

The type Ludlow Series: The Whitcliffe

The Whitcliffe comprises the steep, wooded, south-western bank of the River Teme on the western outskirts of Ludlow, between Dinham Bridge [SO 5070 7447] and Ludford Bridge [SO 5123 7420]. The upper part of the Ludlow succession is exposed, from the upper part of the Lower Leintwardine Formation to the top of the Upper Whitcliffe Formation, and the area contains the basal stratotype sections for the Upper Leintwardine, Lower Whitcliffe and Upper Whitcliffe formations. Select [‘The Whitcliffe - vertical section’](#) to display the section, and [‘Ludlow Anticline’](#) for the location of the section.

See: [The Whitcliffe - chitinozoa, conodonts, graptolites, lithostratigraphy, map, ostracodes, shelly faunas, vertical section, Ludlow Anticline.](#)

[Return to beginning of ‘Sections’.](#)

[Return to ‘The Ludlow Series \(Upper Silurian\) of the type area - introductory page’.](#)

[Author: SGM]

The Whitcliffe - lithostratigraphy

The Lower Leintwardine, Upper Leintwardine, Lower Whitcliffe and Upper Whitcliffe formations are exposed on The Whitcliffe.

See: [The Whitcliffe - vertical section](#).

Lower Leintwardine Formation

Hard, flaggy, calcareous siltstones, constituting beds A and B of Holland *et al.* (1963), both 0.6 m thick and separated by a thin shale about 0.04 m thick, underlie the Upper Leintwardine Formation at the latter's basal boundary stratotype.

Holland, C.H., Lawson, J.D & Walmsley, V.G. 1963. The Silurian rocks of the Ludlow district, Shropshire. *Bulletin of the British Museum (Natural History)*, Geology, **8**, 95-171, pls 1-7.

See: [Lower Leintwardine Formation, Stratotype for the base of the Upper Leintwardine Formation, The Whitcliffe - vertical section](#).

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)

[Author: SGM]

Upper Leintwardine Formation

The basal stratotype of the Upper Leintwardine Formation (locality 3 of Holland *et al.* 1963; locality 3.1b of Siveter *et al.* 1989) is on the south bank of the River Teme, about 140 m SSE of Dinham Bridge [SO 5071 7429]. The succession across the formational boundary is as follows:

Bed	Lithology	Thickness	
E	calcareous siltstones, separated from D by shaly band	0.3 m seen	Upper Leintwardine Formation
D	calcareous siltstones with thin shaly band at base, and thicker shaly band, c. 0.13 m, at top	c. 0.9 m	
C	calcareous siltstone; immediately below recess formed by weathering of shaly layer at base of D; thin fossiliferous seam at base has yielded <i>Aegiria grayi</i> , <i>Calymene puellaris</i> and <i>Encrinurus stubblefieldi</i>	0.02 - 0.04 m	
B	hard, flaggy, calcareous siltstones; separated from A by thin shale, c. 4 cm thick	0.6 m	Lower Leintwardine Formation
A	hard, flaggy, calcareous siltstones	0.6 m seen	

Holland *et al.* (1963) used faunal criteria to distinguish the Lower Leintwardine Formation from the Upper Leintwardine Formation on The Whitcliffe. The base of the Upper Leintwardine Formation coincides with the occurrence of *Aegiria grayi* (Davidson), *Calymene puellaris* Reed and *Encrinurus* at the base of bed C (Holland *et al.* 1963; Siveter *et al.* 1989, p. 43; *Encrinurus* sp. of Holland *et al.* 1963 subsequently identified as *E. stubblefieldi* Tripp by Watkins, 1979, p. 236). These taxa are characteristic of the *Shaleria ornatella* Association (see: [The Whitcliffe - shelly faunas](#)).

The Upper Leintwardine is estimated to be between 5 and 6 m thick on The Whitcliffe (from Sutherland 1994, text-figs 51, 52).

(continued...)

Upper Leintwardine Formation (continued)

- Holland, C.H., Lawson, J.D & Walmsley, V.G. 1963. The Silurian rocks of the Ludlow district, Shropshire. *Bulletin of the British Museum (Natural History)*, Geology, **8**, 95-171, pls 1-7.
- Siveter, D.J., Owens, R.M. & Thomas, A.T. 1989. *Silurian field excursions: a geotraverse across Wales and the Welsh Borderland*. National Museum of Wales, Geological Series No. **10**, Cardiff. 133pp.
- Sutherland, S.J.E. 1994. Ludlow chitinozoans from the type area and adjacent regions. *Palaeontographical Society Monograph*, London, 1-104, pls 1-18 (publ. No. 594, part of vol. 148 for 1994).
- Watkins, R. 1979. Benthic community organization in the Ludlow Series of the Welsh Borderland. *Bulletin of the British Museum (Natural History)*, Geology, **31**, 175-280.

