Barns Batch Spinney and South Main Road Quarry, Somerset

[ST 557 659]–[ST 566 654]

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Introduction

Barns Batch Spinney and South Main Road Quarry are two of the many localities where the highly fossiliferous Inferior Oolite Group of the outlier at Dundry Hill, near Bristol, has been exposed (Figure 3.5). The quarries, as well as underground galleries, hereabouts were opened for the exploitation of the Dundry Freestone but it is the underlying, richly ammonitiferous beds of the lower parts of the Inferior Oolite Group that have made the area so famous. Dundry Hill is the type locality of many species of ammonites, gastropods, bivalves and brachiopods, while belemnites, echinoids, corals, sponges and other fossils abound (Macfadyen, 1970). By the 1890s, many of the quarry sections were becoming obscured as the Dundry Freestone was worked out, but through the pioneer work of Buckman and Wilson (1896, 1897), their place in the study of Aalenian and Bajocian stratigraphy has been secured for all time. These authors produced the first descriptions of both sites (Buckman and Wilson, 1896). Barns Batch Spinney appears not to have featured again in the literature until the section was re-described by Parsons (1979). In contrast, Buckman and Wilson's (1896) section at South Main Road Quarry, probably the most famous quarry on Dundry Hill, has been quoted by Tutcher (in Crookall *et al.,* 1930; Tutcher, 1903) and Macfadyen (1970). A re-excavated section there was described by Parsons (1979). More recently, both sites have featured in the review of Aalenian and Lower Bajocian ammonite bio- and chronostratigraphy undertaken by Callomon and Chandler (1990), and are covered by the British Geological Survey memoir for the Bristol district (Kellaway and Welch, 1993). The key workers on both sections have concentrated on the ammonites and consequently other faunas are under-represented in the published descriptions; the non-ammonite faunas that feature in the descriptions below are taken from Buckman and Wilson (1896) and Macfadyen (1970). At the time of Parsons' (1979) work, Barns Batch Spinney exposed the lowest levels of the Inferior Oolite Group on Dundry Hill, whereas South Main Road Quarry exposed a more complete succession through the higher beds.

Description

Barns Batch Spinney

The following section and bed numbers are based on Parsons (1979) but, following Callomon and Chandler (1990), numbering of Parson's beds 8–9 has been modified in order to accommodate their ammonite biohorizons; for these beds, Parsons' bed numbers are shown in square brackets.

	Thickness (m)
Coralline Beds	
13: Limestone, white, rubbly, bioclastic, mainly disturbed and slipped material; bivalves, brachiopods, echinoids and 'numerous corals' recorded by Buckman and Wilson (1896); planed, limonite-stained surface at base	seen to 0.30
Elton Farm Limestone	
8c-d [9]: Limestone, conglomeratic, iron-shot'; most of fauna, including the ammonites *Docidoceras, Emileia* and *Witchellia,* rolled and worn (derived from bed below); irregular, limonite-stained surface at base	0.0–0.10

