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# Pentre-Bach Quarries, Clwyd

[SJ 061 783]

Potential GCR site

## Introduction

Lying on the west side of Moel Hiraddug, 1 km south of Dyserth, the Pentre-bach Quarries site [SJ 061 783] comprises two overgrown quarries known as 'Pentre-bach North Quarry' and 'Pentre-bach South Quarry' (Somerville *et al.*, 1989). The importance of the site lies in the exposure of the Chadian Foel Formation and the base of the overlying Dyserth Quarry Limestone of Arundian age. Early descriptions of the site were by Strahan (1885) and Neaverson (1935). More recently, Warren *et al.* (1984) published a log of the succession and supplied palaeontological data, while Somerville *et al.* (1989) provided additional sedimentological and biostratigraphical information.

## Description

Pentre-bach North Quarry is the type locality for the Foel Formation of Warren *et al.* (1984), although the base of the formation and its contact with the Basement Beds are not seen. The exposed section is in two parts, the lower consisting of about 7.5 m of the Foel Formation and the higher comprising 2 m of the Foel Formation and about 12 m of the overlying Dyserth Quarry Limestone. The two sections are separated by a gap of about 3 m. The missing strata are mostly represented in the exposure in Pentre-bach South Quarry, 120 m to the SSE, where a 7.5 m section of the middle part of the Foel Formation is seen. Logs of the sections at the two quarries are shown in (Figure 8.13).

The Foel Formation consists of mostly dolomitic and silty carbonates interbedded with grey or green mudstones. Lithologies reported by Somerville *et al.* (1989) include peloidal packstones and intraclastic and bioclastic grainstones. The fauna is dominated by brachiopods, especially *Composita cf. ficoidea*. Corals occur particularly in one bed in the middle of the formation, called the 'Coral Bed' by Somerville *et al.* (1989). Among the corals recorded from this bed by Somerville *et al.* (1989) were the typical Chadian forms *Caninia cornucopiae* and *Koninckophyllum cyathophylloides*. These occurred in association with *Carruthersella cf. compacta* and *Axophyllum cf. simplex* — forms that are known to span the Chadian–Arundian stage boundary (Mitchell, 1989; Riley, 1993). Somerville *et al.* (1989) also recorded a foraminiferal assemblage with abundant endothyrids and tournayellids, but lacking archaedisks. Pentre-bach is also famous for its Viséan floras (e.g. Walton, 1928; Lacey, 1952a,b, 1962), the significance of which is discussed in a companion GCR volume on Palaeozoic palaeobotany by Cleal and Thomas (1995).

The base of the overlying Dyserth Quarry Limestone is taken below a thick, coarse-grained dolomite unit towards the top of the face in Pentre-bach North Quarry (Figure 8.13). On the whole, this unit is more massive and lacks the interbedded mudstones of the Foel Formation. The fauna is sparse, but includes *Composita* and *Syringopora*.

## Interpretation

The lower part of the succession at Moel Hiraddug was included in the Lower Brown limestone of Morton (1870, 1878, 1886) and was regarded as D<sub>1</sub> by Neaverson (1930, 1943). In their new lithostratigraphy for the area, Warren *et al.* (1984) placed the succession at Pentre-bach in the Foel Formation and the lower part of the Ochr-y-foel limestone, which they continued to regard as being entirely Asbian in age (see Warren *et al.*, 1984). New discoveries in the south Clwyd and Prestatyn areas reported by Somerville *et al.* (1986, 1989) and Davies *et al.* (1989) led to a revision of the stratigraphy, although the name 'Foel Formation' was retained (Figure 8.2). Somerville *et al.* (1989) cast doubt on some earlier fossil identifications from the Foel Formation, especially an uncertain record of *Daviesiella llangollensis* reported by Neaverson (1929). Discarding this identification, the macrofauna indicates a Chadian–Arundian age. The foraminiferal assemblages of the Foel Formation lacking archaedisks are regarded as being of late Chadian age and broadly

