Jackdaw Quarry, Gloucestershire

[SP 077 309]

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Introduction

The GCR site known as 'Jackdaw Quarry' is a disused quarry near Stanway, Gloucestershire, which provides a fine section through the upper part of the Birdlip Limestone Formation (Lower Inferior Oolite). The quarry was first described by Woodward (1894), when only the lower part of the succession was exposed, and higher beds in the Hornhill Quarry, a short distance to the north, were described by Buckman (1901); see also Richardson (1929h). Subsequent working extended the Jackdaw Quarry northwards, such that by 1972, the two quarries were conjoined. The quarry is now partly backfilled and landscaped, but excellent exposures remain in the northern face (Figure 3.55).

Description

The succession visible in 1972 was described by Parsons (1976b), and the following section is based on his account.

	Thickness (m)
Aston Limestone Formation	
Notgrove Member	
18: Limestone, hard, heavily bored, with numerous *Entolium demissum* (Phillips) (seen as rubble in field behind quarry)	
Gryphite Grit Member	
17: Limestone, brown, sandy, iron-stained, bioclastic, with numerous fossils (exposed as loose rubble at top of section)	
Lower Trigonia Grit Member	
16: Limestone, hard, white, iron-stained, burrowed, bioclastic, weathering to loose rubble, harder and more compact towards base; numerous burrowing bivalves including *Pholadomya lirata* (J. Sowerby), *Pleuromya uniformis* (J. Sowerby) and *Inoperna plicata* (J. Sowerby); *Graphoceras* (*G.*) sp., *Hyperlioceras* sp., *Euhoploceras* sp	0.45
15b: Limestone, brown, slightly 'iron-shot' limestone; flat top, softer towards base, grading into Bed 15a below; highly fossiliferous; *Hyperlioceras* aff. *subsectum* (*S.S.* Buckman)	0.25–0.30
15a: Limestone, yellow-brown, soft, marly, 'iron-shot'; many fossils, especially rolled and broken corals and belemnites; iron-stained, sandy limestone pebbles (derived from Bed 14) commonly thickly coated with limonite, serpulids and bryozoa; *Haplopleuroceras* cf. *mundum* S.S. Buckman, *Cladophyllia* sp., *Isastrea limitata* (Lamouroux), *Latomeandra gregaria* (McCoy), *Thamnasteria* sp., *Peronidella tenuis* Hinde, *Lopha marshi* (J. Sowerby)	0.10–0.30
Birdlip Limestone Formation	
Hanford Member	
'*Tilestone*'	

14: Limestone, brown, sandy, slightly 'iron-shot', especially towards top which has numerous small, rounded, commonly limonite-coated pebbles; flat, bored hardground upper surface	0.45–0.60
'*Snowshill Clay*'	
13: Clay, brown, very sandy, calcareous, abundant shell-debris; more indurated towards base; lowest 0.12 m locally a calcareous sandstone	0.26–0.43
12: Clay, blue, mottled with red limonite-rich bands; browner and sandier in upper part, with strongly limonite-stained top	0.40
11b: Clay, strongly limonitic	0.03
11a: Limestone, blue-hearted, bioclastic; browner and sandier towards limonite-stained top	0.23
10: Clay, grey, calcareous, interbedded with thin beds of shelly limestone	0.22
9: Clay, calcareous, limonitic	0.01–0.04
8: Clay, pale purple-grey With orange-coloured, limonitic streaks, tenacious, with much shell-debris towards base	0.26–0.33
'Harford Sand'	
7: Sand, orange-coloured, fine grained	0.18–0.20
6: Sand, grey-blue, fine grained; clayey, particularly near top but very sandy near base; intensely bioturbated with orange-coloured, coarse-grained sand in burrows piping into underlying bed; poorly preserved, internal casts of bivalves near top	0.56–0.71
'*Naunton Clay*'	
5: Clay, dark-grey, abundant squashed bivalves and lignite fragments	0.20
4c: Clay, dark-brown; small calcareous concretions at base	0.05–0.10
4b: Clay, yellow-brown, with numerous crushed oysters towards top; *Liostrea* sp.	0.20
4a: Clay, yellow-brown, laminated, sparsely sandy, numerous 'pseudo-ooliths', gradational base; poorly preserved bivalves including *Pinna cuneata* Phillips and *lucina*'cf. *bellona* (d'Orbigny)	0.23–0.25
Scottsquar Member	
3: Limestone, brown, blue-hearted, sandy, ooidal, in three courses separated by sandy marl partings; top packed with poorly preserved, crushed but articulated, bivalves; cf. *bellona*	1.0–1.16
2b: Limestone, yellow, finely laminated, argillaceous and micritic, and densely ooidal to coarsely sandy with layers of clay, ooidal marl and biosparite layers; becoming paler, off-white and sandier with sandy marl partings towards top; numerous limonite-coated surfaces, lenses of shell debris and micrite-filled burrows; *Homoeorhynchia* aff. *cynomorpha* (S.S. Buckman)	1.60–3.00
2a: Marl, limonitic	0.01–0.10
?Cleeve Cloud Member	
'*White Guiting Limestone*'	

