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# The Whitcliffe, Shropshire

[SO 5065 7444]–[SO 5120 7414]

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## Introduction

This site lies within the confines of Ludlow in the central Welsh Borderland, and it encompasses many outcrops of late Ludlow age, around 419 million years old, that form part of the northern limb of the Ludlow Anticline.

Murchison referred to exposures on the Whitcliffe when he established the Silurian System (1835, 1839). This locality was also included in the stratigraphical study of the Ludlow district of Elles and Slater (1906), and more significantly so in the benchmark revision of the type Ludlow Series by Holland *et al.* (1963). Certain key sections on the Whitcliffe were, in addition, logged by Watkins (1979) in his study of Welsh Borderland benthic communities. Most recently the Ludlow succession here has been documented in two field guides (Bassett *et al.*, 1979; Siveter *et al.*, 1989) and in a review of the global standard sections for the Silurian System (Lawson and White, 1989).

Eurypterid and xiphosuran chelicerates from the Whitcliffe were first discussed or figured in nineteenth century works (e.g. Salter, 1859a; Woodward, 1872b). Subsequently, the eurypterids were included by Kjellesvig-Waering (1961) in his taxonomic revision of Welsh Borderland species, Waterston (1964) also commented on one of them, and they were referred to in Plotnick's (1999) analysis of Llandovery–Lochkovian eurypterid habitats. The xiphosuran was cited in Morris (1980). Most of the eurypterid species recorded from the Whitcliffe have a very restricted distribution, and most of the species from here were established on material from the site.

The Whitcliffe is also listed in the GCR volumes for Silurian stratigraphy (Aldridge *et al.*, 2000) and for fossil fishes (Dineley and Metcalf, 1999).

## Description

The site takes the form of a long bluff on the southern side of the River Teme, between Dinham Bridge and Ludford Bridge (Figure 2.39). The beds here belong to the Lower and Upper Leintwardine formations, and Lower and Upper Whitcliffe formations, of the Ludfordian Stage, Ludlow Series. Outcrops on the Whitcliffe stand as basal boundary stratotypes and body stratotypes for the Upper Leintwardine and the Lower and Upper Whitcliffe formations (Holland *et al.*, 1963; Lawson and White, 1989).

Both Lower and Upper Leintwardine formations comprise calcareous siltstones, and in the latter formation they show honeycomb weathering. The boundary between the two Leintwardine formations is drawn just below a thin shale layer and coincides with the introduction of the trilobites *Alcymene puellaris* and *Encrinurus*, and the brachiopod *Aegiria grayi*. The Upper Leintwardine Formation has yielded abundant conodont microfossils (Aldridge and Smith, 1985), and well-preserved palynomorph assemblages have also been recovered from the Leintwardine Group (Elliott, 1995). The boundary between the Upper Leintwardine and Lower Whitcliffe formations is at an horizon where siltstones containing a typical Upper Leintwardine fauna are superseded by sparsely fossiliferous, calcareous and in some cases irregularly bedded siltstones containing the brachiopods *Salopina lunata* and *Protochonetes ludloviensis*.

The disused Whitcliffe Quarry (Holland *et al.*, 1963, locality 6) displays beds of the Lower Whitcliffe Formation, above which are the typically less thickly bedded olive calcareous siltstones of the Upper Whitcliffe Formation. The boundary between the two is defined at the top of a laterally persistent, 18 cm-thick horizon characterized by convolute bedding. The macro-fauna of the Whitcliffe beds includes brachiopods, bivalves, orthoconic nautiloids and gastropods. Macrofossils are generally more abundant in tipper Whitcliffe than in Lower Whitcliffe strata, and shell bands rich in *P. ludloviensis*, *S. lunata* and *Microsphaeridiorhynchus? nucula* are characteristic of the younger unit. With respect to

microfossils, abundant conodonts are known from the Whitcliffe beds (Aldridge and Smith, 1985; Miller and Aldridge, 1993, 1997; Miller, 1995), and ostracods (Siveter, 1978; Miller, 1995), chitinozoans (Sutherland 1994), and acritarch (e.g. Lister, 1970) and spore (e.g. Richardson and Lister, 1969) assemblages have also been recovered.

The Ludfordian rocks of the Whitcliffe represent the type horizon and locality for the eurypterid species *Pterygotus lightbodyi*, *Pterygotus denticulatus*, and *Carcinosoma harleyi*, all established by Kjellesvig-Waering (1961) (Figure 2.40) and (Figure 2.41). The eurypterid *Erettopterus spatulatus* Kjellesvig-Waering, 1961 and the xiphosuran *Bunodes* sp. have also been recorded from here (Woodward, 1872b; Kjellesvig-Waering, 1961; Morris, 1980).

