
Mocktree Quarries

[SO 4130 7520]–[SO 4170 7536]

Introduction

These small, disused quarries occur on the north side of the A4113 Bromfield to Leintwardine road in the Mocktree area, about 1.5 km northeast of Leintwardine, Herefordshire (Figure 5.27), (Figure 5.31). The site displays a sequence through the middle part of the Ludlow Series, from Lower Bringewood to Lower Leintwardine formations (late Gorstian to early Ludfordian).

The first account of the rocks in the vicinity of Leintwardine was in Murchison's (1839) *Silurian System*. He noted, for example, that fine exposures of the 'Aymestry' (= Upper Bringewood) limestones are exposed at 'Mocktree Hayes' and along, 'The new road from Ludlow to Leintwardine...'. The strata are part of the gently dipping northern limb of the asymmetrical Downton Syncline. The overall succession, comprising about 1100 m of Wenlock to Pridoli sediments, is similar to that at Ludlow 10 km to the east, but is thicker, generally less calcareous and shows larger-scale evidence of submarine erosion. Whitaker provided the seminal modern account of the geology of the Leintwardine region and its environmental setting (1962); Cherns (1988) made a specialized study of the local Leintwardine Group strata; and Siveter *et al.* (1989, locality 3.8) summarized the Silurian geology of Mocktree.

Early indications that the site contained a shallow erosive feature (Lightbody, 1863; Marston, 1865; Woodward and Dixon, 1904; see (Figure 5.32)) were confirmed when detailed mapping recognized the so-called Mocktree Channel as one of six, small-scale, NE–SW trending canyon heads in the vicinity of Leintwardine (Whitaker, 1960, 1962, 1994; see also Alexander, 1936 and (Figure 5.27), (Figure 5.28), (Figure 5.29), (Figure 5.30), (Figure 5.31), (Figure 5.32), (Figure 5.33). About 170 m north-west of Mocktree Quarries exposures along the trackway from near Wassell Barn to Martin's Shell demonstrate the adjacent Todding Channel. This is part of a rare, important example (e.g. see Pickering *et al.*, 1989) of an ancient submarine canyon system, characterized in part by the fauna of the channels themselves.

Description

About 30 m from the road a face of the main quarry shows a section across the Mocktree Channel [SO 4167 7537]. The lower part of this section and virtually all of the main part of the same quarry consist of hard, fairly massive and sometimes nodular, biocalcarenic argillaceous limestones of the Upper Bringewood Formation. They contain crinoids, stromatoporoids, small discrete compound rugose and tabulate corals such as *Heliolites* and *Favosites* and brachiopods such as *Atrypa reticularis* and *Kirkidium knightii*. Some of the colonies are inverted, suggesting energetic water conditions. A broad, gently curved channel, 27 m across with an infill of calcareous siltstones of the Lower Leintwardine Formation, is eroded into calcareous siltstones of the Basal Leintwardine Formation that lie above the Bringewood limestones. The Basal Leintwardine of the area is normally about 18 m thick, but at the axis of the channel at Mocktree only 0.7 m survives.

The olive-grey Leintwardine strata contain many fossil-rich bands, yielding typical mid-Ludlow brachiopods (*Atrypa*, *Leptaena* and especially *Dayia*), disarticulated trilobites such as *Alcymene lawsoni* (see Siveter, 1983; RamskOld *et al.*, 1994), ostracods and, in former times, some of the unusual faunal elements (e.g. star fish, phyllocarids, eurypterids) supposedly occupying the channel (see GCR site report for Church Hill Quarry and (Figure 5.28)). Nearer the road from the channel face, these beds are faulted down to ground level, but are currently largely obscured by scree debris. Elsewhere, much of the quarry top is surrounded by Leintwardine siltstones, pieces of which litter the foot of the quarry face; they contain the ostracod *Neobeyrichia lauensis*, indicating the previously unrecorded presence of Upper Leintwardine strata here (David Siveter, pers. observ.).

The existence of the Mocktree Channel is also indicated by a tiny, mostly overgrown but very informative outcrop on the bend of the A4113 road, about 50 m south of the entrance to Mocktree Quarry [SO 4163 7531], immediately east of an old

lime kiln. This outcrop demonstrates a steep canyon head margin, with Lower Leintwardine channel fill resting with an original high dip of 26° against north-east dipping Upper Bringewood limestones that form the channel wall. Thus in a very short lateral distance the channel has cut down deeper and has completely eroded out the basal Leintwardine strata.

