

Foss Cross, Gloucestershire

[SP 0555 0927]

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Introduction

The quarry at the Foss Cross GCR site exposes strata in the middle part of the White Limestone Formation. Much of the section is fossiliferous, and is notable particularly for the presence of the red alga *Solenopora* (Figure 3.40). It is also one of the few localities to have yielded zonally diagnostic ammonites. It lies immediately west of the former Aldgrove cutting on the old Cirencester to Andoversford railway, described by Richardson (1911b); the cutting is now largely infilled, but the present section in the quarry can be readily correlated with Richardson's published section. The site lies approximately 1.5 km south-west of Stony Furlong Railway Cutting (see GCR site report, this volume), also described by Richardson (1911b), where current exposures show strata at the same stratigraphical level as those at Foss Cross.

Description

Although most of the quarry at Foss Cross is now infilled by tipping, the face constituting the GCR site is preserved in the centre of the tipped area ((Figure 3.41) and (Figure 3.42)). The following section is taken mainly from Sumbler (1995). The fauna listed is mostly held in BGS collections; additional information is given by Torrens (1969d) and Barker (1976).

	Thickness (m)
White Limestone Formation	
<i>Ardley Member</i>	
19: <i>Solenopora</i> Bed: Limestone, white to buff, rubbly, wackestone with scattered yellow peloids more abundant towards base; occasional large bivalves and pink/white-banded algal masses; <i>Solenopora jurassica</i> Brown, ramose coral fragments, bryozoan fragments, <i>Avonothyris?</i> , <i>Digonella digonoides</i> S.S. Buckman, <i>Epithyris oxonica</i> Arkell, <i>Kallirhynchia</i> sp., <i>Plagiostoma subcardiiformis</i> (Greppin), <i>Stiphrothyris capillata</i> Arkell	0.95
18: Marl, fawn with occasional bivalves; <i>Kallirhynchia</i> sp., <i>Epithyris oxonica</i> Arkell, <i>Lopha</i> sp., <i>Plagiostoma subcardiiformis</i> (Greppin)	0.08
17: Limestone ('Dagham Stone'); brown, recrystallized wackestone with scattered peloids, becoming softer and marly towards base; uneven top	0.22
16: Limestone, white to buff, well-sorted, cross-bedded, ooidal grainstone, flaggy weathering with harder recrystallized shell concentrations in basal 0.3 m	0.60
15: Limestone, white to brown, hard, recrystallized wackestone, with abundant large yellow peloids; forming prominent bed in the face	0.25