See: [Upper Leintwardine Formation, Stratotype for the base of the Upper Leintwardine Formation, The Whitcliffe - map, vertical section.](#)

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)

[Author: SGM]

Lower Whitcliffe Formation

The basal stratotype of the Lower Whitcliffe Formation is at locality 3 of Holland *et al.* 1963 (locality 3.1c of Siveter *et al.* 1989), about 10 m SE of the stratotype for the base of the Upper Leintwardine Formation [SO 5071 7428]. The succession across the formational boundary is as follows:

Bed	Lithology	Thickness	
I	thickly and irregularly bedded siltstones	0.49 m seen	
H	shelly limestone	0.15 m	Lower Whitcliffe Formation
G	calcareous siltstone; poorly fossiliferous	0.10 - 0.11 m	
F	calcareous siltstone; very fossiliferous	0.09 - 0.10 m	
E	calcareous siltstones	0.05 - 0.07 m	
D	shale	0.09 m	
C	siltstones, less calcareous, more thickly and irregularly bedded than underlying beds	0.5 m	Upper Leintwardine Formation
B	calcareous siltstone, without honeycomb weathering	0.08 - 0.11 m	
A	flaggy, calcareous siltstones, with honeycomb weathering	top 0.6 m of 1.5 m interval	

The base of the Lower Whitcliffe Formation was defined using faunal criteria (Holland *et al.* 1963, pp. 145-146, pl. 2). A more striking lithological change is situated about 0.84 m below the faunal change, at the passage from the conspicuously honeycombed bed A, typical of the Upper Leintwardine Formation, to the overlying beds. Bed C, in particular, was noted by Holland *et al.* (1963) to resemble the Lower Whitcliffe Formation, but they considered the fairly common occurrence of *Shaleria ornatella* (Davidson) and the presence of *Saetograptus* cf. *leintwardinensis* (Lapworth) to indicate the Upper Leintwardine Formation. The abundance of *Aegiria grayi* (Davidson) in bed F was taken to be a definite indication of the Upper Leintwardine Formation. Bed G is poorly fossiliferous, but the overlying bed H was reported by Holland *et al.* to contain no sign of the characteristic Upper Leintwardine fauna, although fossils were reported to be common. The thickly and irregularly bedded siltstones of Bed I are typical of the Lower Whitcliffe Formation.

The Lower Whitcliffe Formation is estimated to be about 23 m thick on The Whitcliffe (from Sutherland 1994, text-figs 52-54).

(continued...)

Lower Whitcliffe Formation (continued)

- Holland, C.H., Lawson, J.D & Walmsley, V.G. 1963. The Silurian rocks of the Ludlow district, Shropshire. *Bulletin of the British Museum (Natural History)*, Geology, **8**, 95-171, pls 1-7.
- Siveter, D.J., Owens, R.M. & Thomas, A.T. 1989. *Silurian field excursions: a geotraverse across Wales and the Welsh Borderland*. National Museum of Wales, Geological Series No. **10**, Cardiff. 133pp.
- Sutherland, S.J.E. 1994. Ludlow chitinozoans from the type area and adjacent regions. *Palaeontographical Society Monograph*, London, 1-104, pls 1-18 (publ. No. 594, part of vol. 148 for 1994).

See: [Lower Whitcliffe Formation, Stratotype for the base of the Lower Whitcliffe Formation, The Whitcliffe - map, vertical section.](#)

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)

[Author: SGM]

Upper Whitcliffe Formation

The basal stratotype of the Lower Whitcliffe Formation is at Whitcliffe Quarry (locality 6 of Holland *et al.* 1963; locality 3.1f of Siveter *et al.* 1989) [SO 5094 7414], on the south bank of the River Teme, about 260 m WSW of Ludford Bridge. The succession across the formational boundary is as follows:

Bed	Lithology	Thickness	
G	calcareous siltstone	0.35 m seen	Upper Whitcliffe Formation
F	laterally persistent unit of convolute bedding	0.18 m	
E	calcareous siltstones	0.28 m	
D	shaly band	0.08 m	Lower Whitcliffe Formation
C	calcareous siltstones	0.46 m	
B	shaly band	0.09 m	
A	calcareous siltstones	1.22 m seen	

The Upper Whitcliffe Formation is characteristically more thinly bedded than the Lower Whitcliffe Formation, but there is a stratigraphical transition between the two formations, and rock types characteristic of each unit may occur in the other, making identification of the lithostratigraphical unit in small exposures difficult. Fossils usually occur in coquinas. They are mainly the same as those in the Lower Whitcliffe Formation, but occur in greater numbers.