Across a fault just south of the lime kiln, the thickly bedded, tough, grey calcareous siltstones of the Lower Bringewood Formation occur. They are exposed for over 300 m westwards in bluffs on the north side of the A4113 road, beyond another lime kiln, to an old quarry near Lower Todding ([SO 4135 7520]; (Figure 5.31)). Occasional bentonitic clays are present. Common macrofossils include particularly large strophomenid brachiopods such as *Strophonella euglypha* and *Leptaena depressa*, together with *Atrypa reticularis*, *Gypidula*, bryozoans, crinoidal debris and the trilobite *Dalmanites*. This roadside section has also yielded many chitinozoan assemblages (Sutherland, 1994).

Interpretation

The sediments of this site were deposited along the western shelf edge of the Midland Platform, on the south-eastern margin of the Welsh Basin (see Siveter *et al.*, 1989, fig. 10; Bassett *et al.*, 1992, figs S4b, S5a; (Figure 5.47)).

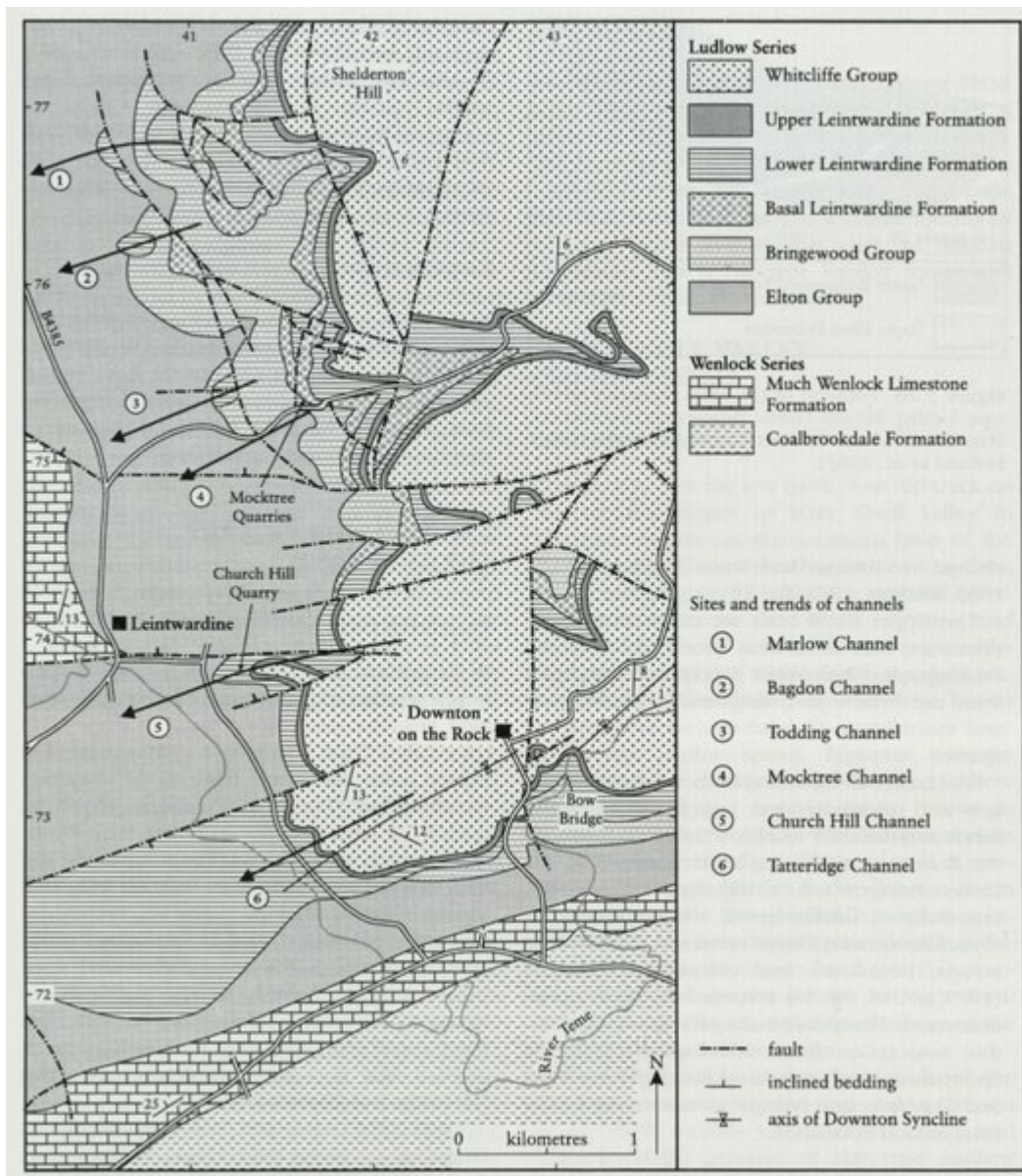
The *Kirkidium* accumulations in the Bringewood strata were formed in moderate to high energy conditions (Watkins and Aithie, 1980). The Mocktree Channel is interpreted as one of several locally developed, parallel, submarine canyon heads trending from the shelf towards the basin (Whitaker, 1962, 1994). Near source, as at Mocktree, these channels take out only part of the Basal Leintwardine Formation. At their maximum axial gradient they erode into Middle Elton beds, thus eliminating over 230 m of Ludlow strata (see GCR site report for Church Hill Quarry). Cut in earliest Ludfordian times, the channels were filled shortly afterwards, during the deposition of the Lower and Upper Leintwardine sediments. Elements of this canyon system can be traced south-westwards to the basin slope in the Wigmore Rolls area and beyond which, as evidenced by the occurrence of wide erosional slide scars, witnessed considerable instability at the same time as the channels were cut (Whitaker, 1994). The fauna of the canyon fill sediments may be indigenous (Whitaker, 1962) or transported into the channels (Goldring and Stephenson, 1972).

