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# Little Orme, Gwynedd

[SH 817 828]–[SH 819 826]

## Introduction

The Little Orme GCR site occupies a small area centred on the bay of Porth Dyniewaid on the north-eastern side of the Little Orme [SH 818 827], 3 km east of Llandudno. Inland, the site extends to include a disused quarry complex where important sections are located in what has been referred to as the 'Upper Quarry' area by Davies and Somerville (1986). The locality provides the best exposed section of the richly fossiliferous Asbian reef limestones which are thought to have formed on the northern margin of the North Wales Shelf during late Viséan times. Comprehensive site descriptions have been provided by Warren *et al.* (1984) and Davies and Somerville (1986).

## Description

The reef limestones can be best seen on the east side of the bay on the north-west facing slopes of Trwyn y Fwch (Figure 8.12). Warren *et al.* (1984) describe the limestones as strongly jointed and obscurely bedded. Lithologies consist of patchily dolomitized fine crystalline limestones and carbonate mudstones. Davies and Somerville (1986) record two main reef lithologies: massive wackestones–packstones with reticulating areas of sparry calcite around bioclasts and lithoclasts, and wackestones–mudstones with lens- and sheet-like stromatactoid cavities floored with laminated and graded geopetal sediment and overlain by fibrous spar cements. Cavities in the reef some of them vertical pipe-like structures, are filled with limestone breccia or with red calcareous sandstones and shales. In the steep cliffs of the western headland to Porth Dyniewaid, a lower and upper level of pale-coloured massive reef limestone occurs separated by thickly bedded dark-grey limestones. Inland, the lateral transition of the upper reef limestone into brecciated reef limestones and a bedded packstone shelf facies can be seen in the 'Upper Quarry' (Davies and Somerville, 1986).

The reef limestones have an abundant and diverse fauna that includes heterocorals, rugose corals, brachiopods, bryozoans, gastropods, bivalves, nautiloids, trilobites and crinoids together with the stratigraphically important goniatite *Bollandites castletonensis*. Detailed faunal lists are supplied by Warren *et al.* (1984).

## Interpretation

The massive, fossiliferous fine-grained limestones of the Little Orme are interpreted as reef limestones that formed at the margin of the North Wales Shelf where it sloped down into the Irish Sea Basin (see (Figure 8.3)b). The presence of *Bollandites castletonensis* indicates a B2b (late Asbian) age for the reef and Warren *et al.* (1984) included it within the Great Orme Limestone. Although an abundant macrofauna has been recorded from the reef, these organisms are unlikely to have been solely responsible for the construction of a reef framework. As with other Dinantian reef structures, the organisms responsible for reef construction are obscure, possibly microbial. Similar reef limestones are known from the Prestatyn area (Neaverson, 1930, 1965), but are otherwise absent from North Wales. These reefs are the same age as those in the transition zone between the Askrigg Block and the Craven Basin in the central Pennines (see Chapter 5) and those located around the northern and western margin of the Derbyshire Platform in the southern Pennines (see Chapter 7), but no work has been done to highlight the similarities and differences between these Pennine reefs and those of the North Wales area.

The reef limestones of the Little Orme are the lateral equivalents of the cyclic Great Orme Limestone seen on the Great Orme and in the more south-westerly exposures on the Little Orme. Unfortunately, faulting and the presence of probable collapse breccias mean that the exact relationships of the reef limestones to the normal bedded shelf limestones cannot be easily demonstrated (Warren *et al.*, 1984).

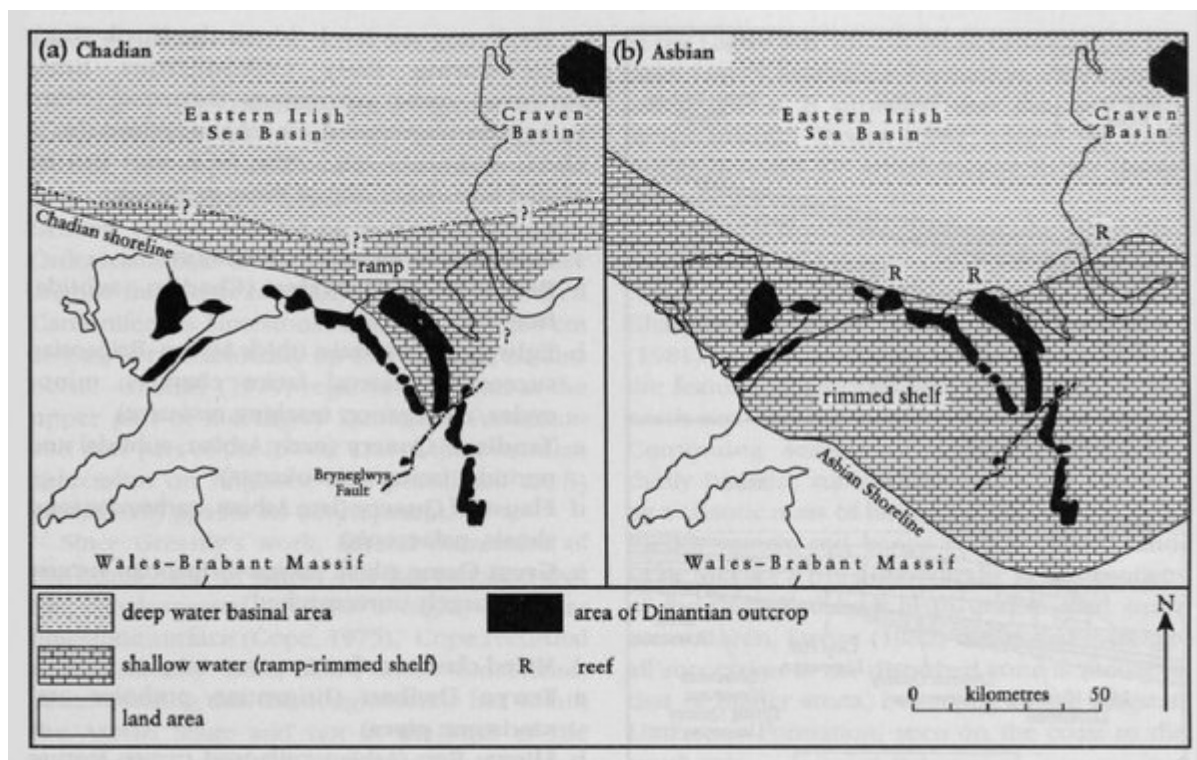
## Conclusions

The Little Orme displays arguably the best exposed section of one of the few outcrops of Asbian reef limestone on the northern edge of the contemporary North Wales Shelf and contains a rich and varied invertebrate fauna. Since little modern sedimentological or palaeoecological work has been undertaken on the Asbian reefs of this area, the site has great potential for future research.

## References



(Figure 8.12) Cliff and escarpment sections in the bedded and cyclic Great Orme Limestone (Dyserth Limestone Group, Asbian) near Ogof Hafnant at the Great Orme GCR site, Llandudno. (Photo: P.J. Cossey.)



(Figure 8.3) Palaeogeography of North Wales during Dinantian times illustrating (a) the situation after the Chadian transgression (after Somerville et al., 1989), and (b) the maximum extent of the shelf sea during Asbian times. After Warren et al. (1984).