Viaduct Quarry, Somerset

[ST 621 443]

Introduction

The Viaduct Quarry GCR site is a disused quarry that lies 50 m east of the abandoned railway viaduct where it crosses the Shepton Mallet–Downside road, on the northern outskirts of Shepton Mallet (Figure 3.9). This site provides the best-exposed and thickest section seen in the Downside Stone marginal facies of the Mendip region. A succession of coarsely bioclastic, and often conglomeratic, limestones contrasts markedly with the contemporaneous mudstone-dominated 'offshore' facies which is developed away from the Palaeozoic outcrop. Only a few brief descriptions of this or nearby exposures, such as Beacon Farm [ST 635 448] or road cuttings to the north of Shepton Mallet, which exposed very similar successions, have been published (Moore, 1867a; Woodward, 1893; Richardson, 1909; Reynolds, 1912, 1921; Donovan, 1958a; Green and Welch, 1965; Savage, 1977; Copp in Duff *et al.,* 1985).

Description

The vertical face of Viaduct Quarry (Figure 3.10) exposes about 9 m of Downside Stone, a series of coarsely bioclastic limestones which represent the marginal facies of the Lower Lias in this area. The strata here dip gently southwards such that the lowest beds, estimated to lie about 4.5 m above the base, are exposed at the northern end of the quarry. The contact with the underlying Carboniferous Limestone was exposed in the roadside just to the south of the quarry (see (Figure 3.9)), where the unconformity surface was overlain by a 0.3 m-thick conglomerate of Carboniferous Limestone and chert fragments (De la Beche, 1846; Moore, 1867a; Reynolds, 1921; Green and Welch, 1965). The matrix contained vertebrate debris, quartz pebbles and the bivalve *Rhaetavicula contorta,* indicative of the (Upper Triassic) Penarth Group.

Bedding planes within the marginal facies generally are indistinct but the quarry face can be divided roughly into three main units, each about 3 m thick. The lower two units, rather massive and sandy-textured, are divided by a conspicuous notch at the level of a thin conglomerate. The upper third of the face is more thinly bedded, on a 0.1–0.3 m scale, and somewhat ferruginous (Figure 3.11).

The lowest bed exposed is a compact, pale-brown, sandy-textured bioclastic limestone with a gently undulating top penetrated by scattered, indistinct borings. It is sharply demarcated from a thin breccio-conglomerate of small chert clasts immediately above, which is succeeded by a 0.15 m-thick shell coquina with scattered chert pebbles. A further 3 m of sandy-textured bioclastic limestone is broken by three or four bedding planes and by thin shell-beds or coquinas up to 0.2 m thick. Some of these bedding planes are penetrated by *Trypanites* borings; one occurs 1.6 m above the previous bored surface, but has proven difficult to trace into the southern part of the quarry, while another lies 1.6 m higher immediately beneath another conglomerate band. Some of the *Trypanites* borings are filled with small quartz and chert pebbles.

The highest conglomerate, termed the 'Main Pebble Bed' can be traced throughout the quarry and was mentioned specifically by Woodward (1893), Donovan (1958a) and Copp (in Duff *et al.,* 1985). At the south end of the quarry it forms a poorly sorted, clast-supported conglomerate up to 0.25 m thick showing crude stratification and with a fairly sharp top and base. Most clasts are of angular to subrounded chert fragments, up to 8 cm across and often highly fractured, but poorly to well-rounded quartz pebbles are also common. The Main Pebble Bed thins dramatically towards the north end of the quarry, where it consists of a 2–3 cm thick band of scattered pebbles in a poorly sorted matrix. At the south end of the quarry several cross-bedded units, each 0.15–0.25 m thick and with foresets dipping mostly to the south, occur above and below the Main Pebble Bed and are associated with shell beds containing scattered intact bivalve moulds. The cross-bedded units cannot be identified in the central and northern parts of the quarry, where the Main Pebble Bed is succeeded by a particularly massive limestone bed about 1.5 m thick. Above are four to five thinner beds, each 0.3–0.5 m thick, passing up into still more thinly bedded limestones, each 0.1–0.3 m thick, which comprise the top third of the quarry face.

