
Meeting House Quarry

[SO 1372 6407]

Potential GCR Site

Introduction

This small disused hillside quarry is on the north side of a lane 80 m west of the Friends' Meeting House ('The Pales'), about 1 km north of Llandegley, on the western margins of the Radnor Forest area of Powys. It is located on the Pontesford Lineament, a component of the NE–SW trending Welsh Borderland Fault System (Woodcock and Gibbons, 1988; (Figure 5.57), (Figure 5.58) and is a very instructive exposure of off-shelf, basin margin facies and faunas of the Ludlow Series of the Welsh Basin. All of the rocks exposed in the quarry belong to the upper part of the Llanbadarn Formation (of Dimberline and Woodcock, 1987) of the Gorstian Stage (Figure 5.58).

The overall geology of this region, the 'Brecon anticlinal' area that was researched by Kirk (1947, 1951b; see also Bailey, 1964), still awaits comprehensive modern documentation. Nevertheless, Meeting House Quarry has featured in detailed sedimentological studies of the area (Tyler, 1987; see also Dimberline and Woodcock, 1987, Tyler and Woodcock, 1987, Dimberline *et al.*, 1990), its fossils and their palaeoecological significance have been highlighted (Siveter 1984; Siveter *et al.*, 1987, 1991) and it is a recommended site for field excursions to the Silurian of the Welsh Basin (Siveter, 1988, stop 13; Siveter *et al.*, 1989, locality 4.4; Woodcock and Tyler, 1993, locality 4).

Description

The gently north-easterly dipping strata consist of interbedded units of 1–25 mm thick, homogeneous silty mudstone and 1–25 mm thick intervals of laminated carbonaceous mudstone (Tyler, 1987; see also Siveter *et al.*, 1987, 1991 and Woodcock and Tyler, 1993; (Figure 5.59)). The so-called 'homogenous mudstones' may be weakly graded, or have a basal division of parallel-laminated or cross-laminated siltstone. Subtle grading is seen only in thin or polished section (Woodcock and Tyler, 1993). The carbonaceous mudstones comprise alternating quartz-rich laminae and carbon-rich laminae (3–4 per mm).

The fauna at Meeting House Quarry is sparse, dominantly pelagic, and scattered at very low densities through the sequence (Siveter, 1984, Siveter *et al.*, 1987, 1991; (Figure 5.60)). It consists mostly of the graptolites *Bohemograptus bohemicus*, *Cucullograptus scanicus*, *Pristiograptus dubius*, *Pristiograptus tumescens*, *Saetograptus chimaera semispinosus* and *Saetograptus varians*; orthoconic nautiloids with, rarely, small epifaunal pisocrinoids attached; and ostracods, especially *Parabolbozoe bohémica* but including at least three other species. The orthocones and the graptolites are in some cases current orientated. The graptolites indicate that at Meeting House Quarry the Llanbadarn Formation belongs to the *C. scanicus* Biozone. Bivalves (*Slava fibrosa* and *Cardiola* species amongst others), brachiopods (*Aegiria grayi*, *Lingula lata*) and phyllocarids are minor associates.

Interpretation

Based on sedimentological, palaeontological and palaeogeographical evidence this part of the Welsh Basin during Gorstian times is modelled as, probably, basin slope (see Siveter *et al.*, 1989, fig. 10, 1991, fig. 5; Dimberline *et al.*, 1990, fig. 6; Bassett *et al.*, 1992, fig. S4a). In broad terms it is transitional between the shelf area of the Midland Platform beyond the Church Stretton Fault to the south-east, and the deeper, axial part of the turbidite-dominated Montgomery Trough to the west.

The alternating quartz-rich laminae and carbon-rich laminae of the carbonaceous mudstones are considered to represent periodic, possibly annual couplets comprising silt influx and organic (plankton) background hemipelagic fall-out (Dimberline *et al.*, 1990). The silt layers often have a mottled appearance due to the presence of silt-clay aggregates of

up to 2 mm diameter. Vertical fall-out probably occurred into oxygen deficient waters, hence favouring the preservation of organic material; this notion is supported by the fact that the concomitant fauna is dominantly pelagic. Indigenous epifaunal elements are rare and there is no infauna. Evidence of bioturbation is lacking (laminae are preserved complete), thus supporting the latter observation.

