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# Mithil Brook and Cwm Blithus

[SO 1600 6127]–[SO 1677 6131]

Potential GCR Site

## Introduction

These early Ludlow exposures are along Mithil Brook and at nearby Cwm Blithus rocks, beginning approximately 1 km north of the A44 road, 14 km WNW of Kington in mid-Powys, east central Wales (Figure 5.57), (Figure 5.61).

Mithil Brook lies in the Radnor Forest area, a tract of land between the Church Stretton and Pontesford lineaments of the NE–SW trending Welsh Borderland Fault System (Woodcock and Gibbons, 1988; (Figure 5.57), (Figure 5.58)). This ground was originally mapped, though never published in detail, by Kirk (1947, 1951b), and its facies patterns were analysed by Bailey (1962, 1964, 1969) and by Holland and Lawson (1963). Recently there has been a rejuvenation of interest in its sedimentology and palaeoenvironmental setting, especially of the Ludlow Series (Tyler, 1987; Tyler and Woodcock, 1987; see also Dimberline and Woodcock, 1987 and Dimberline *et al.*, 1990).

This site shows an excellent sequence of rocks of Gorstian age, from the Upper Llanbadarn Formation, through the Bailey Hill Formation, and into the succeeding Striped Flags. The locality is noted in particular for its superbly developed slumped horizons, documented in detail by Woodcock (1976a, b; (Figure 5.62), (Figure 5.63)). These outcrops are also described in the field guides of Bailey and Woodcock (1976), Siveter *et al.* (1989, locality 4.3) and Woodcock and Tyler (1993, locality 3).

## Description

Where a fence crosses Mithil Brook, some 350 m east of Llan-Evan farm, the upper part of the Llanbadarn Formation (of Dimberline and Woodcock, 1987) dips gently eastwards [SO 1600 6127]. Such mudstone sequences locally consist of homogeneous silty mudstones and carbonaceous mudstones (for which see site report for Meeting House Quarry), reflecting different sedimentary processes within a single environment. The age of the Llanbadarn Formation at Mithil Brook is not yet known, but nearby outcrops of this formation yield graptolites of the upper part of the basal Gorstian *Neodiversograptus nilssoni* Biozone (Woodcock and Tyler, 1993) and at Meeting House Quarry, some 4 km to the north-west, the formation probably belongs to the succeeding *Cucullograptus scanicus* Biozone (Siveter *et al.*, 1987).

Just upstream there is a rapid lithological transition to the base of the Bailey Hill Formation, which is here represented by easterly dipping calcareous sandy siltstone beds, each 10–20 cm thick and characteristically with many allochthonous shells at their base. At a slightly younger horizon which crops out at a meander a short distance upstream, the Bailey Hill Formation shows sole marks, convolute lamination and ripple cross-lamination in beds of 5 cm average thickness [SO 1618 6124]. Sporadic exposures can be traced upstream to the base of the gully called Cwm Blithus [SO 1662 6153], which exposes a 200 m thick sequence of calcareous siltstones of the Bailey Hill Formation which at many horizons have suffered penecontemporaneous deformation to generate a magnificent array of slump and slide structures (Figure 5.62), (Figure 5.63).

Many of the more obvious slump structures are folds, mostly recumbent, with limb lengths of 10–80 cm, limb angles of 0–54°, NE–SW aligned hinges and in some cases eroded tops. Later formed, axial planar cleavage affects some of the folds. Direction of movement down the palaeoslope was from south-east to north-west, as indicated by the general north-westerly direction of overturning of the folds. Unslumped units punctuate the sequence throughout. They have lithologies characteristic of either the Bailey Hill Formation or, as seen especially in the upper part of the section in the upper reaches of Cwm Blithus, of the more finely laminated rocks included within the Striped Flags (of, for example, Kirk, 1947; Bailey, 1962). The latter is a regionally diachronous, often slump affected, hemipelagite-bearing facies unit that is coeval with much of the generally more distally formed Bailey Hill Formation (Tyler and Woodcock, 1987; Woodcock and

Tyler, 1993).

## Interpretation

The Bailey Hill sediments accumulated on a north-west dipping palaeoslope on the southeast margin of the Montgomery Trough (of Cummins, 1959b) in the Welsh Basin. This trough was a NE–SW trending, Wenlock to Ludlow age turbidite-dominated depocentre (see Dimberline and Woodcock, 1987, fig. 4; Siveter *et al.*, 1989, fig. 10; Dimberline *et al.*, 1990, fig.1; Bassett *et al.*, 1992, figs S3b, S4a). By early Ludlow times its axis had migrated eastwards, so that its eastern margin coincided with the line of the Church Stretton Lineament. Thus in Gorstian times the Radnor Forest area represents a transition zone between shelf and the basin proper and an area that experienced extensive submarine slumping (see Woodcock and Tyler, 1993). Similar slumped horizons occur in the Ludlow of the adjoining districts of the Clun Forest to the north-west, north and north-east, such as Kerry (Earp (1938), southwest Clun (Earp, 1940) and the Knighton area (Holland, 1959; see also Tyler and Woodcock, 1987).

