Minchinhampton, Gloucestershire

[SO 856 017]

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Introduction

The common at Minchinhampton, near Stroud, Gloucerstershire, is a steep-sided plateau area of high open grassland, owned by the National Trust. Bathonian limestones were once extensively quarried here for building materials, and during the 19th century numerous quarries became celebrated fossil-collecting sites. In particular, the locality features prominently in the monographs of Morris and Lycett (1851–1855) and Lycett (1863) who described many new species of bivalves and gastropods from the Great Oolite Group hereabouts; this work was subsequently revised by Cox and Arkell (1948–1950).

Since the late 19th century, almost all of the limestone quarries on the common at Minchinhampton have been abandoned and infilled. Now, much of the area, with its hummocks and hollows, is used as a golf course. The GCR site at Gate Quarry (Figure 3.25) was never infilled, but lacked any exposure until excavations in 1984 produced two new faces, on the north-eastern and south-western sides of the quarry. It is believed to be the quarry described by Lycett (1848, 1857) and Morris and Lycett (1851–1855); it was also later referred to by Witchell (1882a) and Woodward (1894). In modern times, the section was cited by Arkell and Donovan (1952), when the quarry was still being worked. More recently, Wyatt (1996a) has re-assessed the stratigraphical relationships of the Bathonian succession, as originally exposed in the quarry.

Description

The south-west face exposes *c.* 1.8 m of massively bedded, fine- to medium-grained, ooidal and peloidal packstones with some more marly, shelly and rubbly beds, overlain by *c.* 2.5 m of medium-grained, white to pale-buff, well-sorted, ooidal and shell-fragmental grainstone in one large co-set. Brachiopods, crustacean remains and small oysters were noted by R. Cottle in 1992 (unpublished English Nature records).

The north-east face exposes *c.* 2 m of coarse-grained, shelly, shell-fragmental and ooidal grainstone with large-scale cross-bedding, overlain by *c.* 2 m of less massive, flaggy, medium-grained, white to pale-buff, cross-bedded, ooidal grainstone with some very shelly layers on fore-sets including, in particular, small bivalves and shell debris.

Interpretation

The stratigraphical position of the exposed limestones is not self-evident from the lithologies, which represent recurring facies of the Great Oolite Group. The large number of small bivalves is, likewise, not diagnostic, but could suggest that the shelly strata are the beds known by the old quarrymen as the 'Planking', from which some believe most of Morris and Lycett's (1851–1855; Lycett, 1863) molluscan fauna came. However, the most reliable means of identifying the stratigraphical position is by comparison with the section recorded by Woodward (1894) in the former Crane Quarry, about 150 m to the south-east of the present site, which was infilled and levelled by 1955. The top part of the section there, quoted by Channon (1950), exposed the lower part of what is now known as the Athelstan Oolite Formation', comprising 'The Scroff ' (0.45–0.58 m thick), overlain by 2.5 m of cross-bedded 'Planking', 0.30 m of hard, smooth limestone and 1.8 m of 'Dry Wall-Stone' and rubble. In previous descriptions of the succession here (e.g. Arkell and Donovan, 1952), the 'Planking' was described as massive, brownish, shell-fragmental, ooidal, cross-bedded limestone with the gastropod *Purpuroidea* at its base. The shelly limestones of the 'Planking' in nearby Simmond's Quarry [SO 862 015] (Channon, 1950) intimated that the corresponding beds in Crane Quarry probably contained an abundance of bivalves and gastropods. The limestones in Gate Quarry are manifestly more-or-less equivalent to the 'Planking' of the

former Crane Quarry and are therefore inferred to be that unit although higher beds of the Athelstan Oolite Formation (undifferentiated) may also be present above.

The coarsely shell-fragmental, ooidal, cross-bedded limestones of the Athelstan Oolite Formation were deposited as mobile, carbonate sand-shoals that formed part of a barrier-bar complex at the margin of an extensive shallow lagoon to the east. Deposition occurred in high-energy, shallow-water conditions characterized by strong currents. However, the presence of numerous gastropods and bivalves, and sporadic brachiopods, corals and crustaceans in the 'Planking', suggests a measure of substrate stabilization at times, associated with a reduction in both sedimentation rate and turbulence.

Although Arkell and Donovan (1952) suggested that the biostratigraphically significant ammonites collected by Morris and Lycett (1851–1855; Lycett, 1863) came from the 'Planking', others (Cave, 1977; Torrens, 1980b; Wyatt, 1996a) claimed that this was unlikely and that they came from a lower stratigraphical level (the 'Minchinhampton Shelly Beds and Weatherstones', otherwise known as the 'Minchinhampton Beds'), not exposed in Gate Quarry. Consequently, these latter authors assigned the Minchinhampton Beds to the Middle Bathonian Subcontractus and Morrisi zones because Morris and Lycett's ammonite fauna included the type specimens of the index species of these zones. However, according to Sumbler (1999), the lectotype of *Tulites subcontractus* (Morris and Lycett) (BGS specimen No. GSM25610) is preserved in white, coarse-grained, shelly ooidal grainstone that can be matched lithologically with the Minchinhampton Beds, whilst the holotype of *Morrisiceras morrisi* (Oppel) (BGS specimen No. GSM25617) is preserved in a brownish micro-oolite that closely matches the succeeding Dodington Ash Rock Memer of Wyatt (1996a). Thus, it seems likely that the Minchinhampton Beds belong, at least in part, to the Subcontractus Zone, but there is no reason to suppose that they extend up into the Morrisi Zone. Farther east, the Subcontractus Zone is indicated by ammonites in the basal part of the White Limestone Formation (Shipton Member).

