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# The Whitcliffe

[SO 5065 7444]–[SO 5120 7414]

## Introduction

The Whitcliffe encompasses many historically and stratigraphically very important outcrops of Ludfordian age along a bluff on the southern side of the River Teme, between Dinham Bridge and Ludford Bridge at Ludlow, Shropshire (Figure 5.6), (Figure 5.15). The site was independently selected for the GCR for fossil arthropods and for fossil fishes (Dineley and Metcalf, 1999).

Murchison referred to the Whitcliffe exposures when he was establishing the 'Silurian System of Rocks' (1835, 1839) and they featured prominently in the standard research on the type Ludlow Series (Holland *et al.*, 1963; see historical survey and localities therein). Some of the key sections on the Whitcliffe were also logged by Watkins in his study of Ludlow benthic communities of the Welsh Borderland (1979, p. 258, fig. 16). More recently the sequence has been documented in two field guides (Bassett *et al.*, 1979; Siveter *et al.*, 1989, locality 3.1) and in a review of the global standard for the Silurian System (Lawson and White, 1989).

In establishing the standard stratigraphy for the type Ludlow Series, outcrops on the Whitcliffe were selected as basal boundary stratotypes and body stratotypes for the Upper Leintwardine Formation (Leintwardine Group) and for the Lower and Upper Whitcliffe formations (Whitcliffe Group) of the Ludfordian Stage (Holland *et al.*, 1963; Lawson and White, 1989).

## Description

The cliff above the seat beside the riverside path, some 150 m SSE of Dinham Bridge, has the basal boundary stratotype and body stratotype of the Upper Leintwardine Formation, which is a sequence of calcareous siltstones showing honeycomb weathering [SO 5071 7428], Holland *et al.*, 1963, locality 3; , (Figure 5.16), (Figure 5.17), (Figure 5.18). The boundary with the underlying calcareous siltstones of the Lower Leintwardine Formation is drawn just below a thin shaly recess and coincides with the introduction of the trilobites *Alcymene puellaris* and *Encrinurus* and the brachiopod *Aegiria grayi*. High in the cliff the Upper Leintwardine has yielded abundant conodonts, especially *Ozarkodina excavata*, *Ozarkodina confluens*, *Panderodus unicostatus* and *Coryssognathus dubius* (Aldridge and Smith, 1985). In addition, well-preserved palynomorph assemblages have been recovered from the Leintwardine Group at this locality (Elliott, 1995). However, *Neobeyrichia lauensis*, the large ostracod so diagnostic of the Upper Leintwardine in several parts of the Ludlow Anticline and elsewhere in the Welsh Borderland, is not recorded from the Whitcliffe.

Immediately behind the seat [SO 5071 7429], Holland *et al.*, 1963, locality 2), the calcareous siltstones of the Lower Leintwardine Formation have yielded the biozonal graptolite *Saetograptus leintwardinensis* and the brachiopods *Atrypa reticularis*, *Dayia navicula*, *Isorthis orbicularis*, *Leptaena depressa*, *Microsphaeridiorhynchus nucula* and *Shaleria ornatella*.

At the top of the slope approximately 10 m south-east of the seat is the basal boundary stratotype and body stratotype of the Lower Whitcliffe Formation ([SO 5071 7428], Holland *et al.*, 1963, locality 3; (Figure 5.16), (Figure 5.18), (Figure 5.19). The boundary is established at an horizon where siltstones containing a characteristic Upper Leintwardine fauna, including *S. leintwardinensis*, are superseded by sparsely fossiliferous, calcareous and in some cases irregularly bedded Lower Whitcliffe siltstones with the brachiopods *Salopina lunata* and *Protochonetes ludloviensis*.

The disused Whitcliffe Quarry ([SO 5096 7414], Holland *et al.*, 1963, locality 6; (Figure 5.20), (Figure 5.21)) displays the basal boundary stratotype and body stratotype of the well-bedded, olive calcareous siltstones of the Upper Whitcliffe Formation, there resting on the typically more thickly bedded Lower Whitcliffe Formation. The boundary is defined at the top of a laterally persistent 18 cm horizon of convolute bedding. Macrofossils are generally much more common in the