## Interpretation

Sedimentation of the calcareous siltstones, which in some cases are coquinoid, was perhaps subtidal but it was mostly within wave base. The coquinas may represent the lag deposits of high-energy, turbid, storm episodes (Watkins, 1979; Cherns, 1988). The convolute bedding that occurs at the top of the Lower Whitcliffe Formation has been interpreted as slumps and other wet sediment deformation features that perhaps indicate occasional periods of instability on the platform.

These shallow marine Ludfordian sediments accumulated on the shelf area of the Midland Platform, on the eastern margin of the Welsh Basin (see Siveter *et al.*, 1989; Bassett *et al.*, 1992). They represent late-stage infilling of the Anglo-Welsh Basin, and preface the quasi-marine and fluvial deposits of the Pridoli Series in the Ludlow area and elsewhere in the Welsh Borderland.

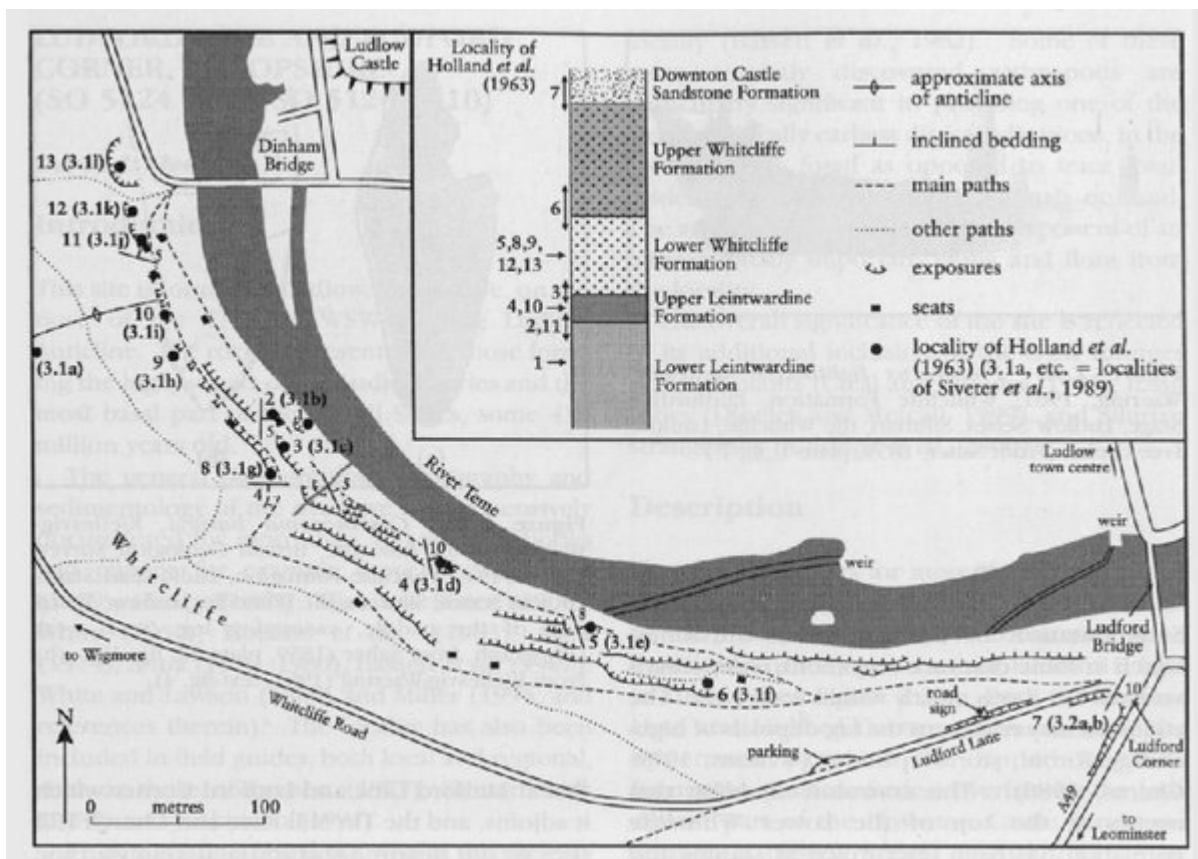
*Carcinosoma harleyi* from the Whitcliffe has not been recorded elsewhere. *Pterygotus lightbodyi* is also unique to the site, except for one specimen from the upper Ludlow of Batch Common, a nearby locality in the Ludlow Anticline. *P. denticulatus* has, subsequent to the investigations of Kjellesvig-Waering (1961), also been recorded from the Pridoli of the adjacent locality of Ludford Lane (Manning and Dunlop, 1995). *Erettopterus spatulatus* is known from several localities of upper Ludlow or basal Pridoli age in the Ludlow area and at Kington in Herefordshire.