8a-b: *Ovalis Bed:* Limestone, cream-grey, rubbly, with numerous, small limonite ooids (8b) becoming pinker and more crystalline below (8a); highly fossiliferous with fauna mainly concentrated at 0.10–0.15 m and 0.25 m below top, latter level with brittle fracture; ammonites including *Bradfordia, Docidoceras, Emileia, Sonninia, Strigoceras* and *Witchellia;* bivalves including *Ctenostreon,* 'myids', pectinids and *Trigonia;* belemnites; irregular sandy parting at base	0.25–0.45
7: Limestone, hard, massive, crystalline, 'iron-shot' with pink matrix; poorly fossiliferous with a few belemnites, bivalves and the ammonite *Hyperlioceras;* irregular sandy parting, with adjacent limestone sandier and more nodular, divides bed into two; 0.05 m-thick brown, sandy marl at base	0.35–0.53
Grove Farm Limestone	
6: Limestone, hard, nodular, crystalline with minor marl intercalations, softer and whiter towards base; weak parting divides bed roughly in two; extensively bioturbated, moderately fossiliferous but preservation mainly as distorted internal casts; ammonites including *Hyperlioceras;* bivalves including *Gresslya,* 'myids' and pectinids; marl parting at base	0.30
5: Soft marl with hard, pinkish-grey, slightly 'iron-shot' limestone nodules; numerous, mainly distorted poorly preserved ammonites (*Graphoceras*) as internal casts of body chambers	0.20
4: *Eudesi Bed:* Limestone, pinkish-grey, harder and more massive than beds above; divided into three courses; middle course with the brachiopod *Sphaeroidothyris eudesi* (Oppel) (abundant); basal course darker, more crystalline with derived pisoids; rare ammonites and bivalves including *Modiolus*	0 40
Barns Batch Limestone	
3b: Layer of laminated limonite	0.02–0.04
3a: *Pleurotomaria Bed:* Limestone, hard, pinkish-grey, 'iron-shot' particularly towards very irregular, highly conglomeratic top with '*lithophaga*'borings, large pisoids, serpulid- and limonite-encrusted ammonites and small 'snuff-boxes'; particularly hard and massive towards base (forms topographic feature); ammonites including *Brasilia?* and *Ludwigia;* abundant pleurotomariid gastropods; marl parting at base	0.50
2: Limestone, hard, pinkish-grey, crystalline, sandy, sparsely ooidal, very nodular, with some marl layers; well bioturbated, probably by *Pleuromya* (seen in growth position); ammonites including *Ludwigia;* sandy, marl parting at base	0.28–0.30
1: Limestone, massive, buff-coloured, sandy with small limonite flecks	seen to 0.85

South Main Road Quarry

The following section is based on Parsons (1979). Bed numbers relate to those at Barns Batch Spinney but, following Callomon and Chandler (1990), numbering of Parson's beds 8–10 has been modified in order to accommodate their

ammonite biohorizons; for these beds, Parsons' bed numbers are shown in square brackets.

	Thickness (m)
Coralline Beds	
13: Limestone, white, bioclastic, largely slipped and cambered material; brachiopods including *Aulacothyris, Rhactorhynchia subtetrahedra* (Davidson); *Rugitela waltoni* (Davidson); bivalves including '*Ostrea*'and '*Lima*'*;* corals including *Isastrea;* echinoderms; sponges	seen to 1.5
?Dundry Freestone	
12: Limestone, compact, well bedded, ooidal, slightly 'iron-shot' particularly near base	1.0
?Maes Knoll Conglomerate	
11: Conglomerate, iron-stained, limonite and serpulid-encrusted pebbles/lithoclasts in 'iron-shot' matrix; erosional base marked by limonite-staining, borings and sparse oyster-encrustation; brachiopods including *Acanthothiris spinosa* (Linnaeus) and *Rhact. subtetrahedra;* bivalves including '*Astarte*'and *Trigonia costata* Parkinson; corals; other fossils	0.2–0.25
Elton Farm Limestone	
10: [10b] *Brown Ironshot Bed:* Limestone, densely 'iron-shot' with shiny, brown, limonite ooids in purple-stained matrix; bivalves and gastropods; base marked by bivalve-rich parting with *Liostrea* and *Ctenostreon* (very flat hardground); many well-preserved ammonites including *Emileia, Labyrinthoceras, Protoecotraustes, Sonninia, Stephanoceras* and *Witchellia*	0.15–0.22
9: [10a] *Witchellia Bed:* Limestone, 'iron-shot', with fewer limonite ooids than bed above and with whiter, soft, 'pastey' matrix; ammonites including *Witchellia* (abundant) with *Bradfordia, Emileia, Frogdenites, Shirbuirnia* and *Strigoceras;* irregular limonite-coated surface at base	0.25–0.28
8c–d [9]: *Limonitic Bed:* Limestone, 'iron-shot', extremely nodular, hard, bioturbated, with appearance of conglomerate; upper surface thickly coated with limonite and some incipient 'snuff-boxes'; many fossils (mainly distorted and badly preserved, or difficult to extract); bivalves including *Ctenostreon;* ammonites including *Docidoceras, Emileia, Lissoceras, Mollistephanus, Shirbuirnia, Witchellia;* limonite-stained parting at base	0.20–0.25
8a–b [8]: *Ovalis Bed:* Limestone, finely 'iron-shot', crystalline with pinkish matrix; top tending to be nodular and limonitic, base more crystalline and massive with less common limonite ooids; rich fauna particularly bivalves; ammonites including *Docidoceras, Sonninia* and *Witchellia;* irregular parting at base	0.30
7: Limestone, hard, crystalline, similar to bed above but poorly fossiliferous	seen to 0.10