Upper Whitcliffe than in the Lower Whitcliffe strata. Lenticular, decalcified shell bands, rich in brachiopods such as *P. ludloviensis*, *M. nucula* and *S. lunata*, are characteristic of the upper unit. Associates include the bivalves *Fuchsella amygdalina*, *Goniophora cymbaeformis* and *Pteronitella retroflexa*, the annelid *Serpuloides longissimus*, orthoconic nautiloids and gastropods. Abundant conodonts, especially *Ozarkodina excavata* and *Coryssognathus dubius* elements, occur in the Whitcliffe beds (Aldridge and Smith, 1985; Miller and Aldridge, 1993, 1997; Miller, 1995), as do rare valves of the ostracod *Calcaribeyrichia torosa* (Siveter, 1978; Miller 1995). The formations on the Whitcliffe also yield chitinozoan (Sutherland, 1994), acritarch (e.g. Lister, 1970) and spore (e.g. Richardson and Lister, 1969) assemblages and eurypterids (Kjellesvig-Waering, 1961).

In addition to the stratotypes many of the other exposures on the Whitcliffe have aided characterization of their respective formations. These include (Figure 5.15) those immediately to the west of Dinham Bridge and also adjacent to a main path from Dinham Bridge to Whitcliffe Common, displaying the Leintwardine Group [SO 5065 7434], [SO 5062 7440]; Holland *et al.*, 1963, localities 10, 11) and the Lower Whitcliffe Formation [SO 5071 7425], [SO 5065 7433], [SO 5062 7442], [SO 5062 7445]; Holland *et al.*, 1963, localities 8, 9, 12, 13); and those just beyond the spring and at the rock steps adjacent to the weir, along the riverside path, which show Upper Leintwardine ([SO 5082 7421], Holland *et al.*, 1963, locality 4) and Lower Whitcliffe ([SO 5090 7417], Holland *et al.*, 1963, locality 5) strata respectively.

## Interpretation

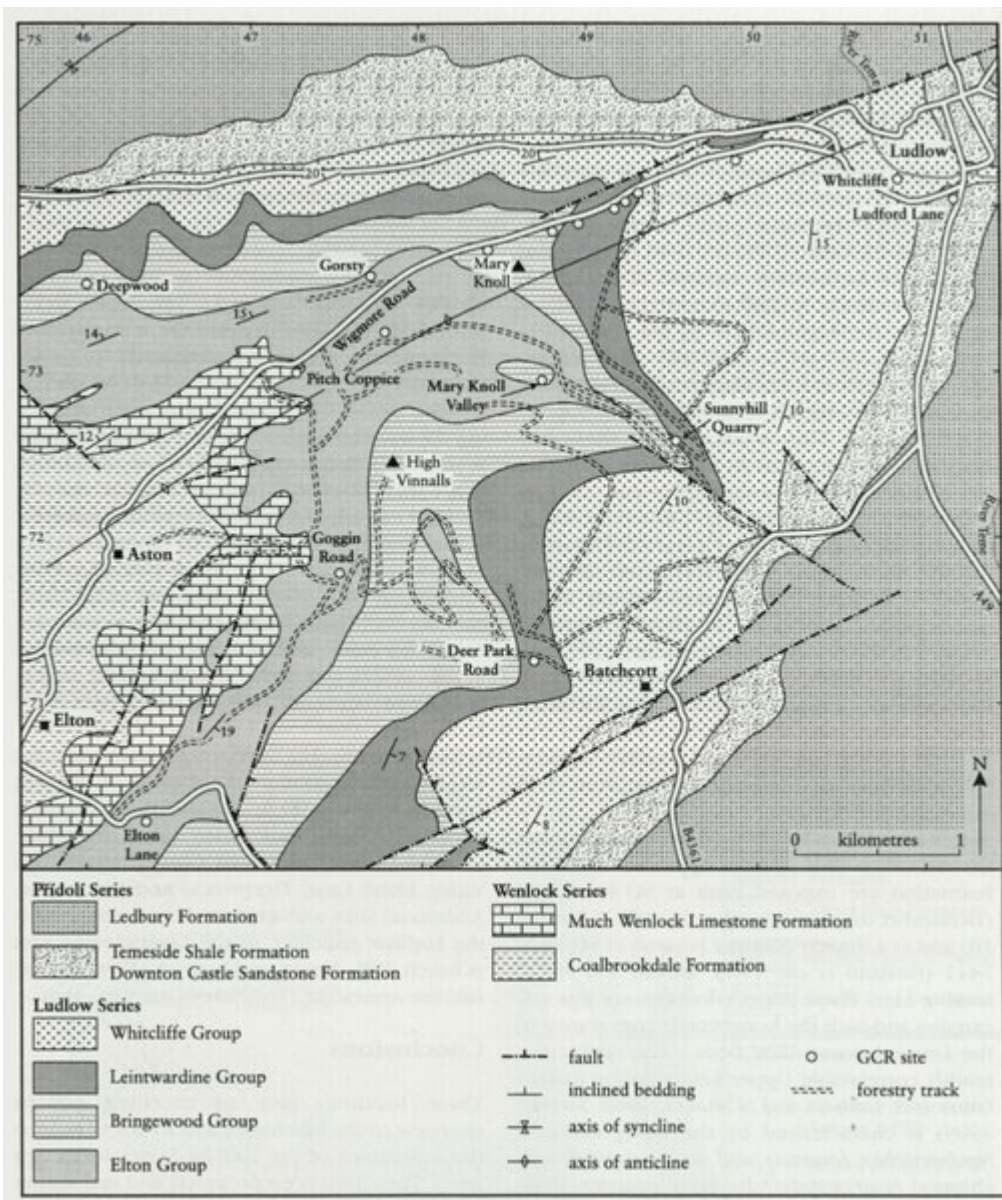
These marine sediments accumulated on the shelf of the Midland Platform, on the eastern margin of the Welsh Basin (see Siveter *et al.*, 1989, fig. 10; Bassett *et al.*, 1992, figs S5a, S5b). Sedimentation of the calcareous, in some cases coquinoid siltstones was perhaps subtidal but mostly within wave base. The coquinas may be the lag products of episodes of higher energy, storm sedimentation in a shallow, mainly clear, but often turbid proximal shelf environment (Watkins 1979; Cherns, 1988). The convoluted bedding of the Whitcliffe strata are interpreted as slumps and other wet sediment deformation features and attest to occasional periods of possible instability on the platform.

