Babylon Hill, Dorset

[ST 578 155]–[ST 584 161]

Introduction

The Babylon Hill GCR site comprises three roadside exposures, two of which, Underdown Hollow [ST 578 156] and Bradford Hollow [ST 577 155] (Figure 2.24) on the escarpment of Babylon Hill, are found in sunken lanes, a common feature of the Yeovil area caused by centuries of erosion on unmetalled roads. The third exposure is a more recently exposed section on the south side of the A30 Sherborne Road [ST 583 161], as it ascends the scarp. These roadside exposures represent the most extensive inland section in the Wessex Basin of the Bridport Sand Formation (= 'Yeovil Sands' of earlier authors). The Babylon Hill GCR site yields a sequence of stratigraphically important Upper Toarcian ammonite faunas in the type area of the Yeovilian Substage of the Toarcian Stage.

Little detailed information has been published on the Bridport Sand Formation succession at Babylon Hill. James Buckman (1874) provided a descriptive summary and a sketch through the formation, and his son, S.S. Buckman, reproduced this section and combined it with that of the Inferior Oolite Group exposed in a nearby quarry at Bradford Abbas (Buckman, 1887–1907). The stratigraphy at Babylon Hill was discussed briefly by Kellaway and Wilson (1941a), Wilson *et al.* (1958) and Hemingway *et al.* (1969). The most recent account, by Torrens (1969), was based on sections measured and ammonites collected by Mr Hugh Prudden.

Description

Exposures of the Bridport Sand Formation occur in three areas along the scarp of Babylon Hill, all of which are part of the GCR site. At the western end of the scarp an unmetalled trackway, Bradford Hollow (centred on [ST 577 155]), exposes more than 30 m of the formation in faces up to 8 m high ((Figure 2.25); Wilson *et al.,* 1958, pl. IV). To the east the formation is exposed, in faces up to 5 m high, along a minor metalled road at Underdown Hollow (centred on [ST 578 156]). A third area of exposures, on the south side of the A30 Sherborne Road (centred on [ST 583 161]) was created during construction of the dual carriageway along this section of road (Figure 2.24) and (Figure 2.26).

Wilson *et al.* (1958) suggested a total thickness of about 60 m (200 ft) for the Bridport Sand Formation in the Yeovil district. James Buckman (1874) logged about 30 m (100 ft) of the succession, comprising 'fine yellow sands' with at least ten 'bands of stone', in either Bradford Hollow or Underdown Hollow but neither he nor S.S. Buckman, who subsequently reproduced the section (Buckman, 1887–1907), specified which. In the latter work Buckman (1887–1907) indicated that only about an additional 3 m (10 ft) of the Bridport Sand Formation lay above the highest unit recorded by his father (Buckman, 1874), with the formation being capped by a 'hard, blue centred stone' known as the 'Dew Bed' that was exposed in quarries at Bradford Abbas and Halfway House (Figure 2.24).

James Buckman (1874) noted that some of the indurated bands within the sands were richly fossiliferous, although well-preserved fossils were rare. Wilson *et al.* (1958) recorded *Dumortieria falcofila* and *D. tabulata,* together with the bivalves *Grammatodon* and *Cucullaea,* from a 'roadside on Babylon Hill', probably the old route of the A30. Mr Hugh Prudden logged about 20 m of the upper part of the Bridport Sand Formation at the GCR site on the south side of the A30 (Torrens, 1969) (Figure 2.26). The succession is dominated by poorly cemented sands with irregular bands or doggers of well-cemented sandstone, and a thin bed of shelly calcareous shale near the top of the section (Bed U14). Although planar bedding was noted in beds L2 and U15, few sedimentary structures were observed. Prudden recorded loose specimens of *Pleydellia* cf. *fluens* from this horizon or from Bed U12, and in-situ *Pleydellia* cf. *aalensis* grp. and *Pleydellia* sp. from Bed U12, indicating the presence of the late Toarcian Aalensis Zone, and also reported unidentified ammonites from Bed U10. Numerous ammonites from the sandstone of Bed L8 were mostly *Dumortierta pseudoradiosa* and *D. costula,* with rarer *Dumortieria moorei.* This assemblage is indicative of the Pseudoradiosa Zone and Subzone. Prudden (pers. comm.) has also found crustacean fragments associated with large burrow systems in the uppermost row of sandstone doggers at Bradford Hollow.

