

How mud mounds controlled brachiopod population growth and life-style in the Carboniferous: an example from the Viséan of Derbyshire, UK

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Mississippian carbonate platforms are predominantly ramps characterized by a widespread development of mud mound bio-constructions (e.g. Gutteridge, 1995; Lees & Miller, 1995). The Viséan carbonate platform of Derbyshire hosts several of these mud mounds, which are associated with rich brachiopod faunas. In particular, in Ricklow Dale (near the village of Monyash) brachiopods occur abundantly both in the mud mounds of the Monsal Dale Limestone Formation and in the overlying Eyam Limestone Formation. The Monsal Dale Limestone Formation mud mounds are in fact composite and complex structures, which originate from the juxtaposition of several smaller mounds and comprise a complex set of core-, flank- and intermound facies. Here, brachiopods are very diversified and occur as life assemblages in 'pockets' possibly scoured by storm currents in the core facies of the mounds (Gutteridge, 1995) as well as neighbourhood assemblages in the well bedded flank-facies, which are otherwise dominated by large crinoids; intermound-facies mainly comprise skeletal wackestone/packstone with diverse skeletal composition. Brachiopods from the core-pockets and from the 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 food resources sparse or not abundant.

The outcrops of the Eyam Limestone Formation at Ricklow are mostly inner to middle ramp facies without the development of mud mounds, but 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). Many authors have previously considered these assemblages as part of the mud mound deposits. Yet they represent distinct life to neighbourhood assemblages developed at times of mud mound inactivity, onlapping the flanks of the mound and its top. Even if

successive to the growth of the mound, their relict morphology provides sheltering for the pioneer *Gigantoproductus* palaeocommunities, allowing their development and success.

The few-tens of metres thick succession at Ricklow Dale discloses a neat and sharp faunal change from the high diversity and spatially restricted mud mound adapted brachiopod communities to the low diversity widespread *Gigantoproductus* shell beds.



View of the Ricklow mud mound with core-pockets brachiopods and the two onlapping *Gigantoproductus* beds.

References

- Gutteridge, P., 1995. Late Dinantian (Brigantian) carbonate mud-mounds of the Derbyshire carbonate platform. Carbonate Mud-mounds, Their Origin and Evolution. Spec. Publ. Int. Assoc. Sedimentol, 23, 289-307.
- 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.

A new Late Tortonian brachiopod assemblage from the Mediterranean-Atlantic seaway (Guadix basin, SE Spain)

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