The 'homogenous mudstones' represent waning-flow events, probably storm induced turbidity flows (Tyler and Woodcock, 1987; Dimberline and Woodcock, 1987; Tyler, 1987). This interpretation involves derivation of sediments and sympatric bioclasts from the shelf to, and down, the shelf slope.

The occurrence and character of the laminated hemipelagite facies was controlled mainly by low bottom water oxicity; the establishment of water stratification and oxygen depletion of bottom waters took place between storm depositional events initiated on the shelf (Dimberline *et al.*, 1990). Such hemipelagites are an important element of basinal sequences of Wenlock and early Ludlow age of many basins flanking the former Iapetus Ocean (Kemp, 1991).

The faunal association represented at Meeting House Quarry was described, from Wales (see Watkins and Berry, 1977), initially from 'Radnorshire' (Kirk, 1947), and has subsequently been recognized elsewhere in the Welsh Basin (e.g. Long Mountain, Powys and Denbigh area,) and in many other countries such as France, Poland and the Czech Republic (Siveter 1984; Siveter *et al.*, 1987, 1991). This fauna, especially its representatives at Meeting House Quarry, is particularly important palaeoecologically as it provides evidence for the recognition of pioneer pelagic ostracods (myodocopes) in the stratigraphical record (Siveter, 1984; Siveter *et al.*, 1987, 1991).

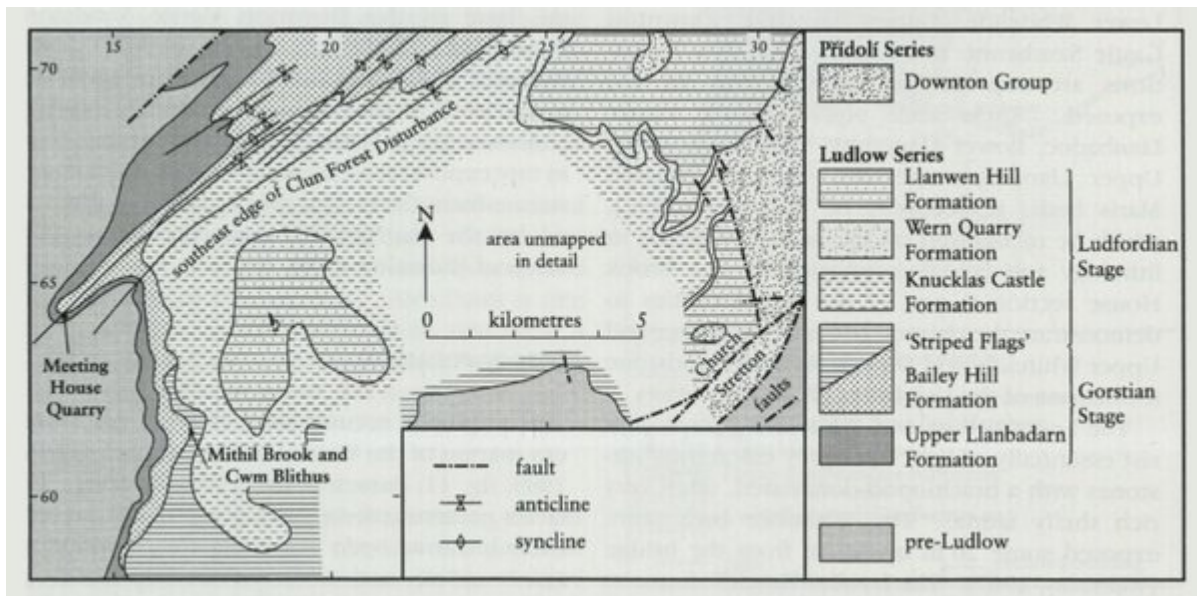
Of the fauna at Meeting House Quarry, the bivalves are the only autochthonous, epibenthic element (Siveter *et al.*, 1987, 1991). Large bioclasts, in the form of generally disarticulated and current-orientated shells of typical shelf dwelling macro-invertebrates such as brachiopods, are confined to the graded, silty soles of the homogeneous mudstones. The less dense skeletons (e.g. graptolites) are generally found in the carbonaceous mudstones. Such fine distinctions between the lithological context of various (transported as opposed to *in situ*) faunal components of the sequence are crucial to its interpretation. In off-shelf environments it appears that environmental stresses (?low oxygen–dysaerobic conditions and/or unsuitable substrates) prevented benthic brachiopods from becoming established. Certain bivalves, such as pterineids and cardioids, were either especially adapted for such conditions or were more tolerant and opportunistic than the brachiopods.