In the type Ludlow area Deer Park Road and Sunnyhill are other GCR sites that have fairly complete sequences of Ludfordian strata. The same applies to the sites at Turner's Hill in the West Midlands, Brook House and Sawdde Gorge in southern Wales and Wood Green, Longhope Hill and Perton Road in the southern Welsh Borderland. Some of these Welsh Basin sequences are shelf; and others are of basin margin aspect.

## Conclusions

This is a much studied, classic site of international importance and has primary status in global Silurian stratigraphy. It includes basal boundary and body stratotypes of three stratigraphical divisions of the Ludfordian Stage of the Ludlow Series. The view from Whitcliffe Common (Figure 5.22), looking across to Ludlow and beyond, is one of the famous geological vistas in Britain. The site is regularly visited by many educational parties and researchers and has high scientific value to the geological community. The highest priority should be given to conserving the exposures.

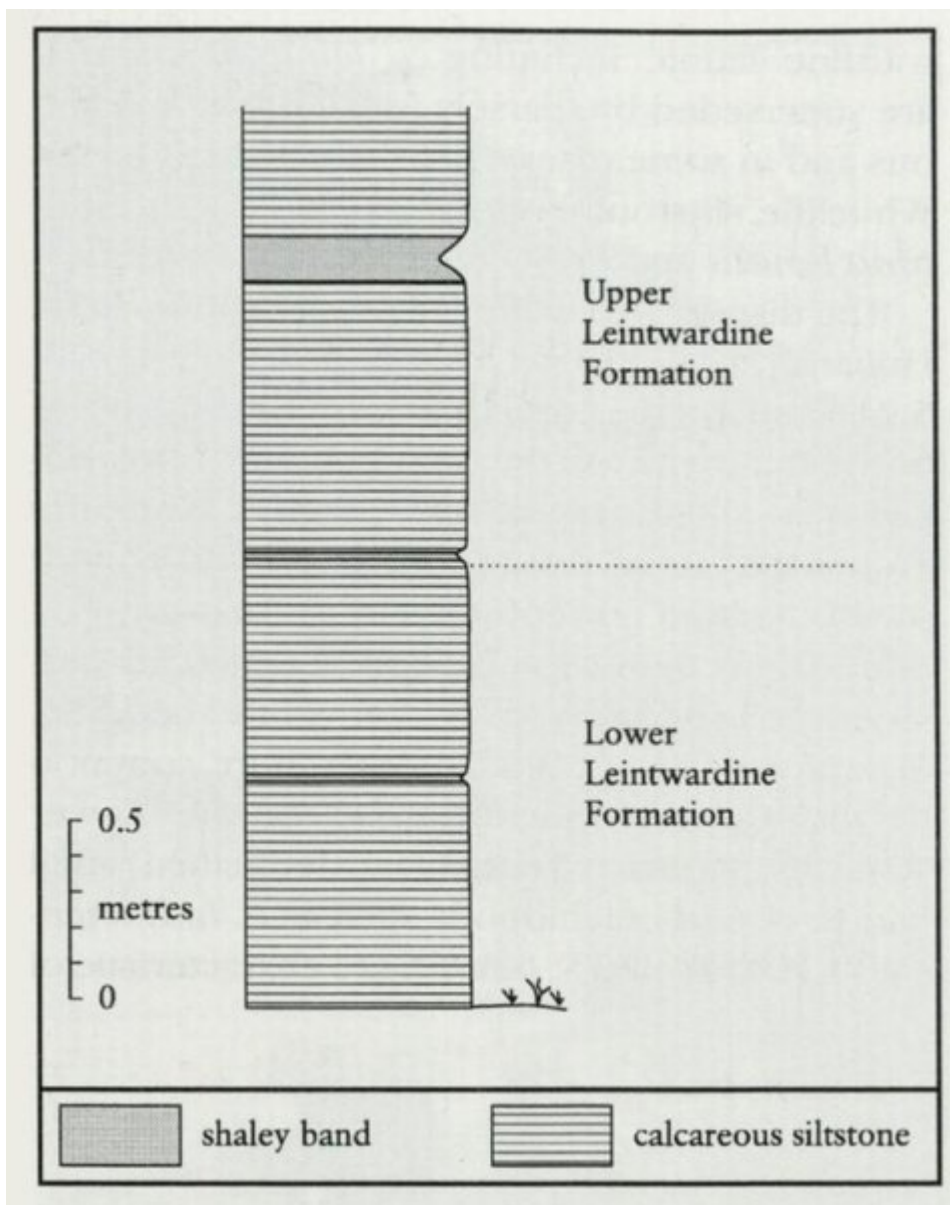
## [References](#)