Many GCR sites in the central and southern parts of the Welsh Borderland (e.g. Wigmore Road, Deer Park Road, Sunnyhill, Perton Road, Longhope Hill) and in southern Wales (Sawdde Gorge) and northern Wales (Dinas Brân) have sequences containing a similar stratigraphical interval to that at Mocktree. Locally, GCR sites at View Edge at Craven Arms to the north, Aymestrey Quarries to the south and Bow Bridge to the west, also have Bringewood carbonates that accumulated in a similar, shelf-edge setting to those along strike at Mocktree. The nearby GCR site Church Hill Quarry contains evidence of the same submarine channel system as that manifest at Mocktree.

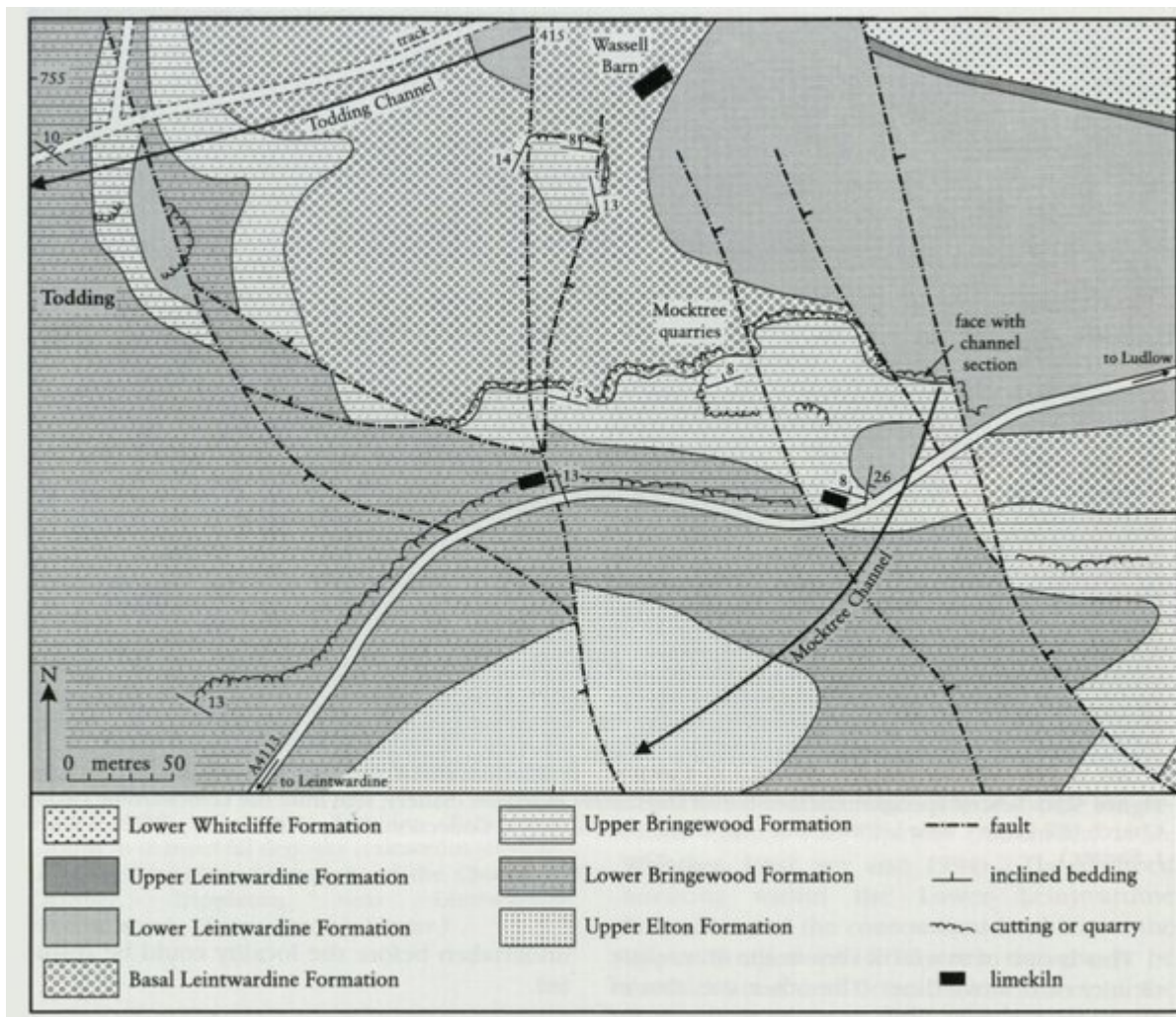
Conclusions