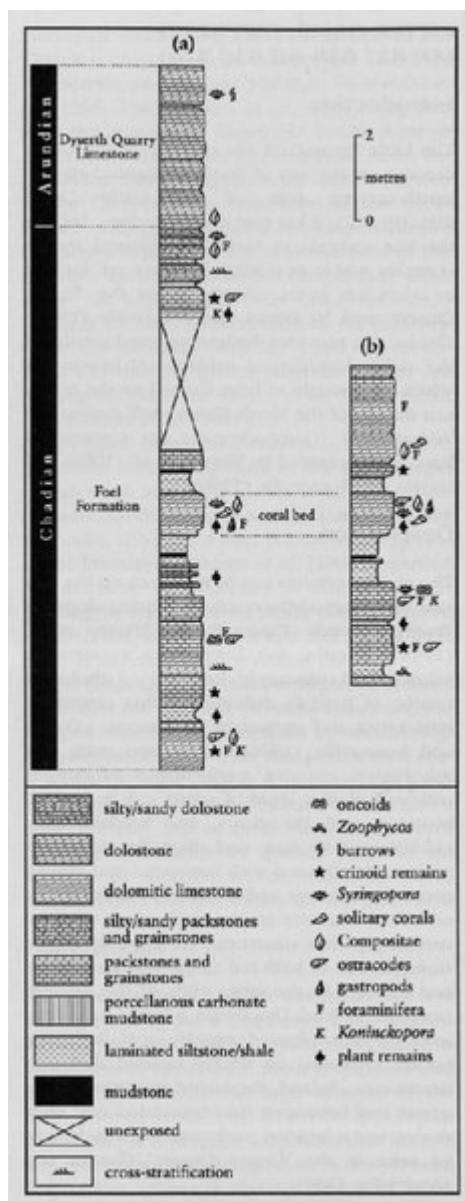
comparable with those obtained from the Stone Gill Beds and Coldbeck Beds of Ravenstonedale (Somerville *et al.*, 1989) (see Chapter 5). The Dyserth Quarry Limestone has a less diverse macrofauna than the Foel Formation, but a rich foraminiferal fauna which indicates an Arundian age (Somerville *et al.*, 1989).

Somerville *et al.* (1989) also supplied a sedimentological interpretation of the Foel Formation. They regarded it as predominantly the deposit of a wave- and storm-influenced shallow subtidal environment. Detrital material was continually being supplied from an adjacent source area, accounting for the impure nature of the limestones and the interbedded terrigenous clastic mudstones. The occurrence of carbonate mudstones suggests that back-barrier lagoonal conditions developed from time to time.