(Figure 5.6) Map of the geology south-west of Ludlow, showing GCR sites along the Wigmore Road and elsewhere in the eastern part of the Ludlow Anticline (after Holland et al., 1963; Lawson, 1977; Lawson and White, 1989).



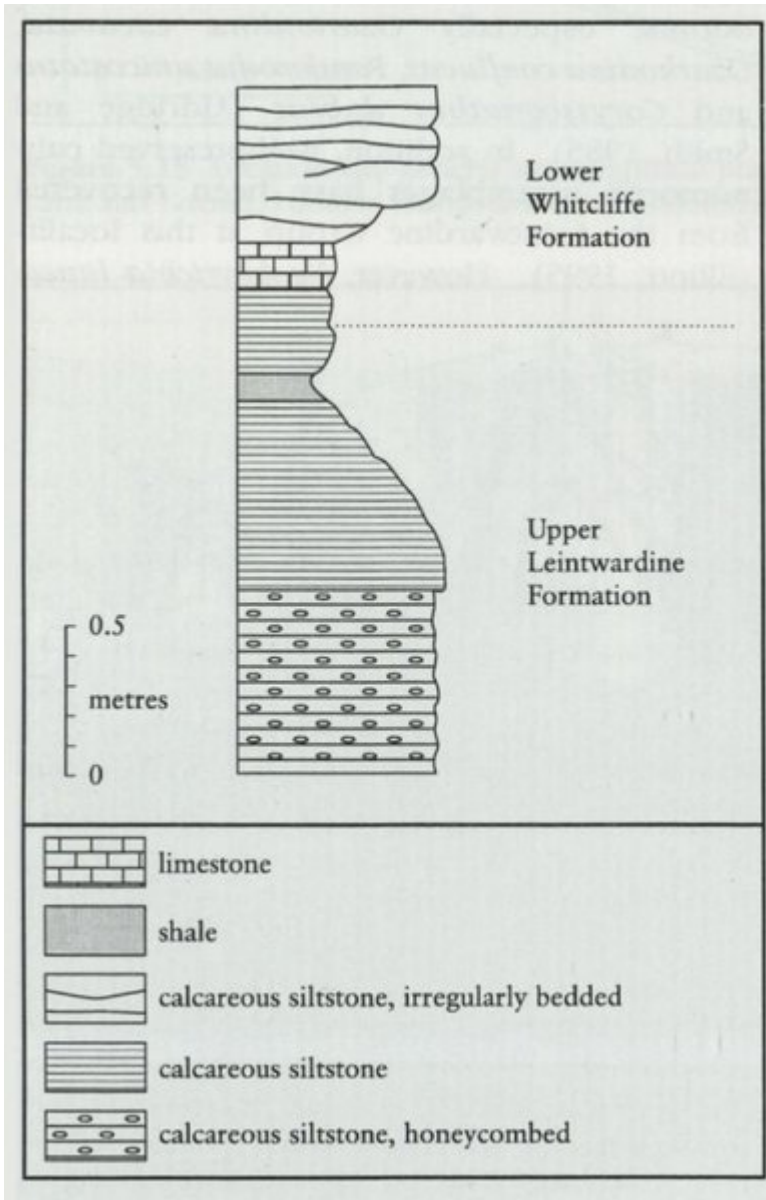




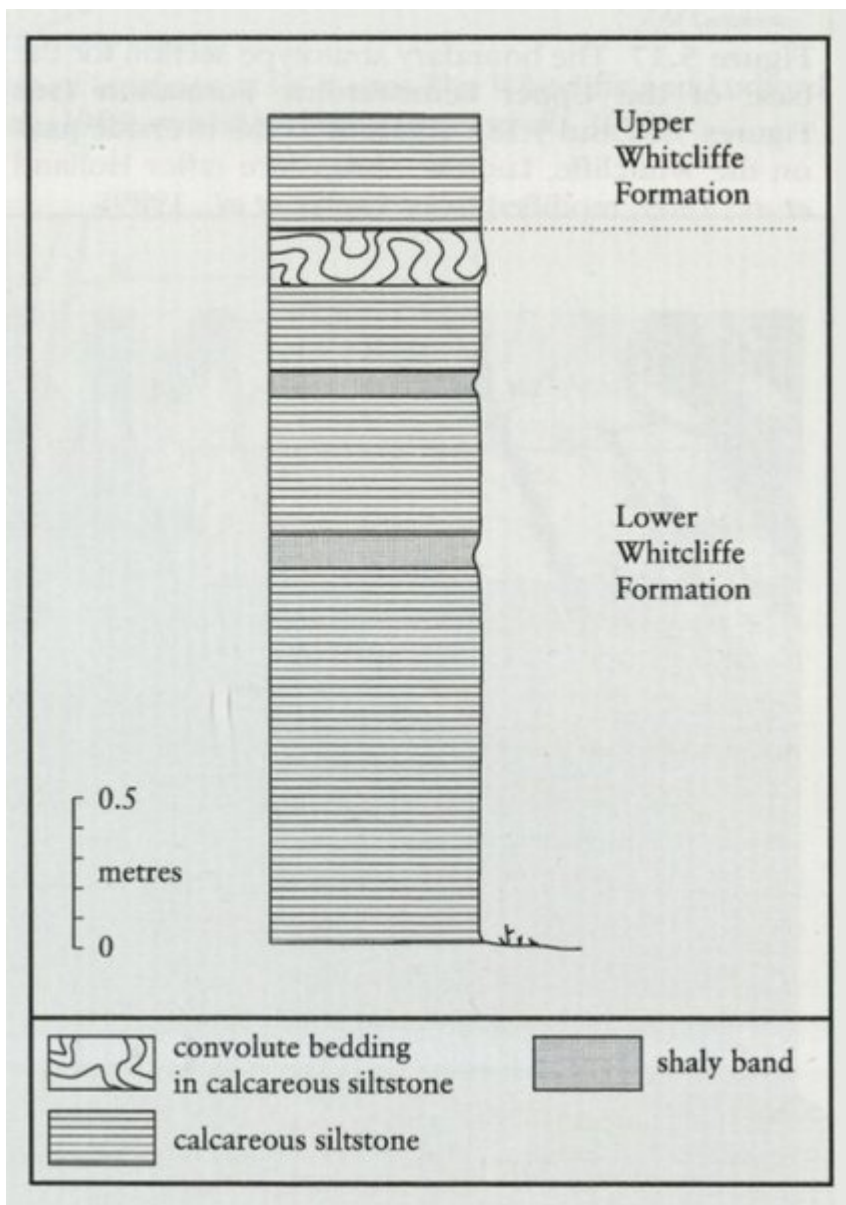
(Figure 5.17) The boundary stratotype section for the base of the Upper Leintwardine Formation (see (Figure 5.16) and (Figure 5.18), adjacent to the riverside path on the Whitcliffe, Ludlow, Shropshire (after Holland et al., 1963; modified from Siveter et al., 1989).