Interpretation

Although probably up to 60 m thick at Babylon Hill, the Bridport Sand Formation in the Yeovil area encompasses at most only part of three late Toarcian ammonite zones. The underlying Barrington Limestone Member of the Beacon Limestone Formation, as seen at the Hurcott Lane Cutting GCR site, spans the remainder of the Toarcian Stage. At Barrington, near Ilminster, 1.5 km north of the Hurcott Lane Cutting GCR site (Figure 2.21) and some 20 km to the west of Babylon Hill, the lowest 1.8 m of the Bridport Sand Formation has yielded *Phlyseogrammoceras dispansum,* indicating that the lowest part of the formation is of Dispansum Zone age, with indeterminate *?Dumortieria* suggesting that succeeding strata in the lower part of the formation lie within the lower part of the Pseudoradiosa Zone (Howarth, 1992).

At Babylon Hill only the upper part of the Bridport Sand Formation is well exposed. James Buckman (1874) considered the sands there to correlate with the Ham Hill Limestone Member and with the lower part of the Inferior Oolite Group in the Cotswolds, although Wright (1856) had already contested that the sands were part of the Lias. The latter view has long since been firmly established. The preponderance of coarsely ribbed species of *Dumortieria* ammonite faunas collected by Prudden (in Torrens, 1969) from the lower part of the succession at Babylon Hill suggests a position low in the Pseudoradiosa Subzone. In general, coarse-ribbed species of *Dumortieria* characteristic of the Levesquei Subzone are superseded by fine-ribbed species typical of the Pseudoradiosa Subzone but Prudden (1966) noted the difficulty of distinguishing Pseudoradiosa and Levesquei subzone faunas without adequate sample sizes.

Prudden's record of *Pleydellia* from the upper part of the succession establishes that at least the upper 3 m of the Bridport Sand Formation at Babylon Hill lies within the Aalensis Zone. Wilson *et al.* (1958) and White (1923) also cited evidence of an Aalensis Zone age for the uppermost few metres of the Bridport Sand Formation in the Yeovil area. This appears to conflict with earlier records of *Dumortieria moorei* from the Dew Bed, an important marker bed that caps the Bridport Sand Formation in the Yeovil area (Buckman, 1887–1907; Richardson, 1930). Gabilly (1976) has reported the co-occurrence of *Dumortieria moorei* with species of *Pleydellia* of the Aalensis Zone but these records from the Dew Bed cannot easily be resolved without re-examination of the material, which may have been mis-identified or reworked from older strata. However, they are more in support of an Aalenian Stage Scissum Zone age for the Dew Bed, as proposed by Chandler and Sole (1996), rather than a Pseudoradiosa Subzone age suggested by Wilson *et al.* (1958) and Callomon and Cope (1995).

Identifying the ages of the base and top of the Bridport Sand Formation in the Yeovil area has demonstrated the diachroneity of the formation along its outcrop (Buckman, 1889). At the Coaley Wood GCR site in the mid-Cotswolds the base of the formation lies in the upper part of the Bifrons Zone and the condensed carbonate-dominated facies of the Cotswold Cephalopod Bed Member commences in the lower part of the Thouarsense Zone. In the Yeovil area the formation spans the interval from the uppermost Dispansum Zone to the Aalensis Zone, while at the East Cliff and Cliff Hill Road Section GCR sites on the Dorset coast it extends from the lower part of the Pseudoradiosa Zone to the top of the Aalensis Zone.