This site displays a complete and fairly continuous exposure of the fossiliferous middle Ludlow sequence in the Leintwardine area. However, its chief significance stems from the evidence it contributes for the existence of a regionally important submarine canyon-head system. Examples of the latter are very rare in the Phanerozoic and no other comparable feature is known in the British Silurian. The unusual, channel-fill fauna gives added, palaeontological significance to the site. Of great value to teachers and researchers, the exposures illustrating the anatomy of the Mocktree Channel are particularly important and should be rigorously preserved.

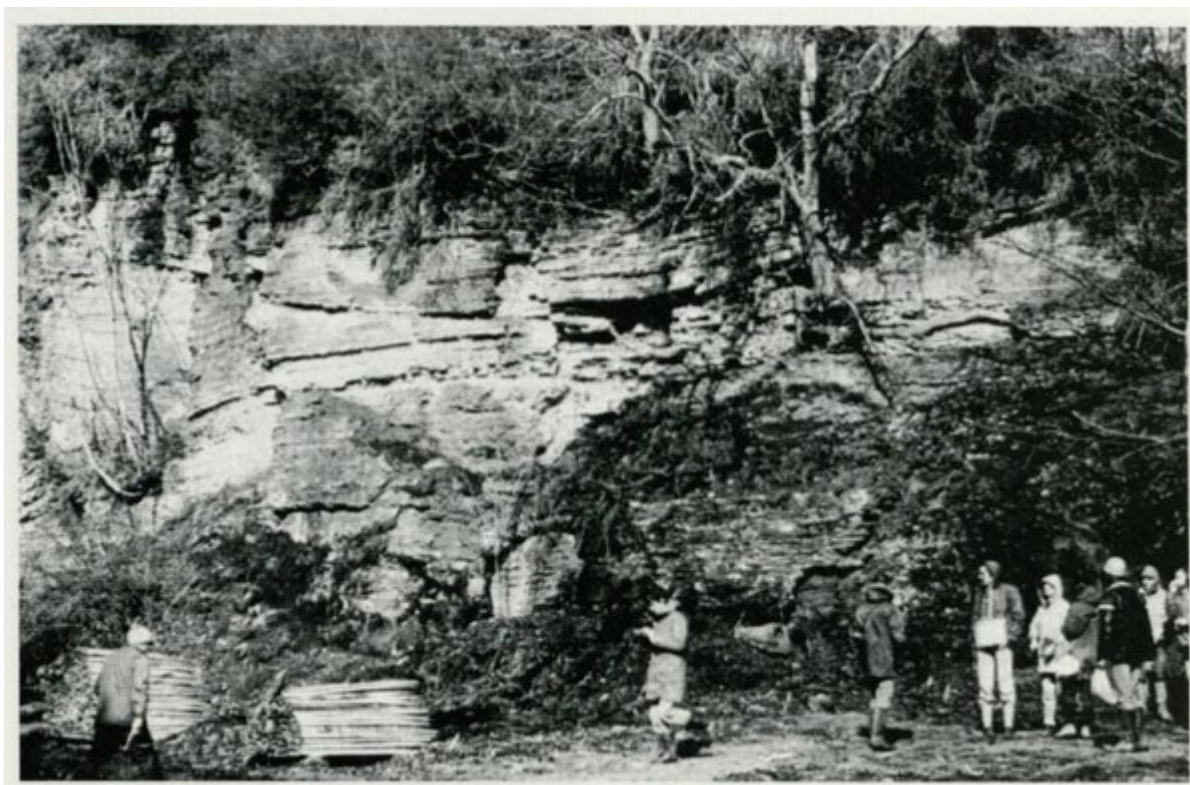
[References](#)