Ludlow GCR sites of basin margin–slope aspect are relatively rare compared to those coeval sites situated on the shelf. In addition to Meeting House Quarry there are two others locally, namely Mithil Brook and Cwm Blithus in the Radnor Forest, and Beacon Hill in the Clun Forest area.

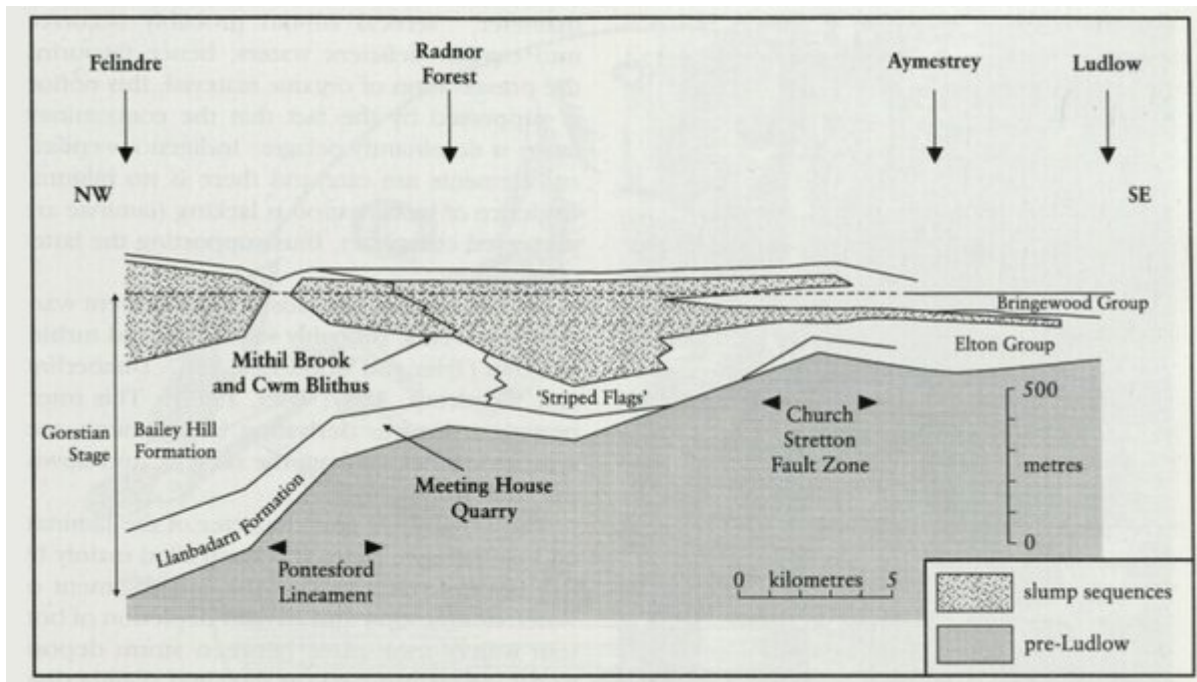
Conclusions

This is an excellent representative locality at which to study sediments and faunas characteristic of an early Ludlow basin margin environment of the Welsh Basin. The lithologies reflect an alternation of both background sedimentation and the results of discrete depositional events originating on the shelf. The rocks yield a dominantly pelagic fauna that has been used in developing the concept that the ostracods, a major invertebrate group, underwent the fundamental ecological shift of adopting pelagic lifestyles during the Silurian.

[References](#)