Comminuted bioclastic debris forms a significant component of the Downside Stone but intact material occurs more sparsely. Fossils tend to occur concentrated into thin shell-bands or 'coquinas', sometimes containing scattered pebbles, but the shells are usually disarticulated and broken. The tops of these shelly layers often show traces of boring; Moore (1867a) noted that some of the chert pebbles were encrusted with the bivalve *Atreta intusstriata.* In the intervening beds the shells are still articulated. The fauna is dominated by bivalves, typically epifaunal taxa, but also includes gastropods and montlivaltiid corals (Moore, 1867a; Copp in Duff *et al.,* 1985). At this site, as elsewhere in the Downside Stone, many of the fossils are preserved as moulds. Only those with originally calcitic shells, such as *Ctenostreon tuberculatus* and *Liostrea laevis,* have survived dissolution. *Pseudopecten* and *Plagiostoma* are the main taxa, with *Liostrea* also present in the lower beds. Ammonites are rare in the Downside Stone but several taxa have been found at this site. Specimens of *Alsatites* and *Waehneroceras* are thought to be from the Main Pebble Bed, from which Copp (in Duff *et al.,* 1985) also recorded *Schlotheimia. Caloceras* occurs below this while a large *Coroniceras rotiforme* has been found loose in quarry debris (N. Morton, pers. comm.). This establishes that the exposed section encompasses at least the Johnstoni and Portlocki subzones near the base of the Hettangian Stage, the Angulata Zone at the top of the Hettangian Stage, and the Rotiforme Subzone low in the succeeding Sinemurian Stage.

Interpretation

The section exposed at Viaduct Quarry complements that seen in the nearby Hobbs Quarry GCR site and also makes an interesting comparison with the Lower Lias marginal facies exposed far more extensively on the south Wales coast at the Pant y Slade to Witches Point GCR site. Although the contact with the underlying Carboniferous Limestone (well exposed at the nearby Hobbs Quarry GCR site) is no longer exposed in the vicinity of Viaduct Quarry, the presence of pebbles of Carboniferous Limestone, chert and quartz up to 8 m above the junction indicate continued erosion of the nearby Palaeozoic outcrop during early Jurassic times. A similar conglomeratic unit was described by Donovan (1958a) from Beacon Farm Quarry [ST 635 448], just over 1 km to the north-east, and was correlated by him with the Main Pebble Bed at Viaduct Quarry. This would imply that a fairly widespread event transported pebbles from the Palaeozoic outcrop and into the early Jurassic marginal deposits. The limestone and chert clasts were derived from the Carboniferous Limestone while the quartz pebbles were considered by Woodward (1893) to originate in the Old Red Sandstone, which today crops out about 2 km to the north, demonstrating that the Carboniferous Limestone across the anticline crest had already been breached by Early Jurassic times. Similar discrete layers of limestone and chert pebbles also occur some distance above the base of the marginal facies of the Lower Lias at the Pant y Slade to Witches Point GCR site. The presence of pebbles and the greater disarticulation and fragmentation of fossil material in the shell beds when compared with the intervening sediments suggests occasional brief periods of increased turbulence or current activity, perhaps associated with storms. The presence of bored surfaces beneath the conglomerates, and also at the top of some of the shelly units, demonstrates sufficiently long pauses in sedimentation for hardgrounds to develop although some of these hardgrounds appear to of very local extent. Records of both Liasicus- and Angulata-zone ammonites associated with the main hardground and conglomerate unit suggest that this hiatus may encompass at least the upper part of the Liasicus Zone.

The upward lithological change at this site, from massive sandy textured beds into more thinly bedded units, is reflected in some elements of the fauna, with the cemented bivalve *Liostrea* being confined to the lower beds. The upward lithological change parallels that seen at the Pant y Slade to Witches Point GCR site in south Wales. By analogy with the latter site, this facies change probably records the increasing distance, both vertically and laterally, from the unconformable contact with underlying Palaeozoic rocks. It implies that here, as in the similar situation in south Wales, this boundary is diachronous, although biostratigraphical resolution within the marginal facies of the Mendip region is inadequate to demonstrate this. However, correlation with other Lower Lias successions in the area shows the strongly diachronous nature of the boundary between the marginal Downside Stone facies and the more typical 'offshore' facies in which mudstones dominate or are at least a significant component. Less than 3 km to the south, at Cannard's Grave [ST 629 414], there is little evidence of the proximity of the marginal facies. The 7.3 m-thick succession exposed there, encompassing the Planorbis to Bucklandi zones, is developed entirely in mudstones and limestones of fairly typical 'offshore' Blue Lias Formation facies (Donovan, 1958b). In the vicinity of Shepton Mallet this same interval is developed entirely in marginal Downside Stone facies, here attaining a thickness of about 25–30 m, before passing up into more normal 'offshore' mudstone facies (Green and Welch, 1965). These apparent rapid lateral transitions from marginal facies into basinal mudstone-limestone sequences may be attributable to the position of these sites relative to east–west faults that were active during early Jurassic times (see (Figure 2.1), Chapter 2). Cornford (1986) and Jenkyns and Senior (1991) suggested that development of the marginal facies might be associated with the northern-faulted boundary of a half-graben, possibly now represented by the Beacon Hill Fault, and noted that in the Beacon Hill area the marginal facies extend still higher, to at least the Jamesoni Zone, and are overlain by mudstones of the Davoei Zone.