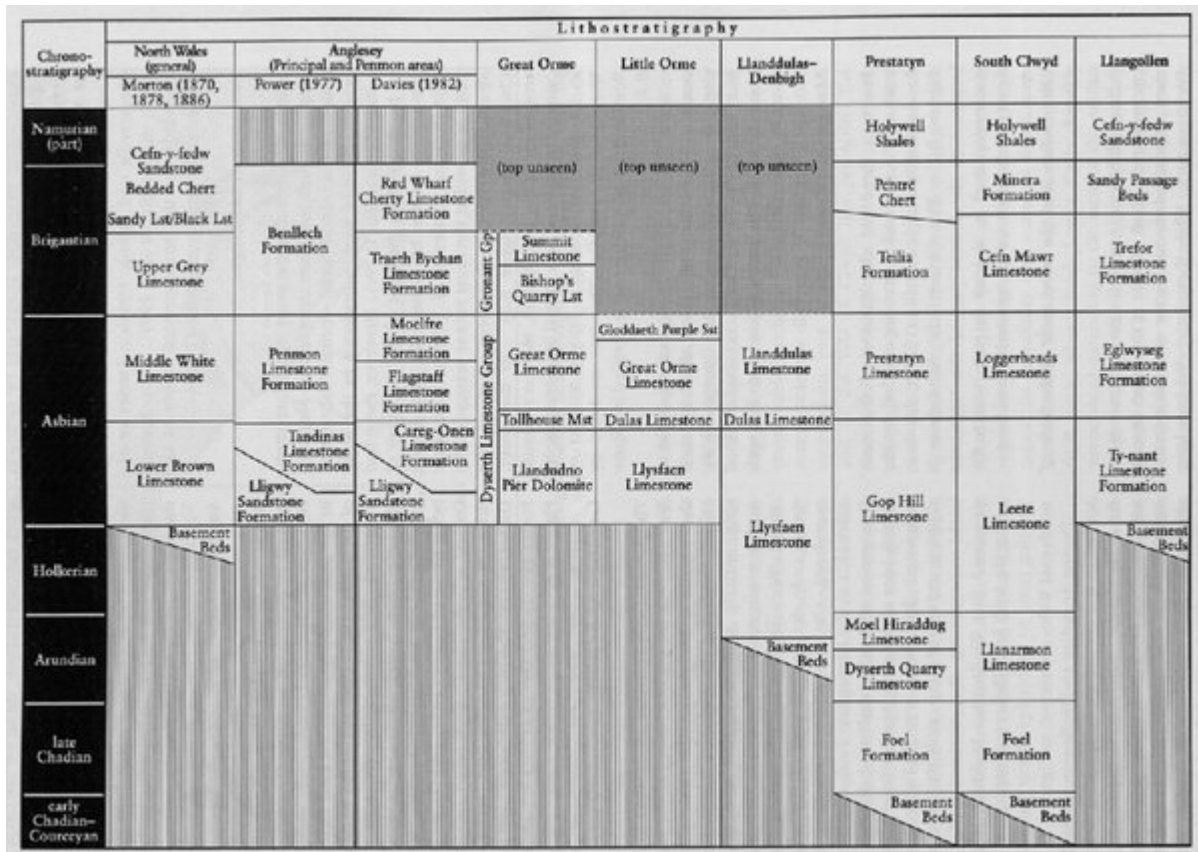
## Conclusions

For many years the Dinantian carbonate succession in North Wales was regarded as being entirely of Asbian and Brigantian age. Recent work, however, has shown that older Dinantian strata are present, at least in the outcrop east of the Vale of Clwyd and north of the Bryneglwys Fault (Figure 8.1) and (Figure 8.3)a. Pentre-bach Quarries provide the best exposures of the late Chadian Foel Formation in the Prestatyn region and are therefore critical localities for the understanding of the revised stratigraphy and palaeogeography of the North Wales Dinantian shelf area.