1: Limestone, cross-bedded, ooidal with yellow ooids in blue-grey spar matrix limestone, well bedded, more massive in lower part; softer and more marly towards planar top with numerous burrows filled with soft micrite and faecal pellets, and numerous poorly preserved bivalves, brachiopods and rare nerineid gastropods; *Globirhynchia tatei* (Davidson), *Plectothyris fimbria* (J.Sowerby), *Bactroptyxis* aff. *bacillus* (d'Orbigny)	seen to 9.0

The section now (1999) visible in the northern face is much as described by Parsons (1976b), with beds 1 to 14 being seen in one, more-or-less continuous, exposure. The general nature of higher beds can be made out from sporadic exposures in Hornhill Quarry immediately to the north of the face, which, however, is now largely backfilled and planted with trees.

Interpretation

In the southern part of the quarry, isolated exposures of massive, yellowish-brown oolite represent the so-called 'Yellow Guiting [Lime]stone' (Richardson, 1929b), named the 'Jackdaw Quarry Oolite' by Mudge (1978a,b), with this site as its type section. This unit has been claimed to be an atypical development of the Pea Grit and Lower Limestone (Crickley Member) of the Cheltenham area (see Crickley Hill and Leckhampton Hill GCR site reports, this volume) (Richardson (1904, 1929b), which has led to the use of the confusing and unsatisfactory terms 'Pea Grit Equivalent' or 'Pea Grit Series' (e.g. Richardson, 1929b; Arkell, 1933). However, this supposed correlation is not well substantiated. Although it is likely that the Crickley Member passes into the lower part of the Yellow Guiting Stone, it is possible that the former is cut out by a non-sequence beneath the latter as the Vale of Moreton Axis is approached (Sumbler *et al.,* 2000). Irrespective of lateral correlation, the Yellow Guiting Stone is now assigned to the Cleeve Cloud Member (the former Lower Freestone) on the basis of its lithology and overall stratigraphical position (Barron *et al.,* 1997).

The lowest beds now seen in continuous section (Bed 1) comprise Richardson's (1929b) White Guiting [Lime] stone. This was assigned to the Devil's Chimney Oolite by Mudge (1978a,b) and is now regarded as the upper part of the Cleeve Cloud Member. Again, however, the correlation of the White Guiting [Lime] stone is somewhat uncertain, but the possibility that it should be included in the succeeding Scottsquar Member, suggested by the presence of the brachiopod *Plectothyris fimbria,* was rejected by Parsons (1976b) because of relationships observed in the nearby ARC Guiting Quarry (SP 79 302).