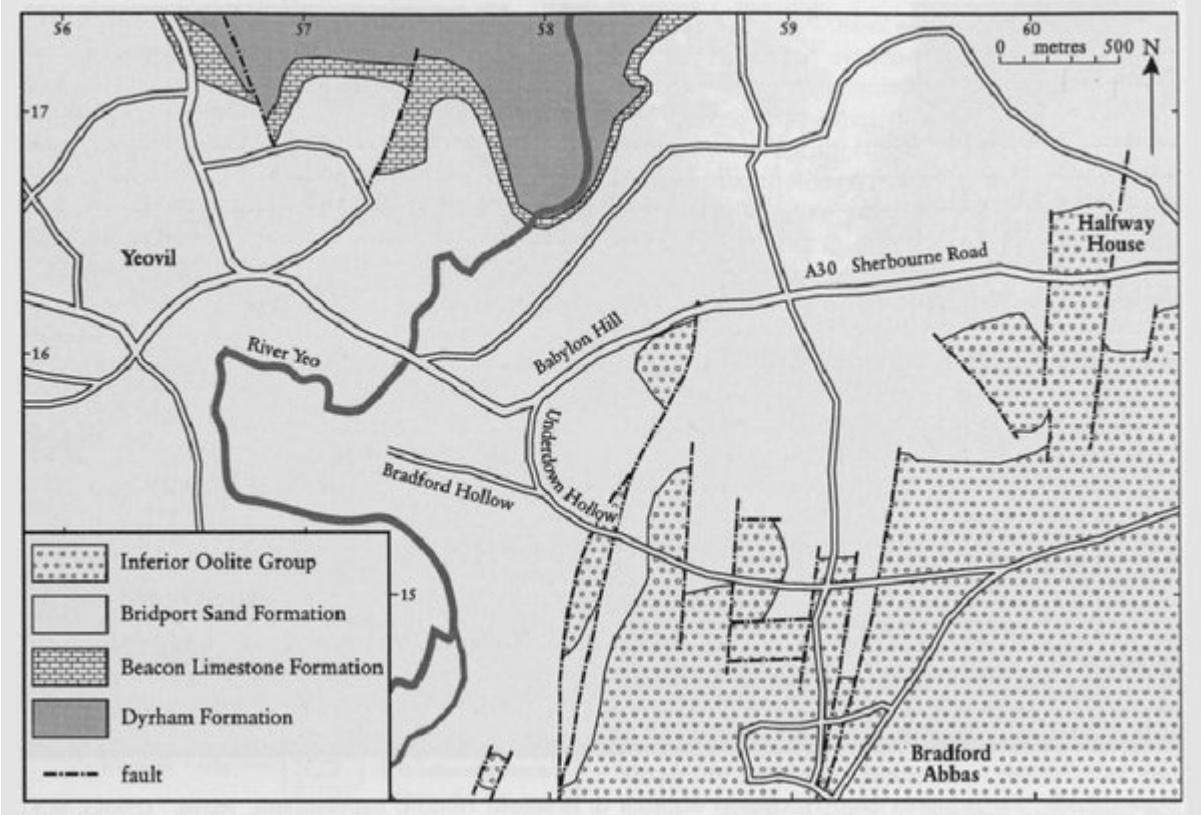
In the Yeovil area the contrast in thickness of the Bridport Sand Formation with contiguous sequences above and below, in thickness, duration and facies is striking, though comparable to that of the Dorset coast. The condensed carbonate-dominated facies of the Barrington Limestone Member of the Beacon Limestone Formation encompasses most of the Toarcian Stage in a sequence that in the Yeovil area may be reduced locally to less than 3 m (Wilson *et al.,* 1958). The overlying clastic-dominated Bridport Sand Formation spans barely more than two ammonite zones yet is about 60 m thick. The condensed, carbonate-dominated, Inferior Oolite Group that succeeds it represents the combined Aalenian and Bajocian stages yet barely exceeds 4 m in thickness (Cope *et al.,* 1980b). In the correlative succession in the Severn Basin the Bridport Sand Formation is underlain by thick mudstones and overlain by an equally thick carbonate-dominated succession. The only condensed part of the sequence in the Severn Basin is the late Toarcian Cotswold Cephalopod Bed Member, as seen at the Wotton Hill, Coaley Wood and Haresfield Hill GCR sites. This can be correlated with the upper part of the Bridport Sand Formation at Babylon Hill. The lack of correspondence between the ages of the condensed units in the Wessex and Severn basins probably reflects differences in local tectonism that caused lower subsidence rates in parts of the Wessex Basin through much of the Toarcian to Bajocian interval.