Interpretation

According to Parsons (1974a, 1979) and Callomon and Chandler (1990), the ammonite faunas that have been recovered from Barns Batch Spinney indicate the Aalenian and Lower Bajocian Murchisonae, Concavum, Discites, Ovalis and Laeviuscula (part) zones, as well as the Upper Bajocian Parkinsoni Zone (Figure 3.6). Aa-5, Aa-7, Aa-15 and Bj-1-?Bj-8b of Callomon and Chandler's (1990; emend. Callomon in Callomon and Cope, 1995) ammonite biohorizons have been recognized (see Chapter 1). Their Horizon Aa-5 is represented in Bed 2; Horizon Aa-7 in Bed 3a; Horizon Aa-15 in Bed 5; Horizon Bj-1 in Bed 6; Horizon Bj-2a/3 probably in Bed *7;* Horizon Bj-5 in Bed 8a; Horizon Bj-6b in Bed 8b (J.H. Callomon, pers. comm., 1997), Horizon Bj-7b in Bed 8c; and Horizon Bj-8b probably in Bed 8d.

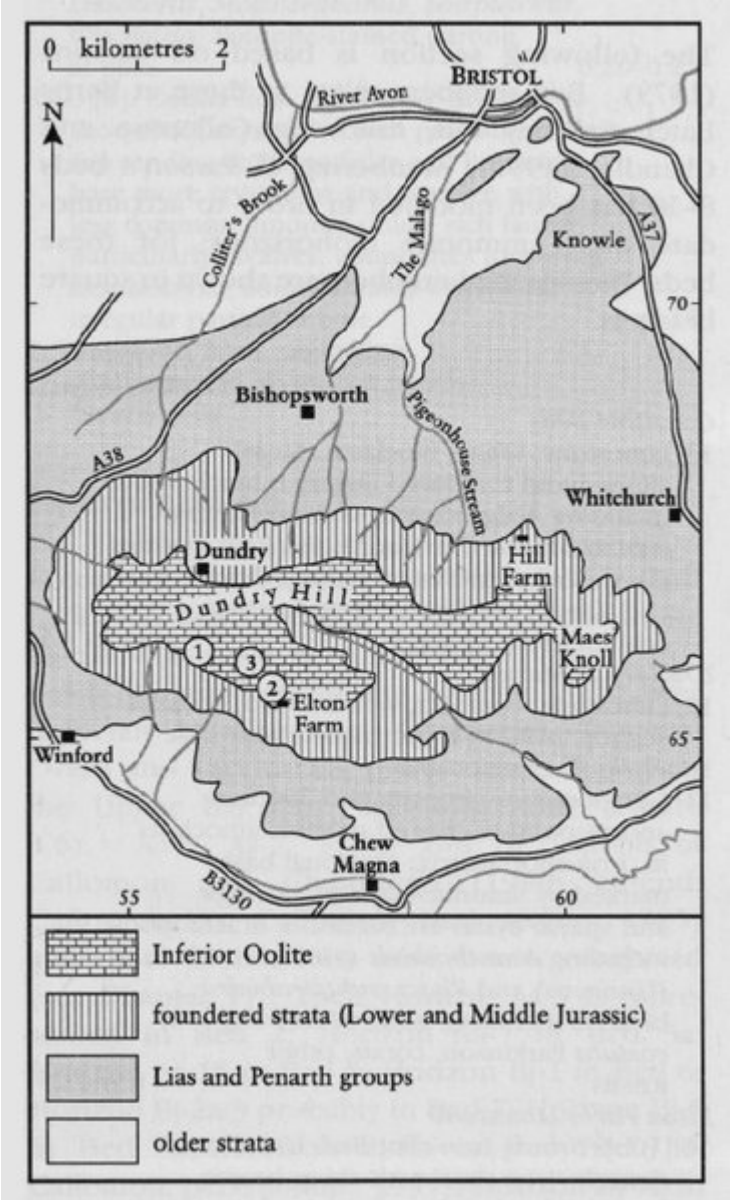
At South Main Road Quarry, the rich ammonite faunas indicate the Discites Zone (part), Ovalis Zone, Laeviuscula Zone, and Sauzei Zone of the Lower Bajocian Substage, as well as the Garantiana and Parkinsoni zones of the Upper Bajocian Substage (Figure 3.6). Bj-5 to Bj-1 la of Callomon and Chandler's (1990; emend. Callomon in Callomon and Cope, 1995) ammonite biohorizons have been recognized. Their Horizon Bj-5 is represented in Bed 8a; Horizon Bj-6b and Bj-6c in Bed 8b (J.H. Callomon, pers. comm., 1997); Horizon Bj-7b in Bed 8c; Horizon Bj-8b probably in Bed 8d; Horizon Bj-10, one of the most diversely fossiliferous horizons in the whole of the Bajocian Stage, in Bed 9; and Bj-11a in Bed 10. Discussion of these ammonite biohorizons and their contained species is given in Callomon and Chandler (1990).