The Upper Whitcliffe Formation on The Whitcliffe is estimated to be about 32 m thick (Miller 1995, p. 348, text-fig. 5).

Holland, C.H., Lawson, J.D & Walmsley, V.G. 1963. The Silurian rocks of the Ludlow district, Shropshire. *Bulletin of the British Museum (Natural History)*, Geology, **8**, 95-171, pls 1-7.

Miller, C.G. 1995. Ostracode and conodont distribution across the Ludlow/Pridoli boundary of Wales and the Welsh Borderland. *Palaeontology*, **38**, 341-384.

Siveter, D.J., Owens, R.M. & Thomas, A.T. 1989. *Silurian field excursions: a geotraverse across Wales and the Welsh Borderland*. National Museum of Wales, Geological Series No. **10**, Cardiff. 133pp.

See: [Upper Whitcliffe Formation, Stratotype for the base of the Upper Whitcliffe Formation, The Whitcliffe - map, vertical section.](#)

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)

The Whitcliffe - shelly faunas

Shelly faunas from The Whitcliffe are assigned to the *Shaleria ornatella* and *Protochonetes ludloviensis* associations.

Shaleria ornatella Association

Holland *et al.* (1963) used faunal criteria to distinguish the Lower Leintwardine Formation from the Upper Leintwardine Formation on The Whitcliffe. The base of the Upper Leintwardine Formation in its basal boundary stratotype coincides with the occurrence of *Aegiria grayi* (Davidson), *Calymene puellaris* Reed and *Encrinurus* (Holland *et al.* 1963; Siveter *et al.* 1989, p. 43; *Encrinurus* sp. subsequently identified as *E. stubblefieldi* Tripp by Watkins, 1979, p. 236). These taxa are characteristic of the *Shaleria ornatella* Association. The upper part of the Lower Leintwardine Formation at the same locality contains the brachiopods *Atrypa reticularis* (Linnaeus), *Shaleria ornatella* (Davidson), *Microsphaeridiorhynchus nucula* (J. de C. Sowerby), *Dayia navicula* (J. de C. Sowerby), *Isorthis orbicularis* (J. de C. Sowerby) and *Leptaena depressa* (J. de C. Sowerby).

Watkins (1979, p. 234) noted the relative abundance of strophomenid brachiopods in the *Shaleria ornatella* Association, compared with the underlying *Sphaerirhynchia wilsoni* Association, commenting particularly on the relative abundance of *Shaleria ornatella* and *Leptaena depressa*. Watkins (1979, fig. 16, section 2C; see also Watkins 1979, p. 236) placed the base of the *Shaleria ornatella* Association about 2 m below the base of the Upper Leintwardine Formation on The Whitcliffe, coinciding with an increase in the relative abundance of *Leptaena* and *Shaleria ornatella*, and a sharp decrease in the relative abundance of *Dayia navicula*. He noted (Watkins 1979, pp. 235, 240) that the lower and upper boundaries of the *S. ornatella* Association were sharp enough to be located within centimetres. *Shaleria ornatella* and *Leptaena depressa* were among the brachiopods listed by Holland *et al.* (1963, pp. 117-118) as being fairly common in the Lower Leintwardine Formation, immediately below the Upper Leintwardine Formation, at the basal boundary stratotype of the latter.

(continued...)

***Shaleria ornatella* Association (continued)**

- Holland, C.H., Lawson, J.D & Walmsley, V.G. 1963. The Silurian rocks of the Ludlow district, Shropshire. *Bulletin of the British Museum (Natural History)*, Geology, **8**, 95-171, pls 1-7.
- Siveter, D.J., Owens, R.M. & Thomas, A.T. 1989. *Silurian field excursions: a geotraverse across Wales and the Welsh Borderland*. National Museum of Wales, Geological Series No. **10**, Cardiff. 133pp.
- Watkins, R. 1979. Benthic community organization in the Ludlow Series of the Welsh Borderland. *Bulletin of the British Museum (Natural History)*, Geology, **31**, 175-280.