(Figure 5.27) The geology in the vicinity of GCR sites Church Hill Quarry and Mocktree Quarries, Leintwardine area, Herefordshire (after Whitaker, 1962).

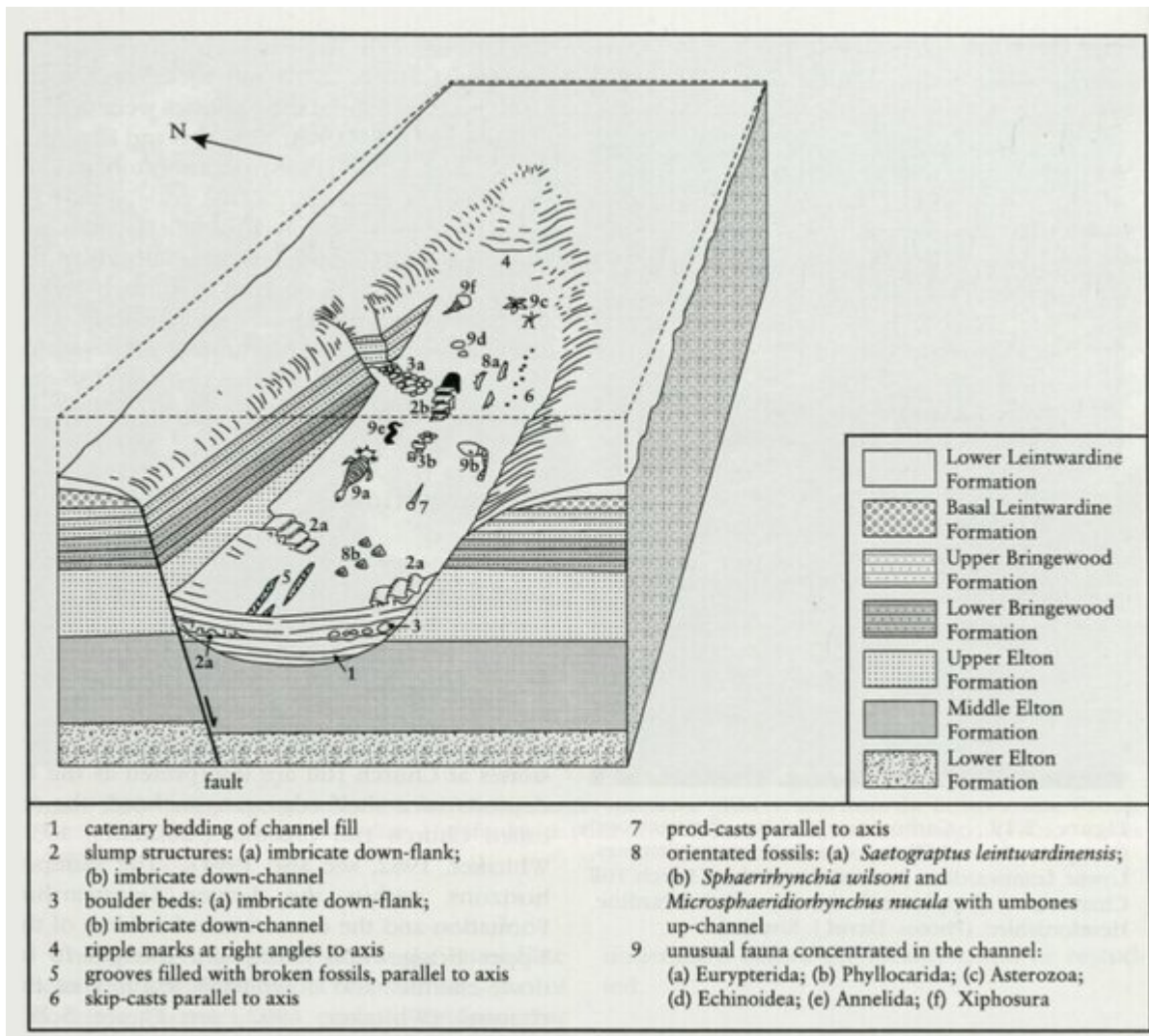


(Figure 5.31) The geology of the vicinity of Mocktree Quarries near Leintwardine, Herefordshire (after Whitaker, 1962).



(Figure 5.32) South-east face of Mocktree Quarries, near Leintwardine, Herefordshire, displaying Lower Leintwardine siltstones