The prevalence of limonite ooids, 'snuffboxes' (limonite concretions), limonite encrustation, thick-shelled bivalves and abundant ammonites in beds 1–10 suggests a very slow rate of deposition in a shallow shelf-sea, interspersed with erosional and non-depositional breaks, the causes of which were almost certainly predominantly tectonic with differential subsidence on a relatively local scale (Parsons, 1979; Callomon and Cope, 1995). At South Main Road Quarry, the upper surface of these lower 'iron-shot beds' is a prominent hard-ground overlain by a conglomerate (Bed 11), which indicate an erosional break, and then limestone strata (beds 12–13) of quite different aspect. On the eastern side of Dundry Hill, this erosion removed the underlying beds of the Inferior Oolite Group altogether, and cut down into the uppermost beds of the Lias Group. Maes Knoll, which is sited there, gives its name to the conglomerate (Buckman and Wilson, 1896; Buckman, 1902b; Richardson, 1907b). At the western end, it cuts down to the level of Bed 8b. The fuller succession in the central part of the hill, where Barns Batch Spinney and South Main Road Quarry are sited, is thought to have been preserved in a small local 'downwarp' (Parsons, 1979), as illustrated by Buckman (1902b, fig. 8). At Barns Batch Spinney, the conglomerate itself is absent (Figure 3.6).