See: [Shaleria ornatella](#) Association, Stratotype for the base of the Upper Leintwardine Formation, The Whitcliffe - vertical section.

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)

[Author: SGM]

***Protochonetes ludloviensis* Association**

Holland *et al.* (1963) recorded a distinct faunal depletion across the base of the Lower Whitcliffe Formation in its basal boundary stratotype, with the brachiopod fauna reduced to *Dayia navicula* (J. de C. Sowerby), *Microsphaeridiorhynchus nucula* (J. de C. Sowerby) and *Protochonetes ludloviensis* Muir-Wood. Watkins (1979, pp. 237-238. fig. 16) recorded the *Protochonetes ludloviensis* Association from the Lower and Upper Whitcliffe Formations on The Whitcliffe, with *Microsphaeridiorhynchus nucula*, *Protochonetes ludloviensis* and *Salopina lunata* (J. de C. Sowerby) being the dominant forms, accompanied by *Dayia navicula* (in the Lower Whitcliffe Formation), gastropods, bivalves and bryozoans. The base of the *Protochonetes ludloviensis* Association coincides with the base of the Lower Whitcliffe Formation at that formation's basal stratotype.

- Holland, C.H., Lawson, J.D & Walmsley, V.G. 1963. The Silurian rocks of the Ludlow district, Shropshire. *Bulletin of the British Museum (Natural History)*, Geology, **8**, 95-171, pls 1-7.
- Siveter, D.J., Owens, R.M. & Thomas, A.T. 1989. *Silurian field excursions: a geotraverse across Wales and the Welsh Borderland*. National Museum of Wales, Geological Series No. **10**, Cardiff. 133pp.
- Watkins, R. 1979. Benthic community organization in the Ludlow Series of the Welsh Borderland. *Bulletin of the British Museum (Natural History)*, Geology, **31**, 175-280.

See: [Protochonetes ludloviensis Association, Stratotype for the base of the Lower Whitcliffe Formation, The Whitcliffe - vertical section.](#)

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)

[Author: SGM]

The Whitcliffe - graptolites

Saetograptus leintwardinensis (Lapworth), indicative of the ***leintwardinensis* Biozone**, occurs in both the Lower Leintwardine and Upper Leintwardine formations of The Whitcliffe (Holland *et al.* 1963, pp. 117-118, 125; Siveter *et al.* 1989, locs 3.1b, 3.1c).

There are no records of identifiable graptolites from either the Lower Whitcliffe Formation or the Upper Whitcliffe Formation, so no direct evidence for the vertical extent of the *leintwardinensis* Biozone in the Ludlow area. Holland & Palmer (1974), however, reported *Bohemograptus bohemicus tenuis* (Boucek), indicative of the *bohemicus* Biozone, to occur in beds above strata yielding *Aegiria grayi* (Davidson), *Neobeyrichia lauensis* (Kiesow) and *Saetograptus leintwardinensis* in Clun Forest, about 30 km WNW of Ludlow. This suggests correlation of the *bohemicus* Biozone with a level above the Upper Leintwardine Formation of the type area.

Holland, C.H., Lawson, J.D & Walmsley, V.G. 1963. The Silurian rocks of the Ludlow district, Shropshire. *Bulletin of the British Museum (Natural History)*, Geology, **8**, 95-171, pls 1-7.

Holland, C.H. & Palmer, D.C. 1974. *Bohemograptus*, the youngest graptoloid known from the British Silurian sequence. *Special Papers in Palaeontology*, **13**, 215-236.

Siveter, D.J., Owens, R.M. & Thomas, A.T. 1989. *Silurian field excursions: a geotraverse across Wales and the Welsh Borderland*. National Museum of Wales, Geological Series No. **10**, Cardiff. 133pp.

See: [Saetograptus leintwardinensis Biozone, Stratotype for the base of the Upper Leintwardine Formation, Stratotype for the base of the Lower Whitcliffe Formation, The top of the leintwardinensis Biozone in the type Ludlow succession, The Whitcliffe - vertical section.](#)

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)

[Author: SGM]

The Whitcliffe - conodonts

The upper 1.5 m of the **Upper Leintwardine Formation** on The Whitcliffe, in the vicinity of localities 3.1b and 3.1c of Siveter *et al.* (1989) [SO 5071 7429 - 5071 7428], have yielded rich faunas, dominated by *Ozarkodina excavata* (Branson & Mehl), *O. confluens* (Branson & Mehl), *Panderodus unicostatus* (Branson & Mehl) and *Coryssognathus dubius* (Rhodes), with *Pelekysgnathus dubius* Jeppsson, *Decoriconus* sp. and *Oulodus* sp. (Aldridge & Smith 1985, p. 35).