14: Marl, pale-grey and buff banded, with abundant peloids and shell fragments; sporadic oysters, brachiopods and limestone concretions; <i>Chomatoseris</i> sp., <i>Kallirhynchia</i> spp. including forms comparable with S.S. Buckman's <i>dromio</i> , <i>obtusa</i> and <i>oxoniensis</i> , <i>Digonella digonoides</i> S.S. Buckman, <i>Epithyris oxonica</i> Arkell, <i>Stiphrothyris</i> cf. <i>capillata</i> Arkell, <i>Anisocardia</i> sp., <i>Camptonectes</i> (<i>Camptonectes</i>) <i>laminatus</i> (J. Sowerby), <i>C. (Radulopecten) vagans</i> (J. de C. Sowerby), <i>Ceratomya striata</i> (J. Sowerby), <i>Corbula hulliana</i> Morris, <i>Limatula</i> sp., <i>Liostrea</i> cf. <i>undosa</i> (Phillips), <i>Lopha gregarea</i> (J. Sowerby), <i>Pholadomya lirata</i> (J. Sowerby), <i>Plagiostoma</i> sp., <i>Pleuromya</i> ?, <i>Tancredia</i> ?; nerineid gastropod	0.25
13: Limestone, white to brown, wackestone with scattered peloids becoming more abundant in parts, and grading to packstone or grainstone; sporadic pods with abundant bivalves and gastropods; highly burrowed top with marl-filled burrows; <i>Epithyris</i> sp., <i>Clypeus</i> sp., ostreid fragments, <i>Plagiostoma subcardiiformis</i> (Greppin), <i>Eunerinea eudesii</i> ? (Morris and Lycett), <i>Fibuloptyx</i> cf. <i>witchelli</i> (Cox and Arkell), <i>Globularia</i> sp.	0.30
12: Limestone, buff, soft, poorly sorted, peloidal and ooidal packstone to grainstone; cross-bedded in parts; several thin partings of grey marl, including one at base	1.30
11: Limestone, buff, poorly sorted, peloidal packstone; locally a poorly developed 'Dagham Stone'	0.40
10: Marl, buff	0.05
9: Limestone, brown, hard, wackestone with scattered peloids	0.15
8: Limestone, buff and white mottled wackestone with scattered peloids; persistent marl parting for 0.01 m at base	0.33
7: Limestone, upper part a hard, recrystallized burrowed 'Dagham Stone' with sharp, bored hardground top surface cutting across fossils; passing down into softer, grey, lime mudstone; <i>Chomatoseris</i> sp., corals, echinoid fragments, <i>Camptonectes</i> sp., <i>Cosa gervillia crassica</i> (Morris and Lycett), <i>Falcimylus sublaevis</i> (J. de C. Sowerby), <i>Inoperna</i> sp., <i>Liostrea</i> cf. <i>undosa</i> (Phillips), <i>Liostrea</i> sp., <i>Lopha</i> sp., <i>Lucina bellona</i> d'Orbigny, <i>Isognomon</i> (<i>Mytiloperna</i>) <i>bathonicus</i> (Morris and Lycett), <i>Modiolus imbricatus</i> J. Sowerby, <i>Pholadomya lirata</i> (J. Sowerby), <i>Plagiostoma cardiiformis</i> J. Sowerby, <i>P. subcardiiformis</i> (Greppin), <i>Pleuromya</i> sp., <i>Protocardia</i> sp., <i>Pteroperna</i> sp., <i>Quenstedtia</i> sp., <i>Trigonia</i> sp., nerineid and nerinellid gastropods including <i>Aphanoptyx</i> ?, <i>Bactroptyx</i> <i>implicata</i> (d'Orbigny), <i>Eunerinea arduennensis</i> (Buvignier), <i>E. eudesii</i> (Morris and Lycett) and <i>Fibuloptyx</i> <i>witchelli</i> (Cox and Arkell)	0.48
6: Limestone, grey to brown, soft, crumbly, slightly bituminous, peloidal wackestone; locally marly at base	0.20
5: Limestone, grey, hard, splintery, peloidal and shell-fragmental, slightly sandy wackestone to packstone; prominent bed in face	0.37

4: Limestone, greyish-brown, argillaceous, bituminous, soft and crumbly, with rippled laminae of clay	0.15
3: Limestone, peloidal and shell-fragmental, sandy wackestone to packstone, with grainstone patches; locally fairly hard and recrystallized	0.33
2: Marl, grey to white banded, sandy and ooidal	0.17
<i>Shipton Member</i>	
1: Limestone, white and cream with buff mottles, massive to rubbly; very sparsely peloidal wackestone with abundant fossils, mainly bivalves and corals; intensively bioturbated; topmost 0.3 m to 0.5 m hard and recrystallized, and upper 0.2 m a good 'Dagham Stone' with soft marl-filled burrows; <i>Chomatoseris porpites</i> (Wm Smith), <i>Montlivaltia</i> sp., thecosmiliid coral, <i>Anisocardia</i> ?, <i>Camptonectes</i> sp., <i>Isocyprina</i> sp., <i>Lucina bellona</i> d'Orbigny, <i>Pleuromya</i> ?, <i>Protocardia stricklandi</i> (Morris and Lycett), <i>Pterocardia pesbovis</i> (d'Archiac), <i>Trigonia</i> ?, <i>Eunerinea</i> sp., <i>Fibuloptyxis witchelli</i> (Cox and Arkell), <i>Globularia</i> cf. <i>formosa</i> (Morris and Lycett), trochid and other gastropod fragments; lower part now obscured	max. seen 1.90