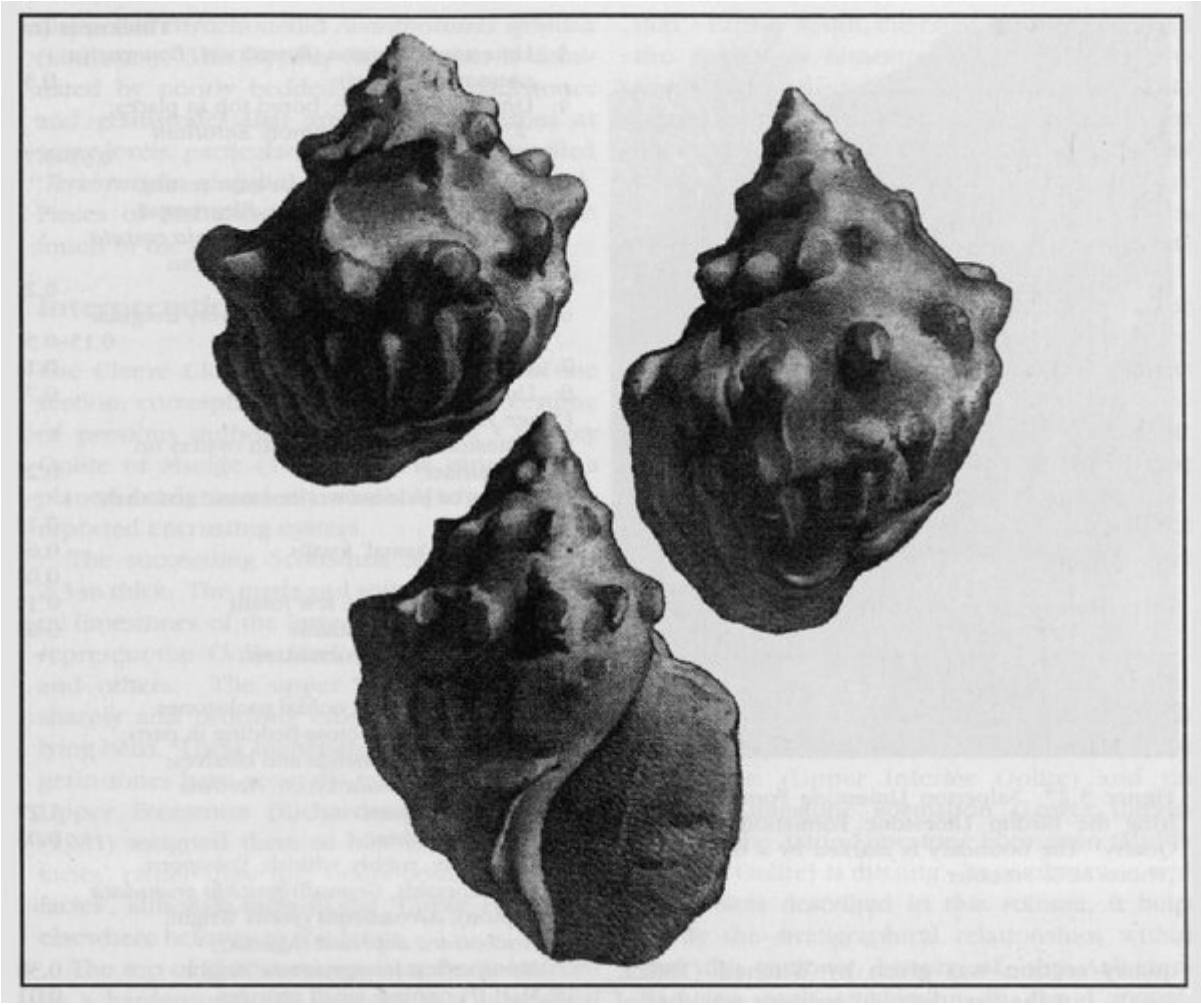
The diverse gastropod fauna of the 'Planking' is unique within the British Bathonian Stage (Barker, 1976), although it has little biostratigraphical significance. It includes the thick-shelled *Purpuroidea* (Figure 3.26), which, at Minchinhampton, is found only in and above the 'Planking'. According to Barker (1976), this genus is known in Bathonian strata at only one other place, near Burford, in the strongly current-bedded shelly oolites (White Limestone Formation, Ardley Member) above the Excavata Bed.

Conclusions

The common at Minchinhampton is an important Bathonian locality, where complex vertical and lateral facies changes have long hindered interpretation of the local stratigraphy. Although at one time peppered with quarries, no major sections remain and the GCR site at Gate Quarry exposes only a small part of the Bathonian succession once more visible hereabouts. It is, nonetheless, representative of the extensively worked limestones of the Great Oolite Group, Athelstan Oolite Formation, at Minchinhampton, and features the 'Planking', which is the source of a diverse Bathonian bivalve and gastopod fauna. Although the stratigraphical relationships within the Minchinhampton succession and its correlation with adjacent districts have recently been clarified (Wyatt, 1996a; Sumbler, 1999), local problems of correlation still exist and exposures, such as those at Gate Quarry, are important in elucidating the stratigraphy.

References

(Figure 3.25) General view of Gate Quarry, Minchinhampton, looking north. (Photo: M.G. Sumbler.))



(Figure 3.26) Purpuroidea lycettea Hudleston and Wilson. (Reproduced from Morris and Lycett, 1851, pl. 5, figs 1–2.) Approximately natural size.)