infilling the Mocktree submarine channel. This channel down-cuts, with a broad, gently curved base, into Basal Leintwardine Formation siltstones (0.7 m remaining in the centre of the channel), which lie above the Upper Bringewood

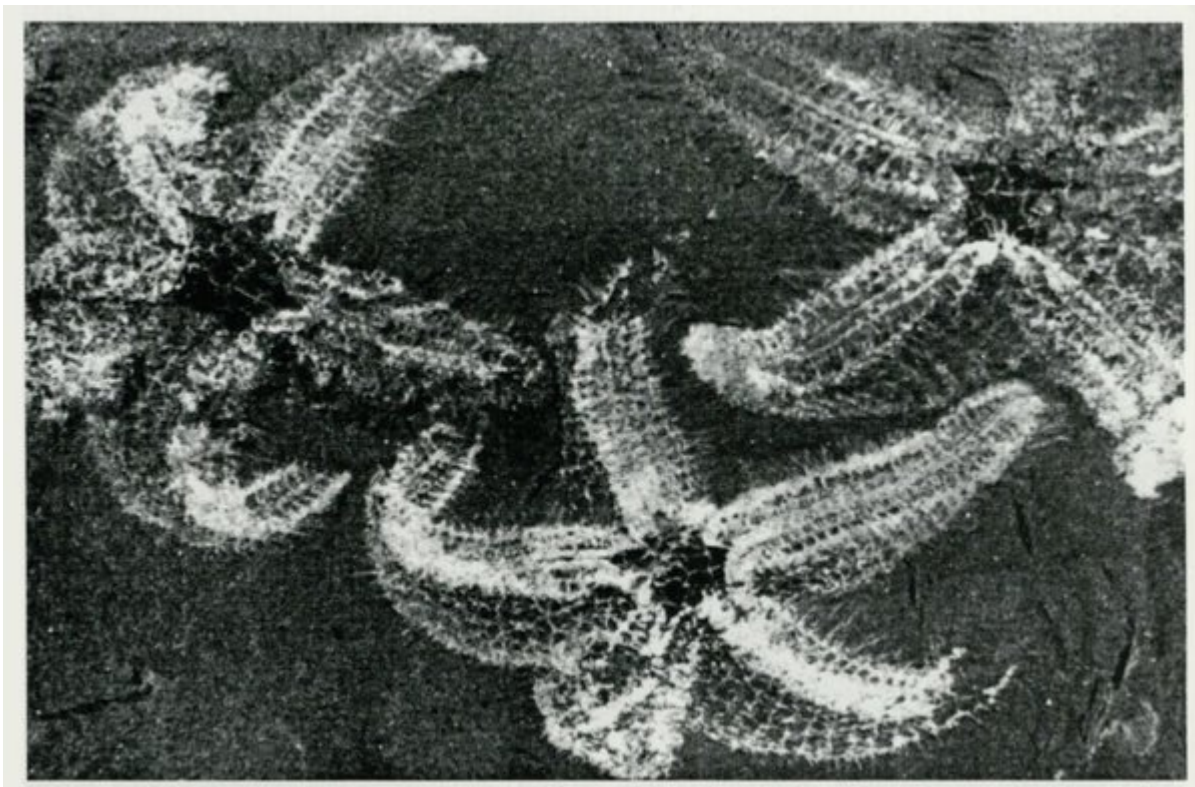
Formation limestones occupying the lower part of the section (from below base of tree at centre right). Person at bottom left is J.H.McD. Whitaker. (Photo: David J. Siveter.)