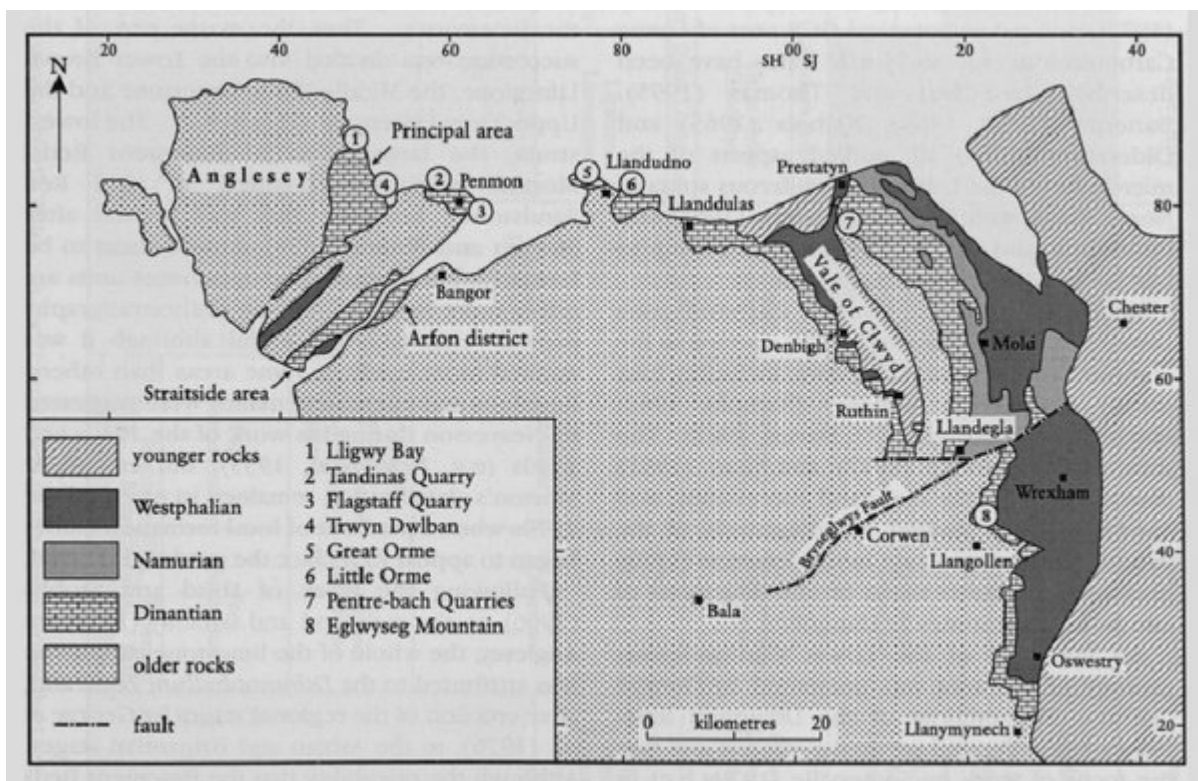
## References



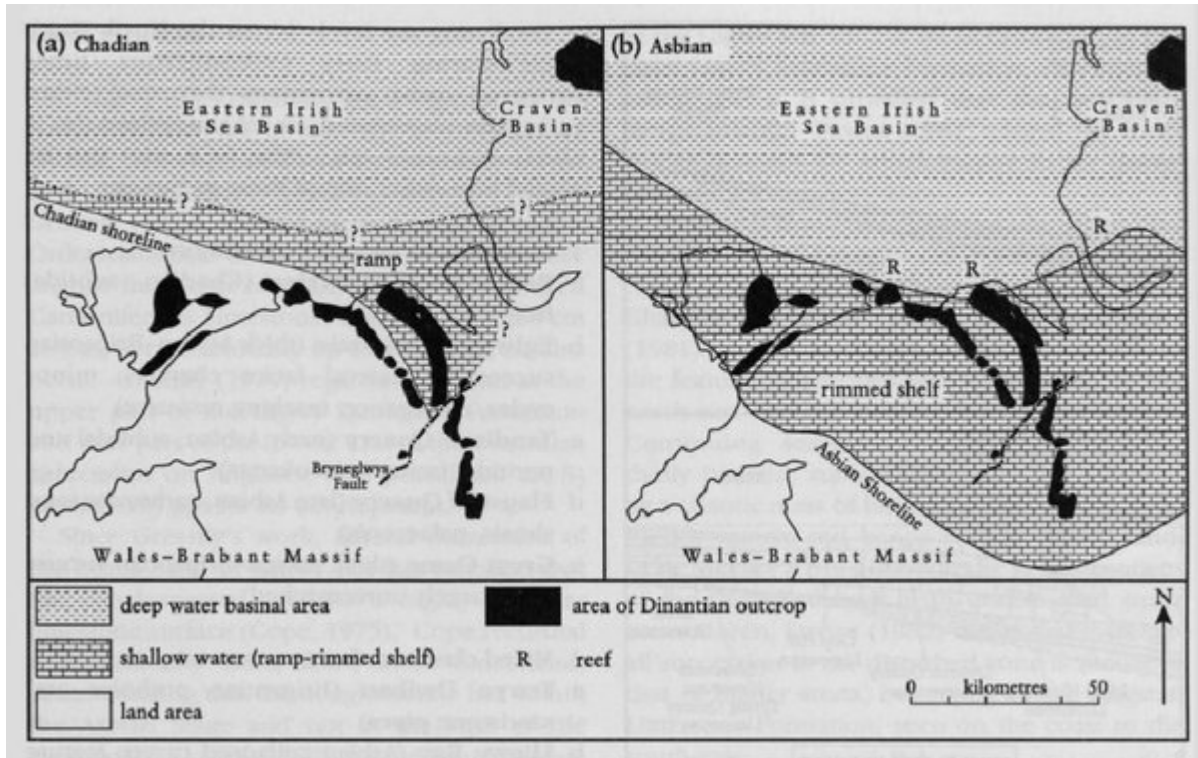
(Figure 8.13) Sedimentary logs of parts of the Foel Formation (late Chadian) and Dyserth Quarry Limestone (Arundian) at (a) Pentre-bach North Quarry, and (b) Pentre-bach South Quarry. After Somerville et al. (1989).



(Figure 8.2) Simplified stratigraphical chart for the Lower Carboniferous succession of North Wales. In the central areas of the Great Orme, the Little Orme and Llanddulas to Denbigh, Warren et al. (1984) placed Brigantian strata in the Gronant Group and Asbian strata in the Dyserth Limestone Group. Compilation based on information from Power (1977), Somerville (1979a), Davies (1982), Somerville and Strank (1984c), Warren et al. (1984), Somerville et al. (1986) and Davies et al. (1989). Areas of vertical ruling indicate non-sequences. Not to scale.



(Figure 8.1) Geological map of North Wales illustrating the distribution of Carboniferous rocks and the locations of GCR sites described in the text. Based on [British] Geological Survey maps of the area (principally institute of Geological Sciences, 1979b).



(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).