(Figure 5.18) The Lower Leintwardine Formation and the basal boundary stratotypes and body stratotypes for the Upper Leintwardine and Lower Whitcliffe formations (see (Figure 5.16), (Figure 5.17) and (Figure 5.19), adjacent to the riverside path on the Whitcliffe, Ludlow, Shropshire. (Photo: David J. Siveter.)

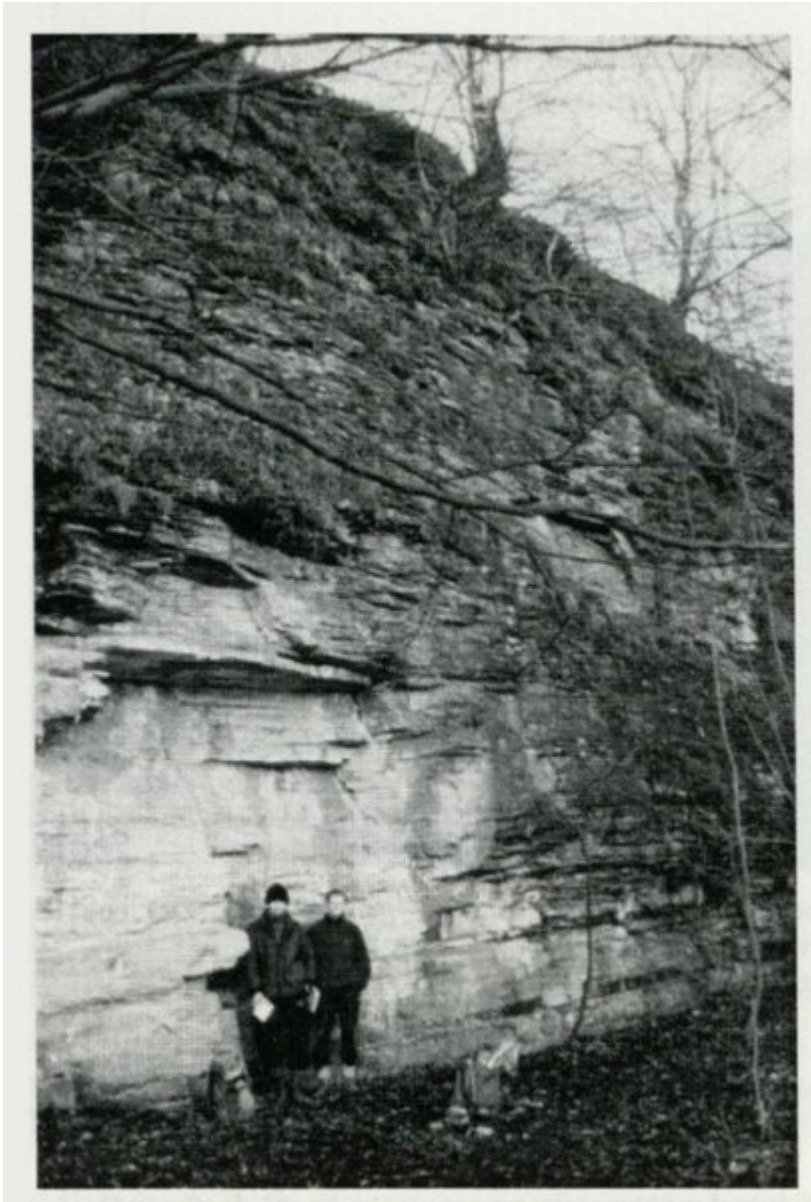


(Figure 5.19) The boundary stratotype section for the base of the Lower Whitcliffe Formation (see Figures 5.16, 5.18), adjacent to riverside path on the Whitcliffe, Ludlow, Shropshire (after Holland et al., 1963; modified from Siveter et al., 1989).



(Figure 5.20) The boundary stratotype section for the base of the Upper Whitcliffe Formation, at the old quarry on the Whitcliffe (see (Figure 5.21)), Ludlow, Shropshire (after Holland et al., 1963; modified from Siveter et al., 1989).





*(Figure 5.21) The Lower Whitcliffe Formation and the basal boundary stratotype and body stratotype for the Upper Whitcliffe Formation, at the old quarry on the Whitcliffe, Ludlow, Shropshire. (Photo: David J. Siveter.)*





*(Figure 5.22) Looking north-east from Whitcliffe Common [SO 5053 7430], locality 3.1a of Siveter et al., 1989); sited on the axial trace of the Ludlow Anticline, across Ludlow, Shropshire towards Titterstone Clee Hill (Devonian-Carboniferous). The regional dip and younging direction is north-west to south-east. (Photo: David J. Siveter.)*