As described by Parsons (1976b), the character of the Scottsquar Member (beds 2a and 2b) change somewhat across the quarry face, the beds on the west being described as thicker-bedded and 'more oolitic'. In general, this member is characterized by rapid lateral facies changes, and the previous separation into Oolite Marl (low-energy marls and carbonate mudstones) and Upper Freestone (high-energy peloidal and ooidal grainstones) was somewhat arbitrary as recognized by Buckman (1895). For this reason, the two divisions are now combined into a single member (Mudge, 1978a,b; Baker, 1981; Barron *et al.,* 1997). Bed 2 is not well exposed, but the lower part includes somewhat sandy marls with lenses of carbonate mudstone, and the upper part includes well-bedded oolite. The succeeding Bed 3 is herein included with the Scottsquar Member on lithological grounds, but Parsons (1976b) grouped it with the overlying beds (now Harford Member) presumably because of the similarity of the fauna to that from Bed 4a, and the gradational contact between the two.

Jackdaw Quarry shows a complete section through the Harford Member (compare Harford Cutting; see GCR site report, this volume), the youngest part of the Birdlip Limestone Formation. At this locality, the member is *c.* 2.8 m thick (beds 4a to 14). It comprises the 'Naunton Clay', 'Harford Sand', 'Snowshill Clay' and 'Tilestone' of Buckman (1890, 1897, 1901) and Richardson (1929b) but, as discussed by Parsons (1976b), these subdivisions are of limited value. As in the Scottsquar Member, there are rapid lateral facies variations, as is apparent from the very different succession exposed in the Guiting Quarry (Mudge, 1995) and, for this reason, the strata are now combined into a single member (Mudge, 1978a,b; Barron *et al.,* 1997). Except for the so-called l'ilestone' at the top, the succession is dominated by clays and sandy clays with oysters, *Lucina* and *Pinna,* and Parsons (1976b) also recorded lignite layers. The facies is similar to —

albeit more 'marine' than — the broadly equivalent Grantham Formation of the East Midlands, and was probably laid down in a shallow water, coastal environment. It has yielded no ammonites, but is thought to belong mainly to the Concavum Zone (Aalenian); Parsons (1976b) showed that Buckman's (1901) record of *Graphoceras* from the 'Snowshill Clay' at Stanway in fact came from the succeeding Lower Trigonia Grit Member. The 'Tilestone' is of more fully marine aspect, and has yielded ammonites (see Harford Cutting GCR site report, this volume). It is capped by a bored hardground, representing the Aalenian denudation' of Buckman (1901). Lithologically, it is rather similar to the succeeding Lower Trigonia Grit Member, although at other localities it is of an entirely different facies.

The Lower Trigonia Grit Member, the basal unit of the Aston Limestone Formation (Middle Inferior Oolite; see Harford Cutting GCR site report, this volume), is not now well exposed. The basal bed (15a) is conglomeratic and contains abundant ferruginous peloids (Iron-shoe). Parsons (1976b) also recorded a number of concentric limonite concretions ('snuffboxes'; probably oxidized siderite nodules) such as typify the condensed Inferior Oolite succession in Dorset. He suggested that these features related to the proximity of the positive 'Moreton Swell', i.e. the Vale of Moreton Axis. *Haplopleuroceras* recorded from this bed indicates the Lower Bajocian Discites Zone.

Conclusions

Jackdaw Quarry is particularly important in exhibiting a complete section through the Harford Member, the topmost unit of the Birdlip Limestone Formation, and is designated a primary reference section for that member (Barron *et al.,* 1997). This member comprises the units formerly known as the 'Naunton Clay', Ilarford Sand', 'Snowshill Clay' and 'Tilestone' of the Lower Inferior Oolite.

References

(Figure 3.55) Exposure at Jackdaw Quarry showing 'White Guiting Limestone' in the lower face overlain by Scottsquar Member and the Harford Member. The Lower Trigonia Grit Member is just visible at the top of the section in the middle. (Photo: M.G. Sumbler.))