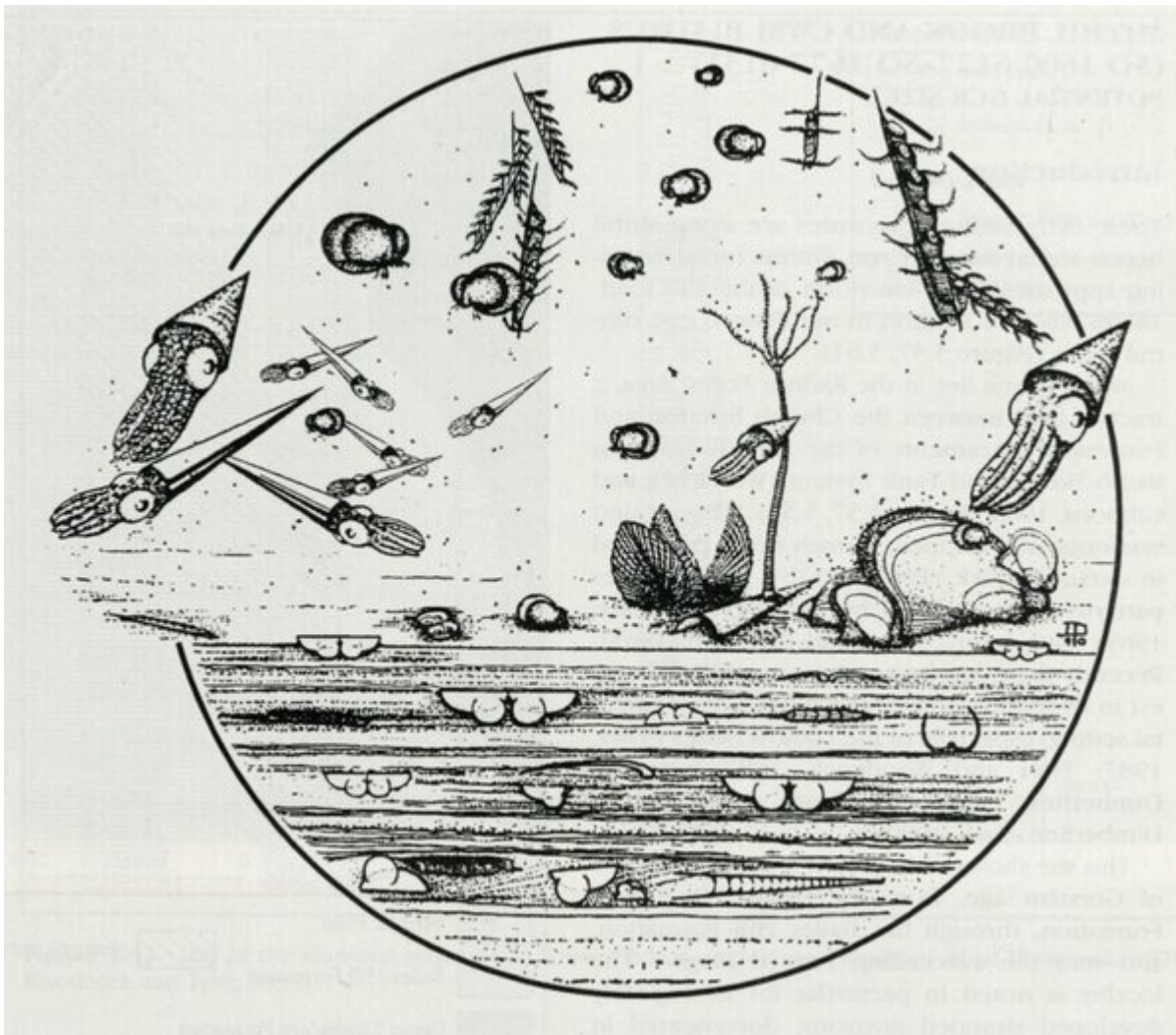
(Figure 5.57) Geological map of the Radnor Forest area, Powys, showing the location of GCR sites Meeting House Quarry and Mithil Brook and Cwm Blithus (after Woodcock and Tyler, 1993; based partly on Kirk, 1947, and Holland, 1959).



(Figure 5.58) Position of Meeting House Quarry and Mithil Brook and Cwm Blithus, Powys, on a platform-basin transect showing lithostratigraphical formations of Gorstian age (after Woodcock and Tyler, 1993).



(Figure 5.59) Laminated hemipelagites and homogeneous silty mudstones of the Llanbadarn Formation, Meeting House Quarry, Powys. (Photo: David J. Siveter.)



(Figure 5.60) Reconstruction of the palaeoenvironment represented by the Ludlow Series Llanbadarn Formation at Meeting House Quarry, Powys (after Siveter et al., 1991): an off-shelf, slope facies assemblage associated with laminated hemipelagites and dominated by pelagic organisms; bottom waters and sediments were mostly poorly aerated. In general order of abundance the fossil taxa illustrated are: orthoconic nautiloids, monograptids, myodocope ostracods, pterineid and cardiolid bivalves and pisocrinid crinoids.