In contrast, the similarity in facies and thickness of the Bridport Sand Formation across the Dorset, central Somerset and Severn basins suggests that the controlling factor in its development was sediment supply. A eustatic fall in sea level in late Toarcian times (Hesselbo and Jenkyns, 1998) may have increased the sediment supply from adjacent land areas. Boswell (1924) noted that the heavy-mineral assemblages in the Bridport Sand Formation were similar to those of Armorican metamorphic rocks of Brittany, which he considered to be a likely source. Davies (1969) used this evidence to suggest that sediment derived from these rocks was carried north-eastwards by longshore currents to form sand-bars. Other possible sources of sediment include the reworking of existing Toarcian sediments, which is known to have occurred from Oxfordshire to Yorkshire prior to the Aalenian Age (Bradshaw *et al.* 1992), or erosion of Palaeozoic rocks on the London Platform.

Conclusions

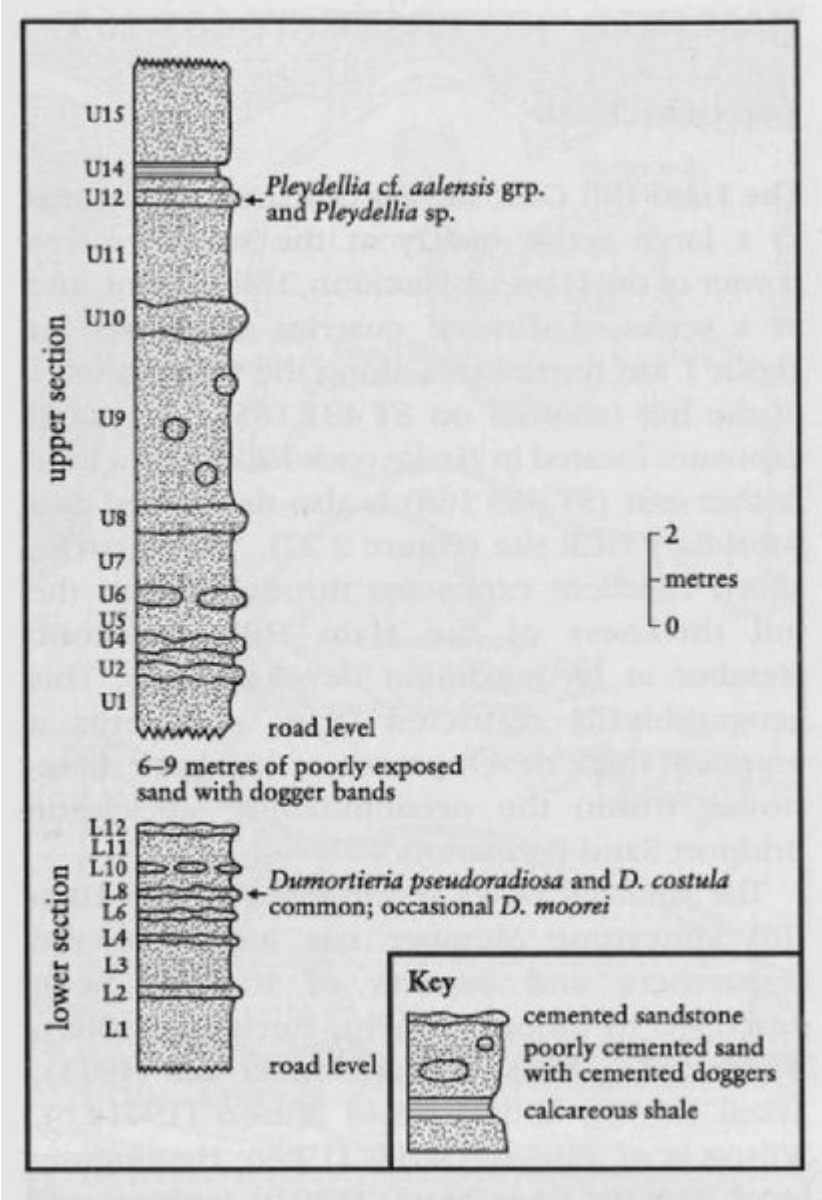
The sections around Babylon Hill expose the best-documented inland succession through the Bridport Sand Formation. Its location between correlative GCR sites on the Dorset coast, around Burton Bradstock, and on the Cotswold scarp, around Wotton-under-Edge, is important for demonstrating the diachronous nature of the formation. Along with the strikingly different facies developed at the Ham Hill GCR site, these sections provide essential comparative data for interpreting the history of this part of the Wessex Basin during late Toarcian times.