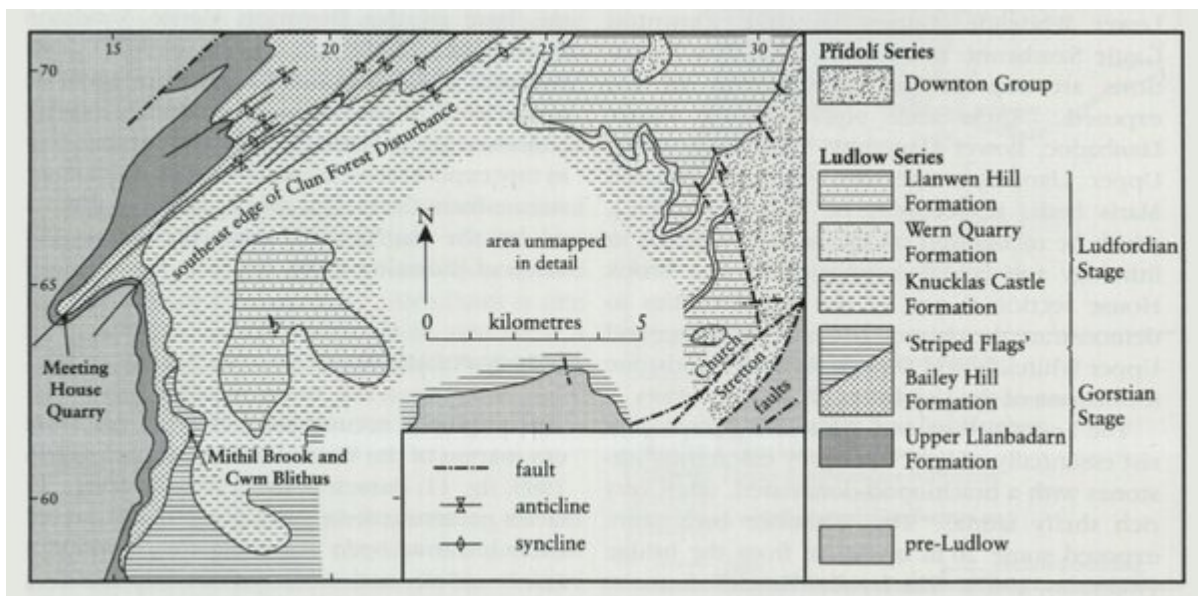
The calcareous siltstones that dominate the Bailey Hill Formation were once considered to be turbidites (Cummins, 1959a; Holland and Lawson, 1963; Bailey, 1964, 1969; Woodcock, 1976b), but they have recently been reinterpreted as storm generated deposits that accumulated on the distal parts of the shelf and adjacent basin slopes (Tyler, 1987; Tyler and Woodcock, 1987). Furthermore, contrary to earlier opinions (Bailey 1964, 1969; Woodcock 1976b), the slump sheets are not synchronous with the start of 'turbidite' sedimentation of the Bailey Hill Formation, nor have they moved great distances (Woodcock and Tyler, 1993). They probably result from a mid-Ludlow reactivation of the Welsh Borderland Fault System, an event which precipitated slippage and deformation of sediments on local palaeoslopes (Tyler, 1987; see Tyler and Woodcock, 1987). Graptolite data tie the main movement to the late *scanicus–tumescens–early leintwardinensis* biozones, with an acme in the *tumescens* Biozone (Tyler and Woodcock, 1987), thus postdating deposition of most of the Bailey Hill Group.

Beacon Hill in Clun Forest and Meeting House Quarry in Radnor Forest are other sites containing Ludlow sediments indicative of the marginal slope of the Welsh Basin. Ty'n-y-Ffordd Quarry, in the Ludlow of northern Wales, is another site selected for the GCR network largely on the basis of its important submarine slumped horizons.

