1991; Nolan et al., 2017), which led Gutteridge (1991) to propose a revision of the boundary between the Monsal Dale Limestone and the Eyam Limestone formations. The revised boundary has, however, not been formally adopted. The outcrops of the Eyam Limestone Formation at Ricklow are mostly inner to middle ramp facies, characterized by the occurrence of massive shell beds dominated by large and thick-shelled seminafaunal species of *Gigantoproductus* (Nolan et al., 2017 and references therein), molluscan wackestone and crinoidal high energy grainstone. These deposits onlap the flanks of the mound and its top. The few tens of metres thick succession at Ricklow Dale records the growth of a bryozoan-crinoid-brachiopod dominated mud mound in an open middle ramp setting. Its growth was interrupted by subaerial exposure and it was replaced by a restricted lagoon dominated by molluscs and then an inner ramp setting dominated by a low diversity *Gigantoproductus* facies that onlapped and overlapped the mound surface.

Gutteridge P. (1991) - Revision of the Monsal Dale/Eyam Limestones boundary (Dinantian) in Derbyshire. *Mercian Geologist*, 12, 71-78.

Lees A. & Miller J. (1995) - Waulsortian banks. Carbonate mud-mounds, 191-271.

Nolan L.S.P., Angiolini L., Jadoul F., Della Porta G., Davies S.J., Banks V.J. & Leng M.J. (2017) - Sedimentary context and palaeoecology of *Gigantoproductus* shell beds in the Mississippian Eyam Limestone Formation, Derbyshire carbonate platform, central England. *Proceedings of the Yorkshire Geological Society*, 61(4), 239-257.