Miller (1995) recorded conodonts from three samples close to the top of the **Lower Whitcliffe Formation** on The Whitcliffe. The most abundant material (in terms of specimens/kg) is from his sample 15d/1, collected about 3 m below the top of the formation, 470 m W of Ludford Bridge [SO 5089 7416] (and about 220 m W of loc. 3.1f of Siveter *et al.* 1989; Miller 1995, loc. 15d). The fauna is dominated by *Ozarkodina excavata*, with common *Coryssognathus dubius* and fewer specimens of *Ozarkodina confluens* and *Panderodus serratus* (Rexroad) (Miller 1995, p. 348, text-figs 5, 7).

The other two samples from the Lower Whitcliffe Formation, 15c/1 and 74/1, are both from a coquinoid shell bed, considered to be less than a metre below the top of the formation (Miller 1995, p. 348, text-fig. 4), and about 350 m W of Ludford Bridge [SO 5092 7415] (about 100 m west of loc. 3.1f of Siveter *et al.* 1989; Miller 1995, loc. 15c). The fauna is similar to that from sample 15d/1, still dominated by *O. excavata*, although *C. dubius* is relatively more common. *Ozarkodina wimani* (Jeppsson) is restricted to sample 74/1 of Miller's dataset (but see the Upper Whitcliffe Formation below), while *O. remscheidensis eosteinhornensis* (Walliser) and *O. snajdri* (Walliser) appear in sample 74/1 (Miller 1995, text-fig. 7).

Aldridge & Smith (1985) reported conodonts to be abundant in limestone lenses of the **Upper Whitcliffe Formation** at Whitcliffe Quarry [SO 5094 7414] (locality 3.1f of Siveter *et al.* 1989), where *Ozarkodina excavata*, *O. confluens*, *Coryssognathus dubius*, *Pelekysgnathus dubius* and *Panderodus* occur throughout. A sample collected 5 m above the base of the formation also yielded *O. remscheidensis eosteinhornensis*, *O. snajdri* and *O. wimani* (Aldridge & Smith 1985, see also Siveter *et al.* 1989, p. 44). From the same area, Miller (1995, p. 348, text-figs 4, 5, 7) reported conodonts from the lowest 5 m of the formation in his sections 15a [SO 5098 7414], 15b [SO 5096 7414], 15c [SO 5092 7415] and 15d [SO 5089 7416]. The faunas from these sections are generally dominated by *O. excavata*, but *Coryssognathus dubius* is also common. The range chart (Miller 1995, text-fig. 7) indicates that *O. remscheidensis eosteinhornensis*, *O. remscheidensis* subspp., *O. snajdri* and *Panderodus serratus* occur at this level. About 22 m above the base of the Upper Whitcliffe Formation, a fauna collected close to Ludford Bridge [SO 5116 7416] is dominated by *Coryssognathus dubius* (Miller 1995, text-fig. 7, sample 76/1*). *O. excavata* is also common, but not dominant as in lower samples, while *O. confluens* increases in importance. *Panderodus serratus* is present.

(continued...)

The Whitcliffe - conodonts (continued)

- Aldridge, R.J. & Smith, M.P. 1985. Lower Palaeozoic succession of the Welsh Borderland. Fourth European Conodont Symposium (ECOS IV) Field Excursion B Guidebook, 39 pp.
- Miller, C.G. 1995. Ostracode and conodont distribution across the Ludlow/Prídolí boundary of Wales and the Welsh Borderland. *Palaeontology*, **38**, 341-384.
- Siveter, D.J., Owens, R.M. & Thomas, A.T. 1989. *Silurian field excursions: a geotraverse across Wales and the Welsh Borderland*. National Museum of Wales, Geological Series No. **10**, Cardiff. 133pp.

See: [Conodonts from the Upper Leintwardine Formation](#), [Conodonts from the Lower Whitcliffe Formation](#), [Conodonts from the Upper Whitcliffe Formation](#), [Ozarkodina remscheidensis eosteinhornensis](#), [Ozarkodina snajdri](#), [Ozarkodina wimani](#), [Stratotype for the base of the Lower Whitcliffe Formation](#), [Stratotype for the base of the Upper Whitcliffe Formation](#), [The Whitcliffe - map](#), [vertical section](#).