Interpretation

The basal 1.9 m of the section (Bed 1) are assigned to the Shipton Member (Barker, 1976; Sumbler, 1984). The lower, highly fossiliferous part of Bed 1 corresponds with the so-called '*Lucina* Beds' (Bed 19) of Richardson's (1911b) section of Stony Furlong Railway Cutting (see GCR site report, this volume). This unit passes upwards into the Excavata Bed (Barker, 1976, 1994; Sumbler, 1984), which marks the top of the member. In addition to the fossils listed above, the Excavata Bed at Foss Cross has yielded the eponymous gastropod *Aphanoptyxis excavata* (Barker, 1976) and, more importantly, a complete specimen of *Morrisiceras comma* (S.S. Buckman) indicative of the Middle Bathonian Morrisi Zone, was found 0.3 m below the top of the bed (Torrens, 1980b). A loose specimen, recorded by Torrens (1967) as an indeterminate *Lycetticeras*, may also have come from this bed (Torrens, 1969e). The upper part of the bed is patchily recrystallized and is developed as a cavernous-weathering 'Dagham Stone' (Woodward, 1894). In the nearby Aldgrove Cutting, Richardson (1911b) recorded 'a waterworn surface' and '*Lithophagus* crypts' at the top of the Excavata Bed (his Bed 17), indicating a hard-ground such as is developed elsewhere at the top of the Shipton Member (Sumbler, 1984).

The upper part of the section (beds 2 to 19), some 6.58 m thick, belongs to the Ardley Member (Barker, 1976; Sumbler, 1984), which is thought to be about 10.5 m in total thickness hereabouts (Sumbler, 1995). Beds 2 to 6 are much like the corresponding beds in Stony Furlong Railway Cutting (Richardson's (1911b) beds 16 and 17); these strata correlate with the sandy 'Roach Bed' and subjacent sand and clay developed in Oxfordshire at this level (Sumbler, 1984). The overlying Bed 7, with its planed, bored hardground top, corresponds with Richardson's (1911b) Bed 15 of Aldgrove Cutting where he recorded encrusting oysters. It represents the Langrunensis Bed, characterized by *Aphanoptyxis langrunensis* in Oxfordshire (Barker, 1976, 1994; Sumbler, 1984). Beds 8 to 14 (or 15) correspond with Richardson's (1911b) Bed 14 of Aldgrove Cutting. These are the so-called 'Ornithella Beds', named from the relative abundance in the marls of '*Ornithella*' (= *Digonella*) species, notably *D. digonoides* S.S. Buckman, although this taxon is by no means confined to this level. Richardson's (1911b) account shows that these beds are highly variable both in thickness and in the proportion of marl present, probably owing to the development of channels both within the 'Ornithella Beds' and above (see Torrens, 1969d; and Stony Furlong Railway Cutting GCR site report, this volume).

The cross-bedded, flaggy-weathering oolite of Bed 16 is the typical lithology of the middle and upper parts of the Ardley Member; such beds were formerly quarried and mined for freestone in the Barnsley–Bibury area, a few kilometres to the south-east of Foss Cross. It corresponds with Richardson's (1911b) more thickly developed Bed 13 of Stony Furlong Railway Cutting. Beds 17 and 18 pass laterally into a 0.4 m-thick fossiliferous marl, the 'Epithyris Bed' (Bed 9) of Torrens