References

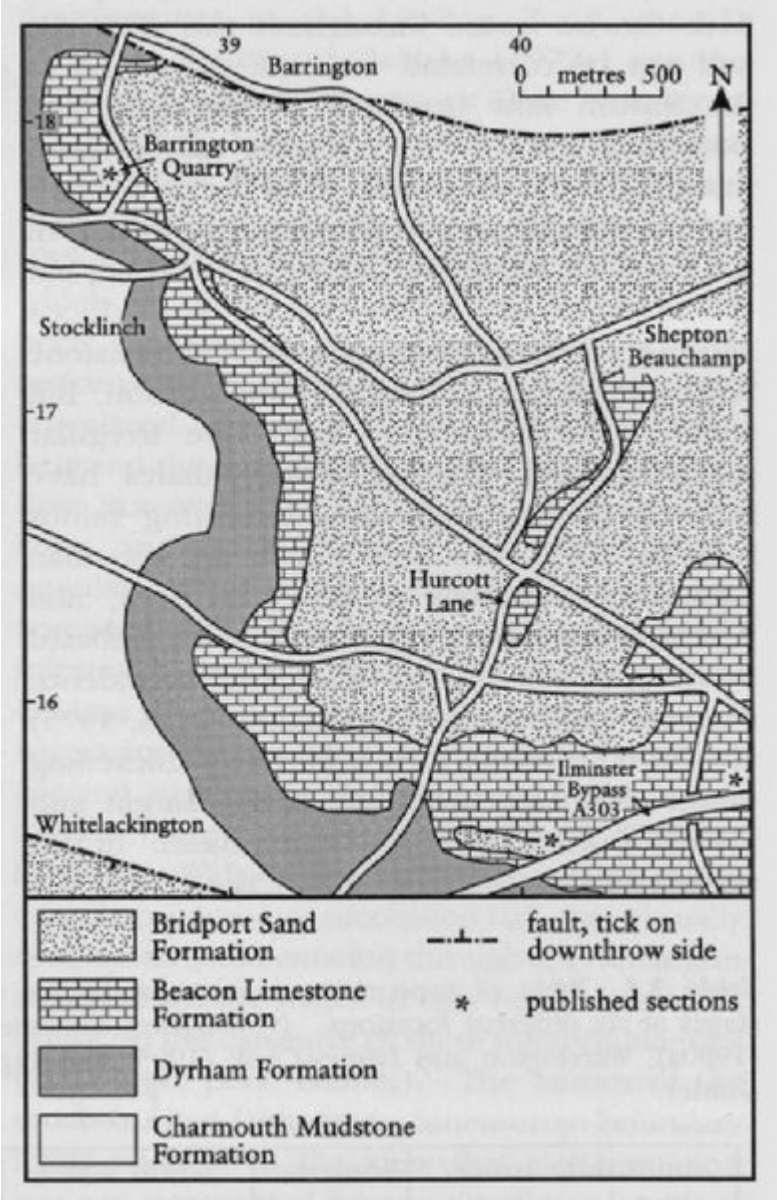


(Figure 2.24) Geological map of the Babylon Hill area.

(Figure 2.25) The Bridport Sand Formation exposed in Bradford Hollow, Babylon Hill, Yeovil. (Photo: M.J. Simms.)



(Figure 2.26) Sections through the Bridport Sand Formation on the south side of the A30 Sherborne Road (centred on [ST 583 161]) at Babylon Hill, Yeovil. After Prudden in Torrens (1969b).



(Figure 2.21) Geological map of the area around the Hurcott Lane Cutting GCR site showing the location of other published sections through the Beacon Limestone Formation.