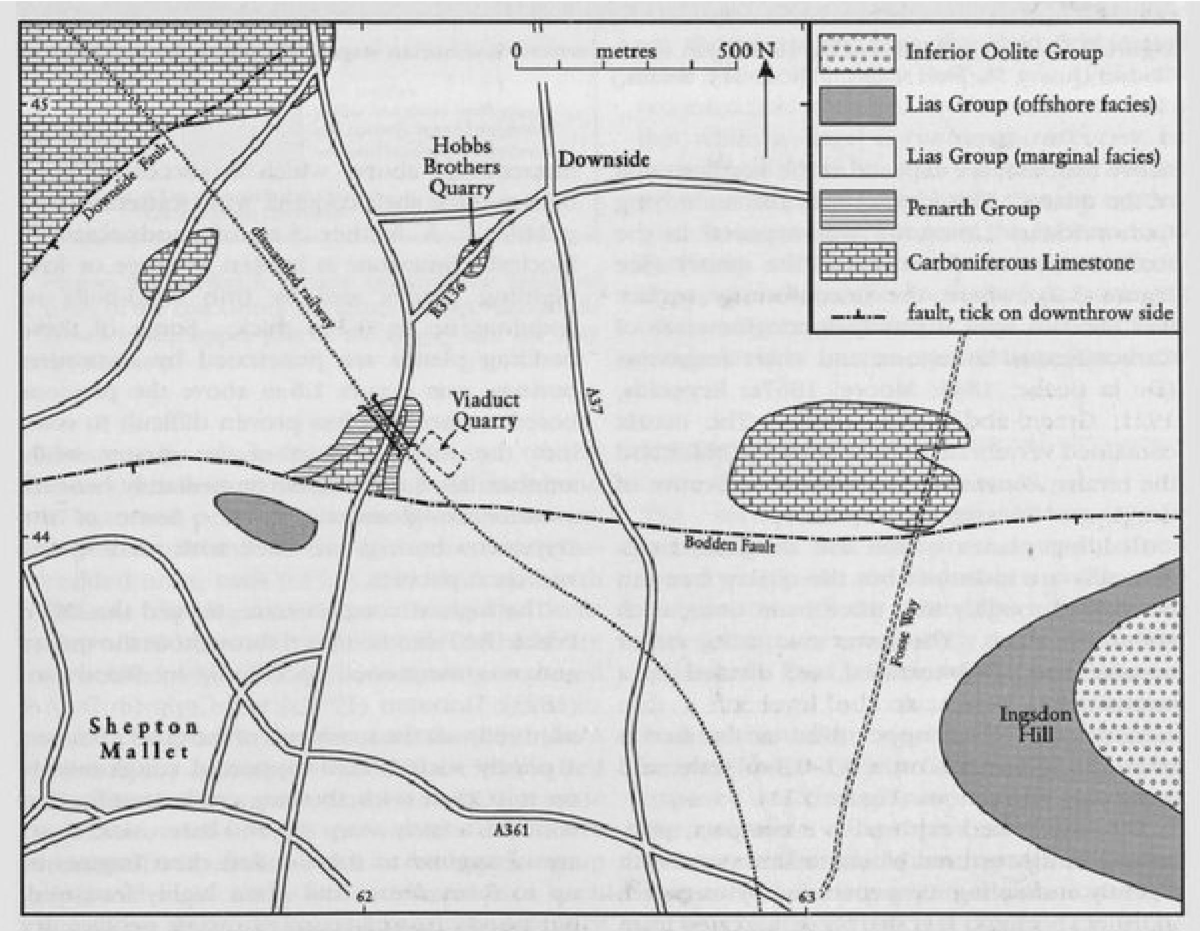
Several earlier writers (Donovan, 1958b; Green and Welch, 1965; Savage, 1977) commented on the apparent greater thickness of the Planorbis to Bucklandi zone succession when developed in marginal facies rather than the more basinal, or 'offshore', facies, attributing this to banking up of these marginal sediments by offshore currents. However, the discovery of *Coroniceras rotiforme* at Viaduct Quarry indicates that the marginal facies is not substantially thicker than the oft-cited correlative section at Cannard's Grave (Donovan, 1958b).