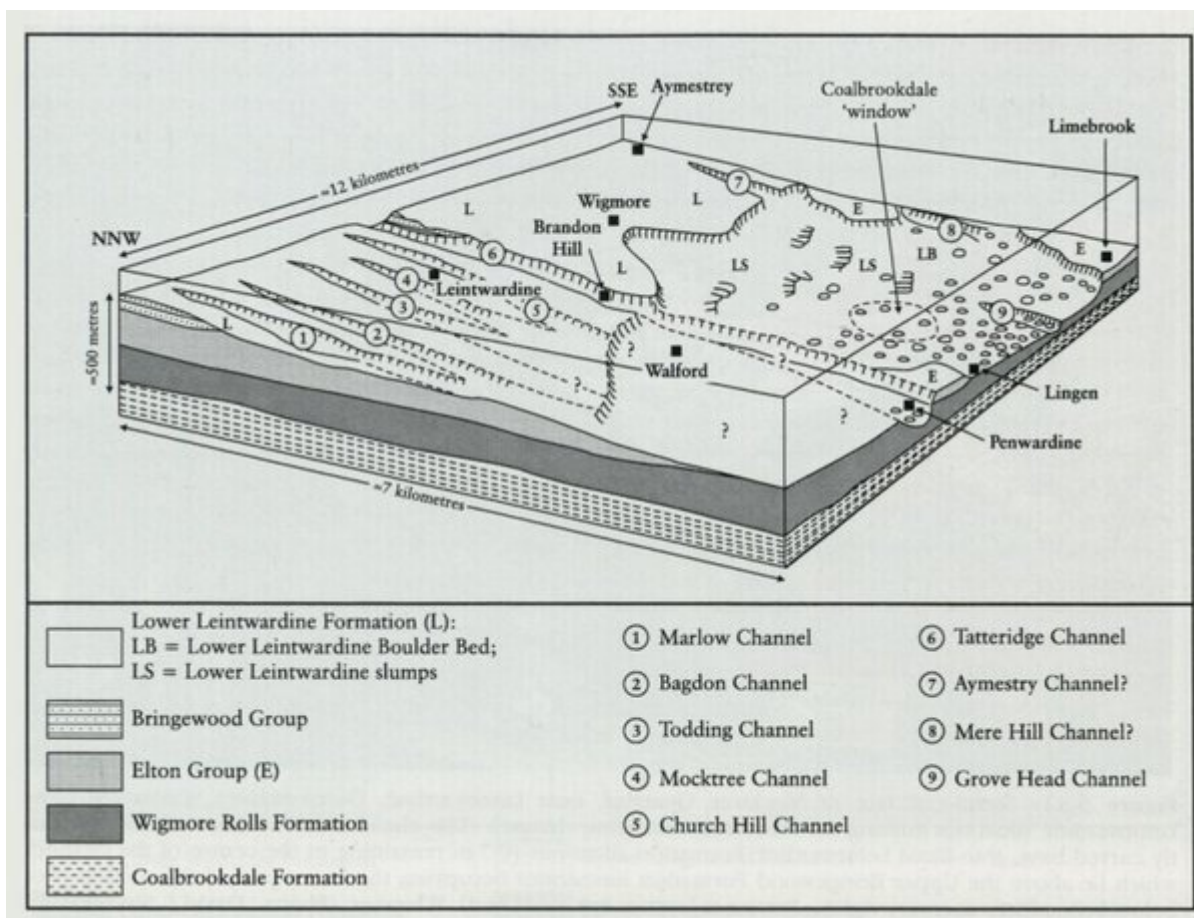
(Figure 5.28) Schematic reconstruction (not to scale) of an idealized submarine channel-head of basal Ludfordian times (after Whitaker, 1962). Data from several channels. Note that down-cutting is more severe down-channel.