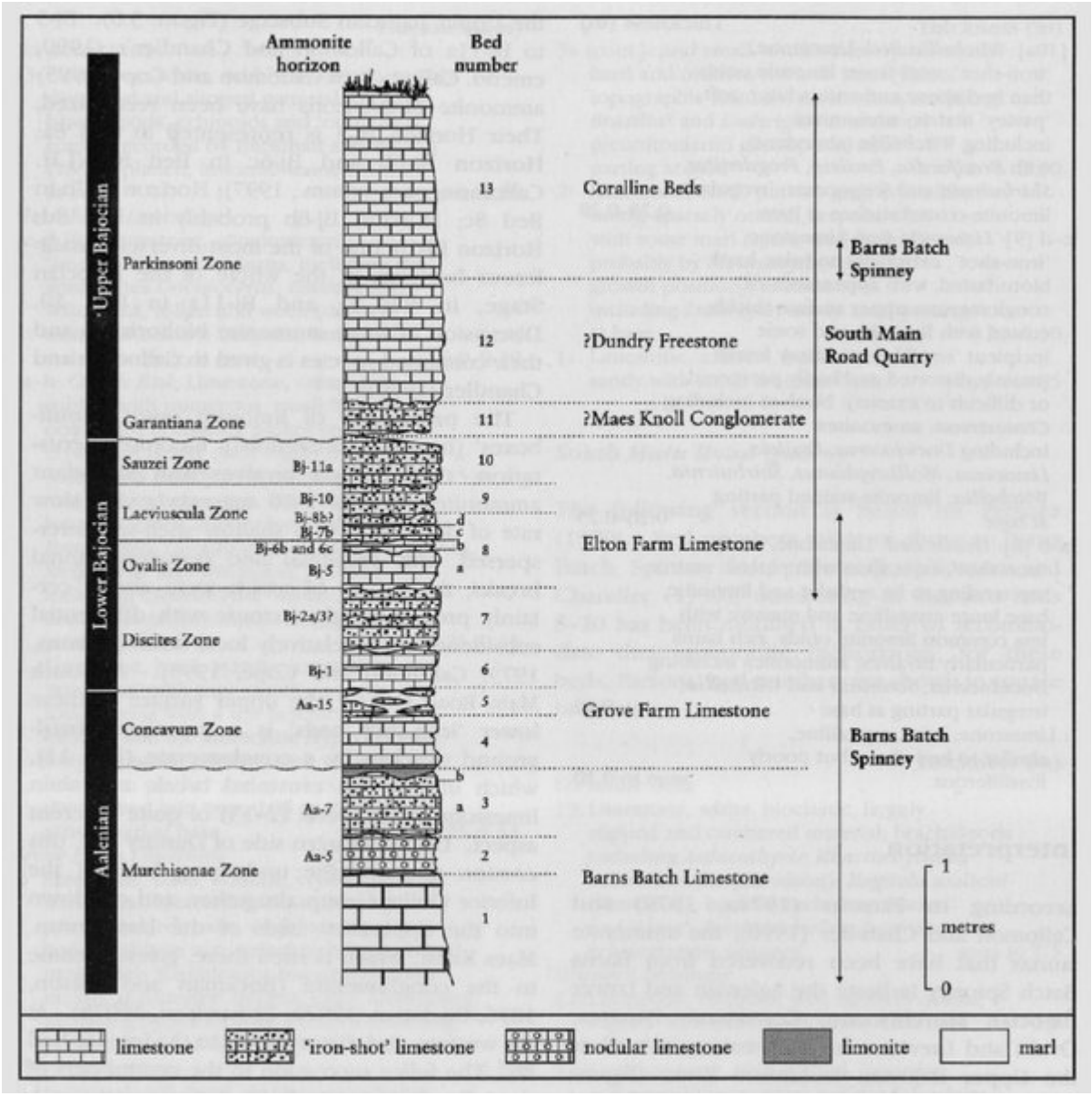
Conclusions

When d'Orbigny (1850a) first divided the Jurassic System into stages, he nominated Dundry as the English 'type section' for the Bajocian Stage (including Aalenian strata), and since then it has been a famous locality for Aalenian–Bajocian palaeontological and stratigraphical research, with the Inferior Oolite Group there having a reputation for being one of the world's most fossiliferous deposits. It is the type locality for many fossils, particularly ammonites and brachiopods, although published descriptions of the section are largely biased towards the former. The contrast between the lithologies of the lower 'iron-shot' beds (of Dorset and northern France aspect) and those of the highest beds (of Cotwolds aspect) is strong evidence for movements of the Mendip Axis during early Late Bajocian times at the time of the 'Bajocian denudation' of Buckman (1901). These sites are thus also important for palaeogeographical research.

References



(Figure 3.5) Geological sketch map showing the location of the GCR sites (1) Barns Batch Spinney and (2) South Main Road Quarry. The site of (3) the BGS Elton Farm Borehole is also shown. (After Ivimey-Cook, 1978, fig. 1; and Kellaway and Welch, 1993, fig. 45.))



(Figure 3.6) Composite graphic section of the two GCR sites at Dundry Hill. Beds 1–8b are based on Barns Batch Spinney, beds 8c-13 are based on South Main Road Quarry (After Callomon and Chandler, 1990, fig. 4.) Horizon numbers have been updated following Callomon in Callomon and Cope (1995). The thickness of Bed 10 is somewhat greater than that given by Parsons (1979). (MCG = Maes Knoll Conglomerate.))