The Whitcliffe site is particularly closely linked geographically with three others in this volume: that at Ludford Lane and Ludford Corner which it adjoins, and the Tin Mill Race and Church Hill sites in the nearby Downton and Leintwardine areas respectively. It overlaps in terms of stratigraphy with Ludford Lane and Ludford Corner, as both have latest Ludfordian (Upper Whitcliffe Formation) rocks, whereas Church Hill has slightly older, lower Ludfordian sediments, and Tin Mill Race slightly younger, lower Pridoli Series strata. The Whitcliffe is also linked with two other, more southerly Welsh Borderland GCR arthropod sites: Bradnor Hill near Kington, and Perton Lane in the Woolhope Inlier, both of which have, like Tin Mill Race and Ludford Lane and Ludford Corner, important eurypterid faunas of basal Pridoli age. All the Scottish Siluro-Devonian sites with eurypterids — Gutterford Burn, Slot Burn, Dunside, and Turin Hill — differ from the Whitcliffe in having stylonuroids as part of their fauna.

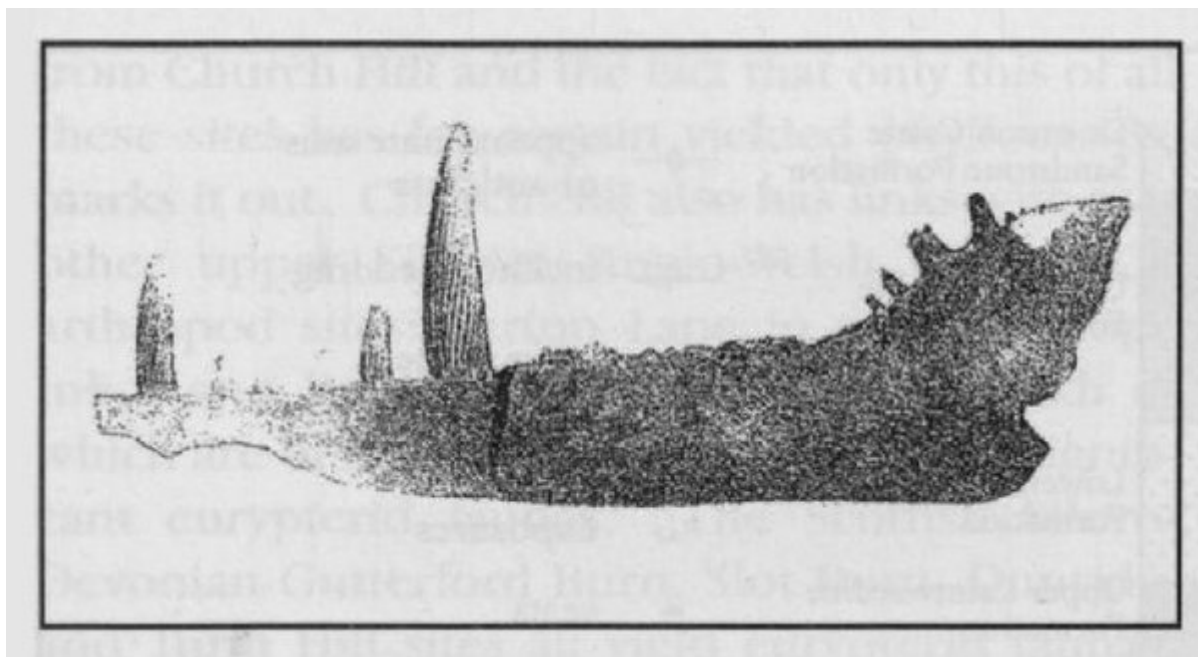
## Conclusions

The Whitcliffe forms one of a series of closely-knit, mainly eurypterid-based arthropod sites in the upper Silurian of the Welsh Borderland. It stands as the type locality for three out of the four species of eurypterid recorded from here, and for one of the species it represents the only known locality.