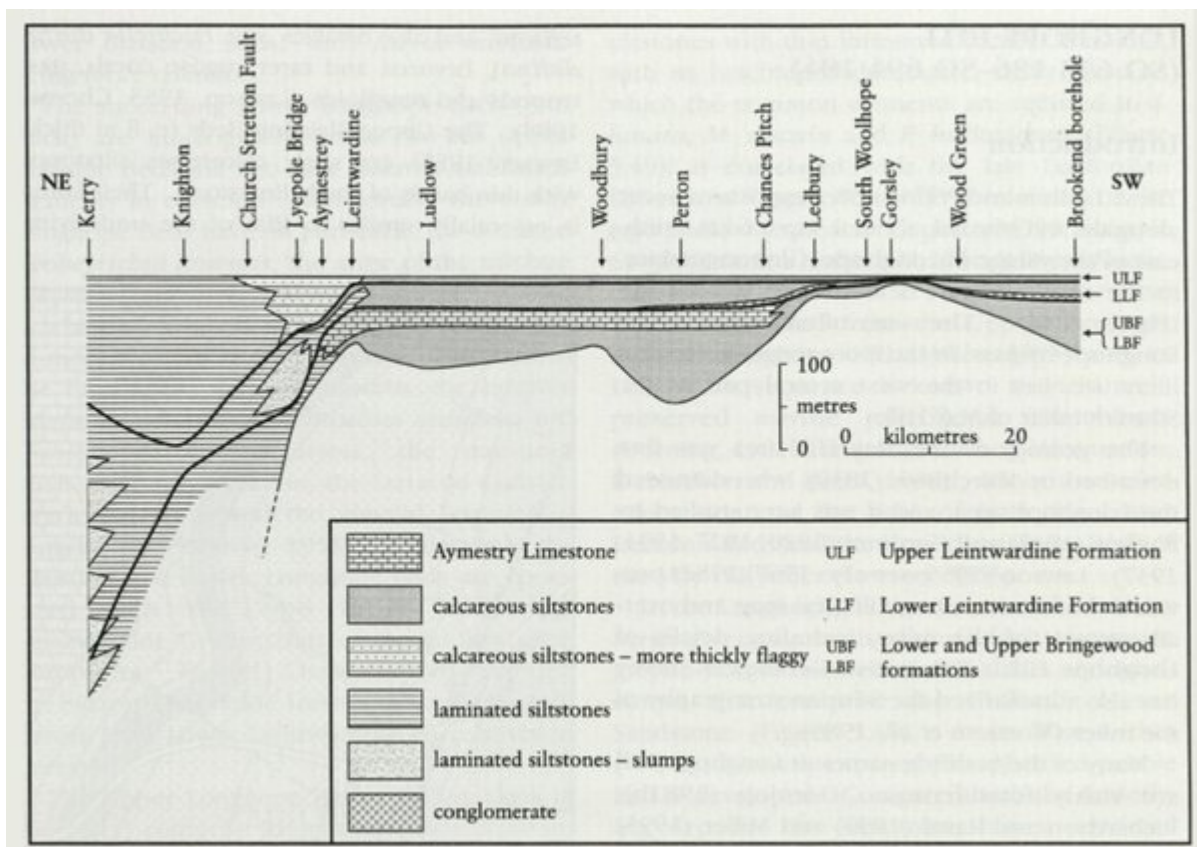
(Figure 5.29) Carbonate boulder (Bringewood Group) in channel-fill deposits (calcareous siltstones, Lower Leintwardine Formation) of the Church Hill Channel, Trippleton, near Leintwardine, Herefordshire. (Photo: David J. Siveter.)



(Figure 5.30) Several specimens of the starfish *Sturtzaster marstoni* (Salter); slab from the Leintwardine Group, Church Hill Quarry, near Leintwardine, Herefordshire (Grindrod Collection, Oxford University). (Photo: Derek J. Siveter.)



(Figure 5.33) Block diagram, not to scale, illustrating the possible shelf edge and Welsh Basin slope in the Leintwardine-Lingen area at the beginning of Ludfordian time (after Whitaker, 1994). In the south-west, where the boulder bed is developed as a debris flow downslope from the postulated slide scar, places where Elton beds are not fully stripped off are not necessarily in their correct positions, nor is the Coalbrookdale 'window' where Lower Leintwardine erosion has cut right through the Wigmore Rolls Formation into the top of the Coalbrookdale Formation.



(Figure 5.47) The concept of the 'Gorsley topographical high' of the Welsh Basin, as illustrated in the facies and thickness variations of the Leintwardine Group (early Ludfordian Stage) in a general south-west to north-east transect from the region of the Brookend Borehole, Gloucestershire, to Kerry, Powys (after Cherns, 1988).