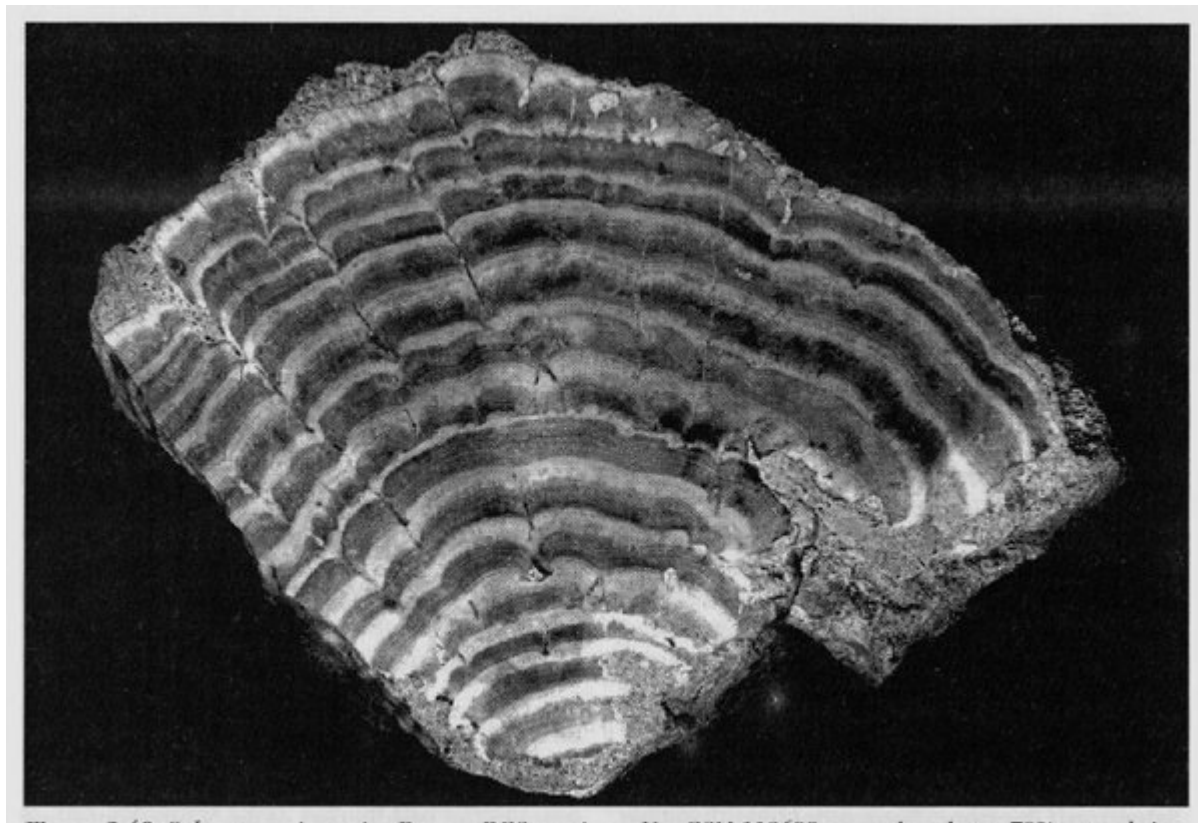
(1969d), which contains abundant specimens of the brachiopod *Epithyris oxonica* Arkell, perhaps the most characteristic fossil of the White Limestone Formation. Bed 19, the topmost bed now exposed in Foss Cross is the so-called 'Beetroot Bed' or 'Solenopora Bed'. Harland and Torrens (1982) attributed the preservation of the original pink colouration of the red alga *Solenopora jurassica* Brown, to rapid burial following a storm. However, although the masses of *Solenopora* may have been transported by currents (as few appear to be in growth position), the surrounding sediment is essentially a carbonate mudstone, with little indication of sorting of the larger grains, and is suggestive of quiet-water sedimentation. The *Solenopora* Bed was recorded by Richardson (1911b) in Aldgrove and Folly Barn cuttings (as Bed 12) and has been found (by the present author) in field brash some 800 m south of Foss Cross [SP 054 085].

A detailed description of a hardground surface formerly exposed in the quarry at Foss Cross a short distance to the south of the present preserved section (Kershaw and Smith, 1986) supposedly relates to Bed 15, the *Langrunensis* Bed. However, examination of the exposure by the present author would suggest that the hardground described lay higher in the succession than present exposures, and perhaps corresponds with Richardson's (1911b) Bed 11 of Aldgrove and Stony Furlong cuttings, just above the *Solenopora* Bed, which (though no longer exposed there) is likewise capped by a bored and oyster-encrusted hardground.