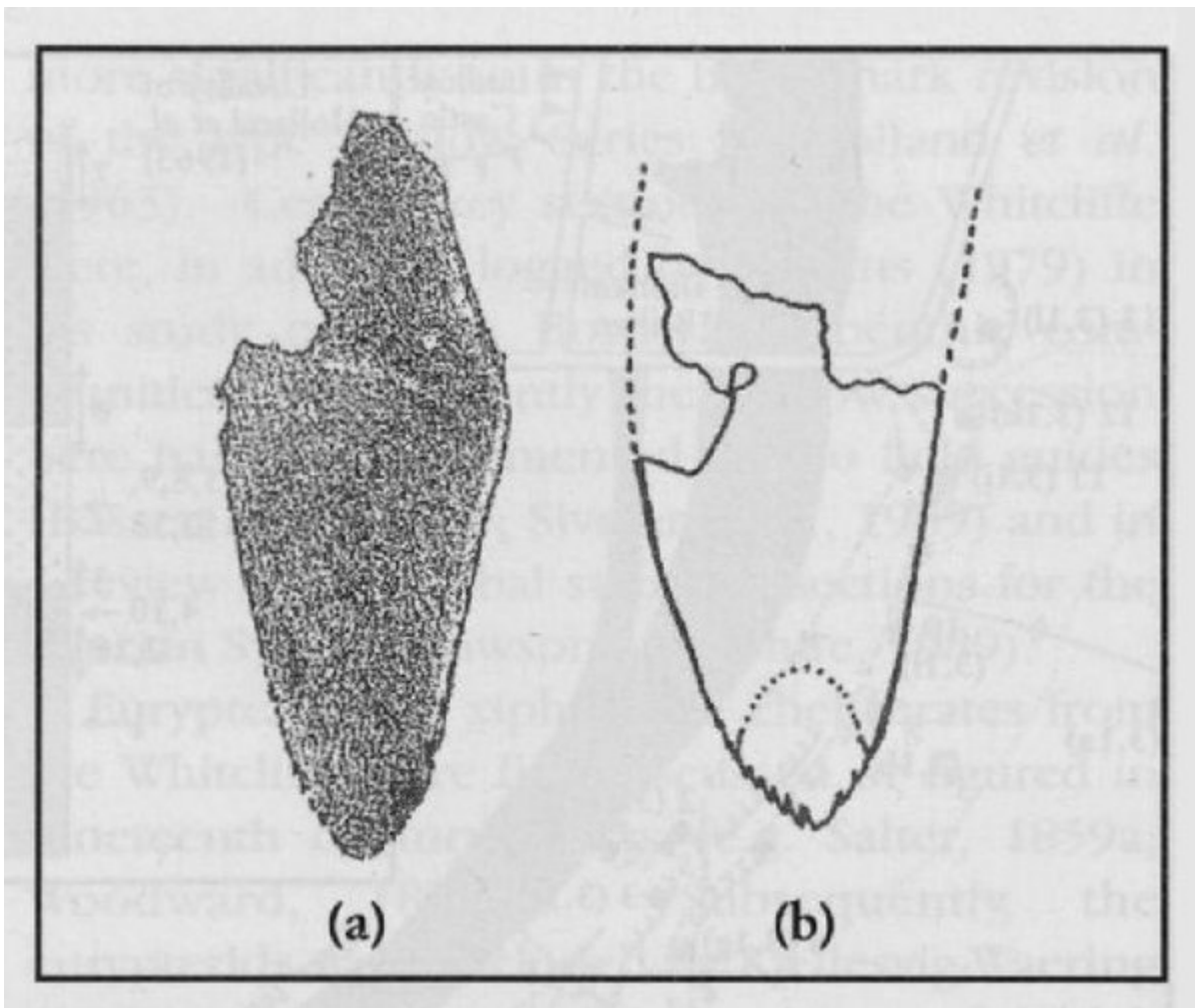
## [References](#)



(Figure 2.39) Location and general stratigraphical position of localities at the Whitcliffe and Ludford Lane and Ludford Corner GCR sites, Ludlow, Shropshire. (After Siveter, 2000c.)



(Figure 2.40) *Pterygotus lightbodyi* Kjellesvig-Waering, 1961; Whitcliffe Formation, Ludfordian Stage, Ludlow Series, Silurian, the Whitcliffe, Ludlow. Free chela. (From Salter, 1859, plate 1, fig 7.)



(Figure 2.41) *Carcinosoma harleyi*, Kjellesvig-Waering, 1961; holotype, British Geological Survey, GSM 89434; Whitcliffe Formation, Ludfordian Stage, Ludlow Series, Silurian, the Whitcliffe, Ludlow. Distal part of the paddle, swimming leg, x 1. (a) Lithograph, from Salter (1859, plate 12, fig. 19). (b) From Kjellesvig-Waering (1961, text-fig. 4).