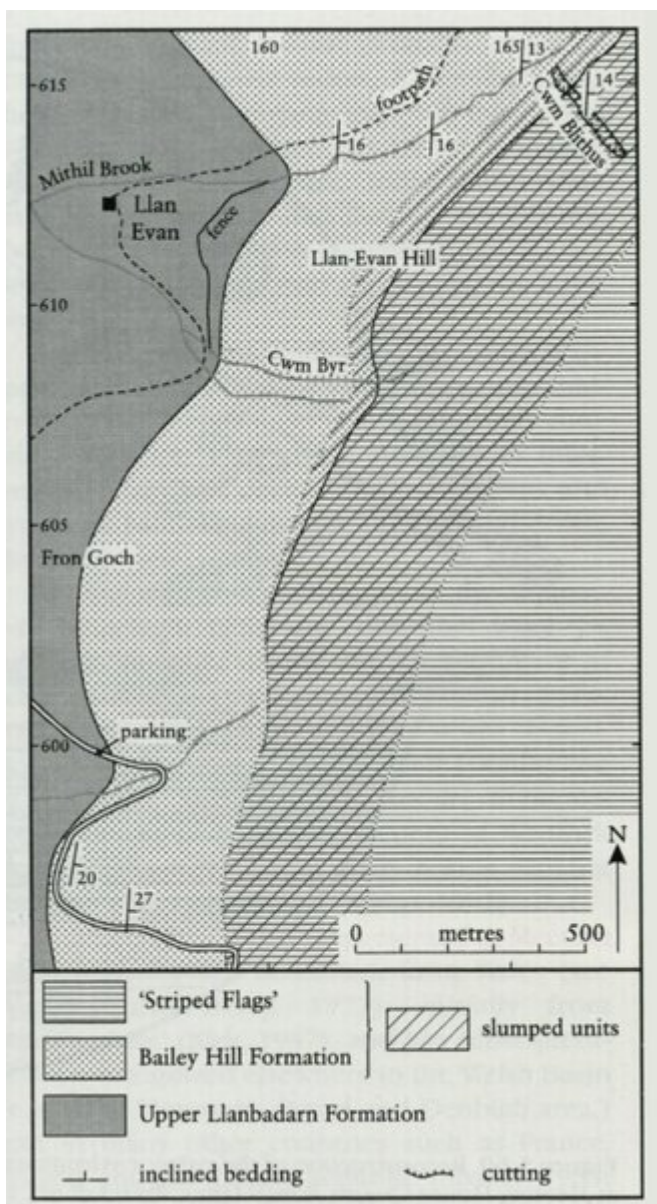
## Conclusions

This site displays spectacular examples of soft sediment deformation structures that are characteristic of certain early and mid-Ludlow rocks over a wide region of this part of east central Wales. Such features are rare on a regional scale within the Silurian of the Welsh Basin, the other well-known area where they are developed being the Denbigh area in northern Wales. The site also has palaeogeographical importance. It defines the contemporaneous slope of the depositional basin and it represents one of the relatively few GCR sites of Ludlow age that have an off-shelf aspect.

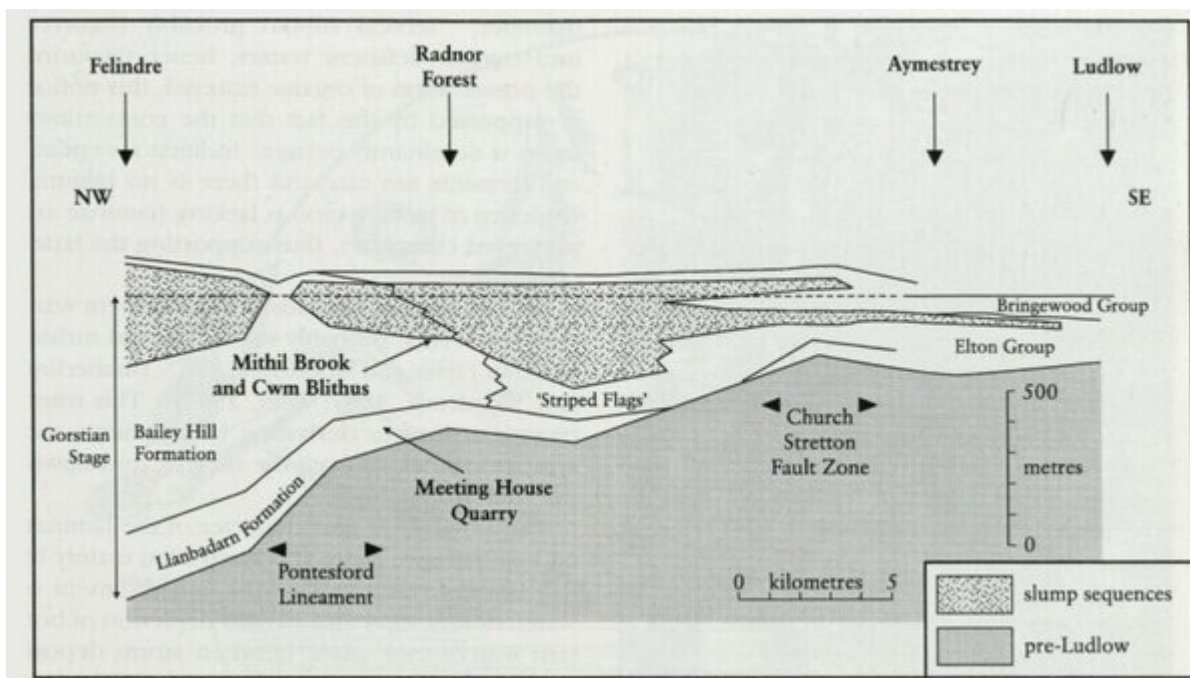
## [References](#)