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)

[Author: SGM]

The Whitcliffe - ostracodes

Published ostracode data that relate specifically to The Whitcliffe are sparse. Miller (1995, p. 349) found the **Upper Whitcliffe Formation** to have a virtually monospecific ostracode fauna in the Ludlow area, consisting of *Calcaribeyrichia torosa* (Jones). On The Whitcliffe, the species occurs in Miller's samples 15b/2 and 15c/3, both within the lowest 2 m of the formation, 290 m and 350 m W of Ludford Bridge, at grid references [SO 5096 7414] and [SO 5092 7415] respectively.

Miller, C.G. 1995. Ostracode and conodont distribution across the Ludlow/Prídolí boundary of Wales and the Welsh Borderland. *Palaeontology*, **38**, 341-384.

See: [Calcaribeyrichia torosa](#), Ludfordian ostracode faunas, The Whitcliffe - vertical section.

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)

[Author: SGM]

The Whitcliffe - chitinozoa

The bases of chitinozoan biozones 11 and 12 are located on The Whitcliffe.

The base of **Chitinozoan Biozone 11** was placed at the first appearance of *Gotlandochitina villosa* Laufeld in sample W1, collected from the stratotype for the base of the Upper Leintwardine Formation on The Whitcliffe (locality 3 of Holland *et al.* 1963; locality 3.1b of Siveter *et al.* 1989). Sutherland's (1994) text-fig. 51 suggests that the sample was collected from the thin shale separating beds A and B of Holland *et al.* (1963). Sutherland (1994, p. 93) put this level 0.84 m below the top of the Lower Leintwardine Formation, but estimates of thickness from Holland *et al.*'s depiction of the section (Holland *et al.* 1963, fig. 5) suggest a level about 0.6 m below the top of the formation.

Sutherland (1994, p. 93) placed the base of **Chitinozoan Biozone 12** at the first appearance of *Eisenackitina philipi* Laufeld in sample W20, 0.46 m below the base of the Lower Whitcliffe Formation in its basal stratotype section (locality 3 of Holland *et al.* 1963; locality 3.1c of Siveter *et al.* 1989). Sutherland (1994, text-fig. 52) placed this level in Bed B of Holland *et al.* (1963), but there is evidently a mistake on that figure as Bed D is wrongly labelled as Bed C, and the thickness of Bed B on the figure (about 0.5 m) far exceeds the thickness of about 0.1 m given by Holland *et al.* The base of Biozone 12 almost certainly lies within Bed C, incorrectly labelled on Sutherland's text-fig. 52 as Bed B. The top of the biozone has not been defined; the highest productive sample from the type Ludlow area, sample W45, was collected about 2.4 m above the base of the Upper Whitcliffe Formation in its basal boundary stratotype section (Whitcliffe Quarry; Holland *et al.* 1963, loc. 6; Siveter *et al.* 1989, loc. 3.1f). This sample contains taxa that are characteristic of Biozone 12 (Sutherland 1994, text-fig. 55). Biozone 12 is equivalent to the *Eisenackitina philipi* Biozone of Verniers *et al.* (1995).

Holland, C.H., Lawson, J.D & Walmsley, V.G. 1963. The Silurian rocks of the Ludlow district, Shropshire. *Bulletin of the British Museum (Natural History)*, Geology, **8**, 95-171, pls 1-7.

Siveter, D.J., Owens, R.M. & Thomas, A.T. 1989. *Silurian field excursions: a geotraverse across Wales and the Welsh Borderland*. National Museum of Wales, Geological Series No. **10**, Cardiff. 133pp.

Sutherland, S.J.E. 1994. Ludlow chitinozoans from the type area and adjacent regions. *Palaeontographical Society Monograph*, London, 1-104, pls 1-18 (publ. No. 594, part of vol. 148 for 1994).

Verniers, J., Nestor, V., Paris, F., Dufka, P., Sutherland, S. & Van Grootel, G. 1995. A global Chitinozoa biozonation for the Silurian. *Geological Magazine*, **132**, 651-666.

See: [Chitinozoan Biozone 11](#), [Chitinozoan Biozone 12](#), [Eisenackitina philipi Biozone](#), [Stratotype for the base of the Upper Leintwardine Formation](#), [Stratotype for the base of the Lower Whitcliffe Formation](#), [Stratotype for the base of the Upper Whitcliffe Formation](#), [The Whitcliffe - map](#), [vertical section](#).

[Return to beginning of 'The Whitcliffe'.](#)

[Return to 'The Ludlow Series \(Upper Silurian\) of the type area - introductory page'.](#)