Flagstaff Quarry, Isle of Anglesey, Gwynedd

[SH 636 807]

Introduction

The Flagstaff Quarry GCR site is a disused quarry on the south side of the Penmon peninsula on the north-east tip of Anglesey [SH 636 807]. It is the type section for the Penmon Limestone Formation, defined by Power (1977) and the approximate equivalent of the Flagstaff Limestone Formation of Davies (1982). Exposures here provide the best examples of late Asbian sedimentation and cycle development in the northwestern area of the North Wales Shelf.

Description

The section at Flagstaff Quarry is entirely of Asbian age and embraces the boundary between the Tandinas Limestone and Penmon Limestone formations of Power (1977) and the boundary between the Careg-Onen Limestone and Flagstaff Limestone formations of Davies (1982). However, these boundaries are apparently not coincident, that of Davies (1982) lying about 8 m higher than that of Power (1977). Details of the upper part of the sequence are illustrated in (Figure 8.8).

The lower part of the succession at Flagstaff is dominated by about 14 m of cross-stratified bioclastic and oolitic grainstone. This is overlain by a more heterogeneous unit about 10 m thick, dominated by fenestrate carbonate mudstone. Power (1977) placed the top of his Tandinas limestone Formation at a palaeokarstic surface near the top of this unit, whereas Davies (1982) included a further unit of cross-stratified grainstone in his Careg-Onen Limestone Formation, also capped by a palaeokarstic surface, probably on the basis of the occurrence of *Daviesiella llangollenensis,* indicating an early Asbian age, within it (see (Figure 8.8)). This unit forms the first cycle of the Penmon Limestone Formation according to Power (1977).

A further 25 m are exposed in Flagstaff Quarry comprising cycles 2–5 and part of cycle 6 of Power (1977), each cycle boundary marked by a palaeokarstic surface. Differences in interpretation led Davies (1982) to recognize three complete cycles and part of a fourth. The Flagstaff Limestone Formation or Penmon Limestone Formation is, as noted by Davies (1982), quite heterogeneous. It is distinguished by the dominance of pale-coloured bioclastic limestones, the extensive development of rubbly beds, the well-developed palaeokarstic surfaces often overlain by palaeosol clays and by the absence of porcellanous carbonate mudstones. The uppermost exposed unit is patchily dolomitized. The upper part of this formation is not seen in Flagstaff Quarry.

Interpretation

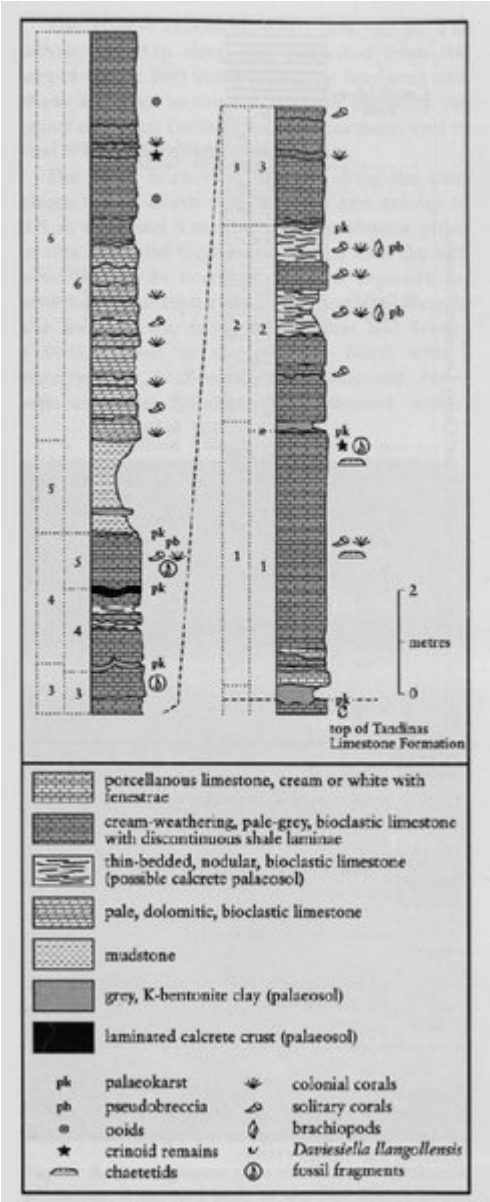
The lower (early Asbian) part of the succession seen at Flagstaff Quarry, comprising cross-stratified grainstones and fenestrate mudstones, indicates carbonate shoal environments that periodically built up to sea level, allowing tidal-flat deposits to develop. Tidal-flat deposits are important elsewhere in rocks of this age in North Wales, for example at Eglwyseg Mountain, but at Flagstaff Quarry these have developed on higher-energy deposits.

The higher part of the succession shows typical late Asbian cyclicity, with bioclastic limestones deposited in shallow shelf environments separated by palaeokarstic surfaces and clays indicative of emergence and soil development. Compared to sections to the north-west, in the principal area, there is an absence of coarse clastic material. A prominent feature of this part of the succession is the occurrence of rubbly limestones. Their development is probably related to solution during emergence, enhanced by selective re-crystallization and pressure solution (Davies, 1982).

Conclusions

Flagstaff Quarry is the most important site on Anglesey for the understanding of sedimentary processes operating during late Asbian times. The succession contains an extensive range of limestone rock types deposited as shallow marine carbonate sand bars and tidal-flat sediments that were, periodically, exposed above sea level and to the effects of subaerial weathering. Exposures here complement those at Tandinas Quarry, the two sites together giving the most complete and best exposed sections of Asbian marine shelf limestones with exposure surfaces on Anglesey.

References



(Figure 8.8) Sedimentary log of the Penmon Limestone Formation (late Asbian) at Flagstaff Quarry. Cycles of Power (1977) indicated in large numbers. Cycles of Power and Somerville (1975) indicated by small numbers. An asterisk at the 1–2 cycle boundary of Power marks the approximate line of division between the Careg Onen Limestone Formation and the overlying Flagstaff Limestone Formation of Davies (1982). After Power (1977).