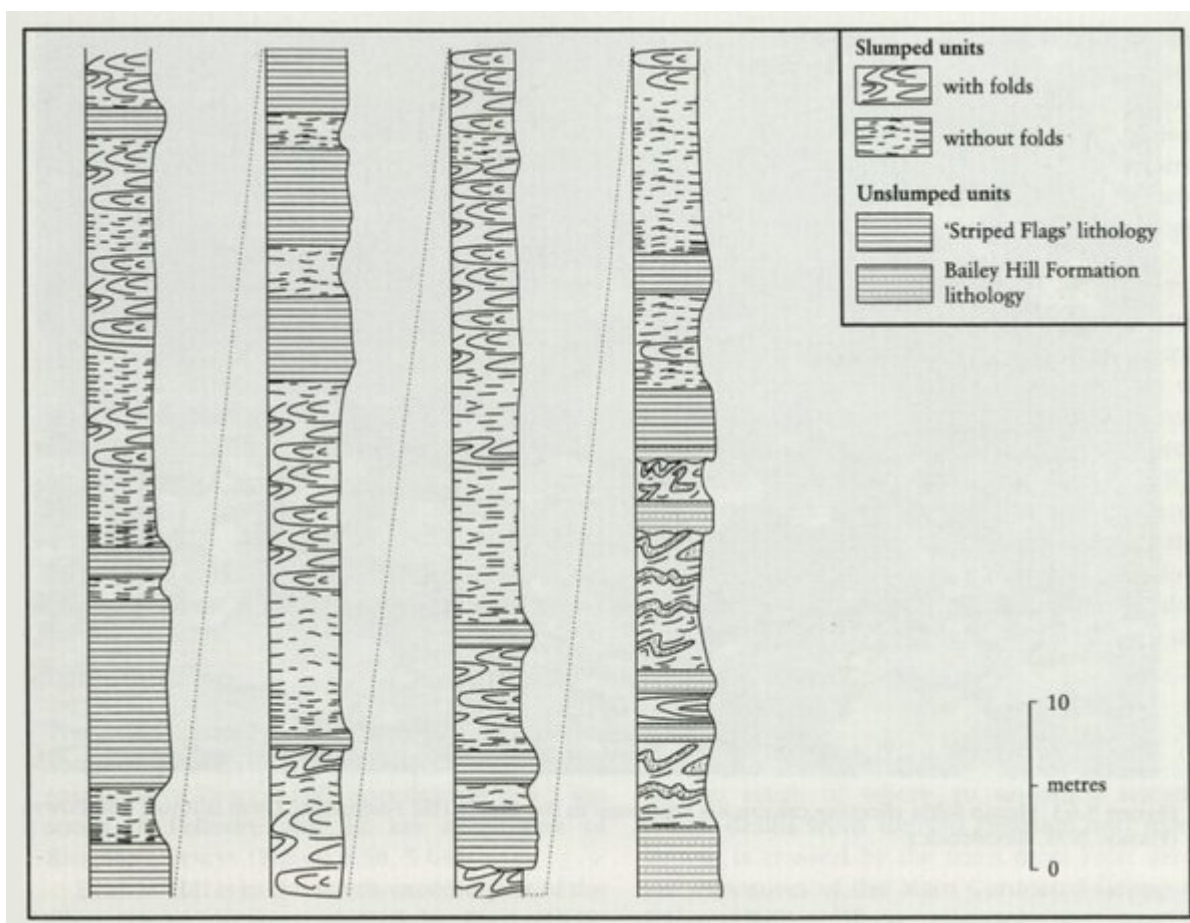
(Figure 5.57) Geological map of the Radnor Forest area, Powys, showing the location of GCR sites Meeting House Quarry and Mithil Brook and Cwm Blithus (after Woodcock and Tyler, 1993; based partly on Kirk, 1947, and Holland, 1959).



(Figure 5.61) The geology in the vicinity of Mithil Brook and Cwm Blithus, mid-Powys (after Bailey and Woodcock, 1976; Siveter et al., 1989; Woodcock and Tyler, 1993).



(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 5.62) Log of the slumped sequence in Cwm Blithus, mid-Powys (modified from Woodcock, 1976a; Woodcock and Tyler, 1993).



(Figure 5.63) Slump folds affecting calcareous siltstones in the Bailey Hill Formation, Cwm Blithus, mid-Powys. (Photo: N.H. Woodcock.)