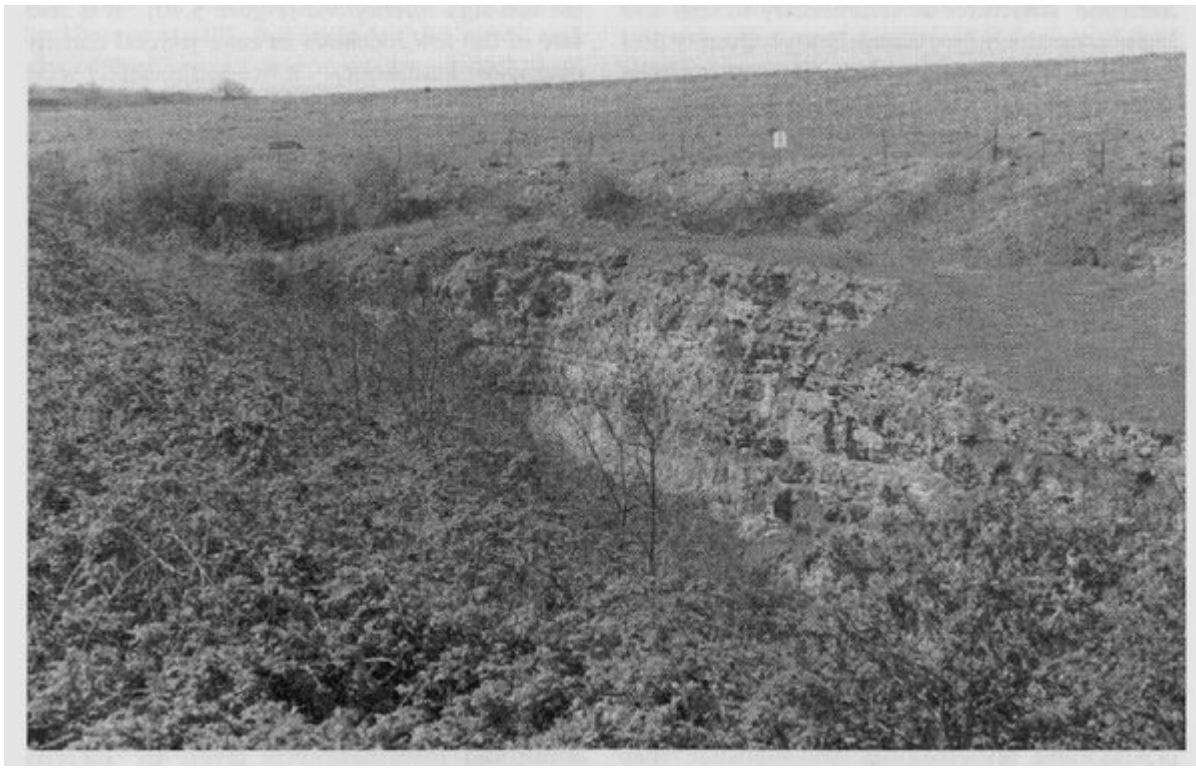
Conclusions

Foss Cross shows an important, highly fossiliferous section through the middle part of the White Limestone Formation, and is one of the few localities in that formation to have yielded zonally diagnostic Bathonian ammonites. Its proximity to Stony Furlong Railway Cutting (see GCR site report, this volume), where many of the same beds are exposed, allows pertinent comparisons and contrasts to be drawn, giving much information on palaeoenvironments in the seas fringing the London Landmass in mid Bathonian times.

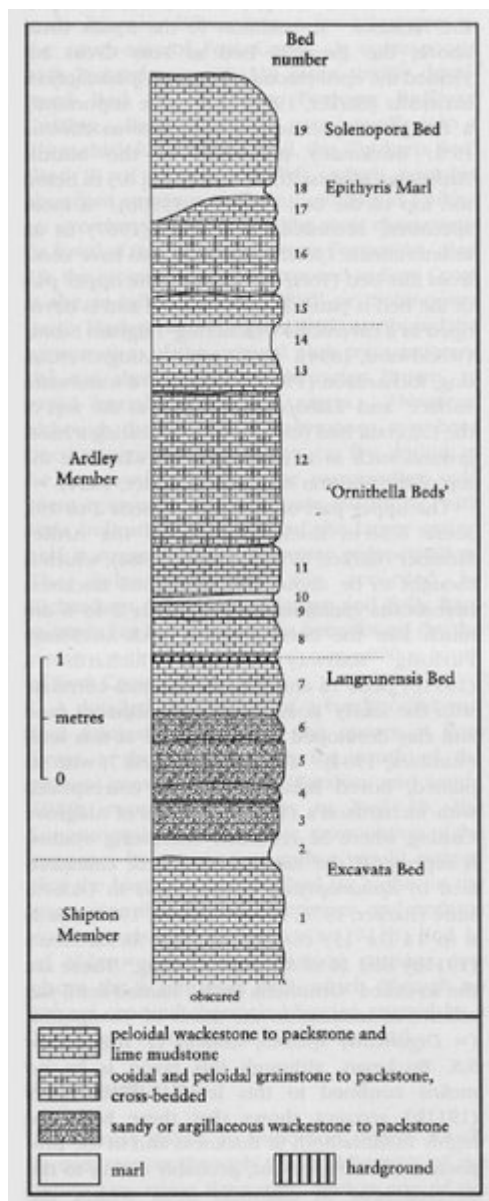
References



(Figure 3.40) *Solenopora jurassica* Brown; BGS specimen No. GSM 119600, reproduced at c. 70% natural size. (Photo: M.G. Sumbler.)



(Figure 3.41) Exposure of the White Limestone Formation in the quarry at Foss Cross. (Photo: M.G. Sumbler.)



(Figure 3.42) Graphic section of the White Limestone Formation in the quarry at Foss Cross.)