The composition of the fauna at the Viaduct Quarry GCR site bears considerable similarities to that seen in the analogous marginal facies of the Pant y Slade to Witches Point GCR site, as commented on by Moore (1867a), and clearly is facies controlled. At both sites the fauna is dominated by thick-shelled bivalves and a relative abundance of gastropods, and ammonites are very rare. However, whereas the south Wales site has yielded a rich and fairly diverse fauna of colonial and solitary corals, only occasional solitary montlivaltiids have been recovered from the Downside Stone in the Mendip region.

Conclusions

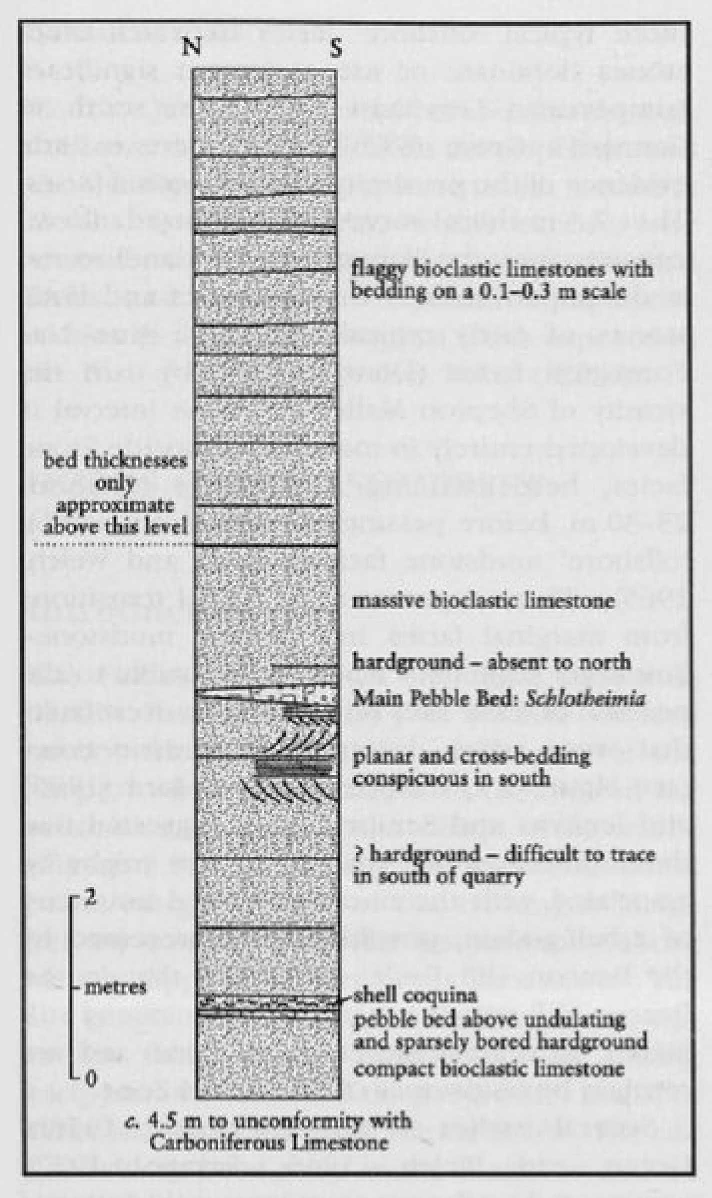
Viaduct Quarry exposes the best section through the Lower Lias marginal facies developed around the Mendip Hills. It complements the section at Hobbs Quarry nearby, which exposes the unconformable contact beneath the marginal facies, and provides an important comparative section to analogous marginal facies exposed in the Pant y Slade to Witches Point GCR site.

[References](#)

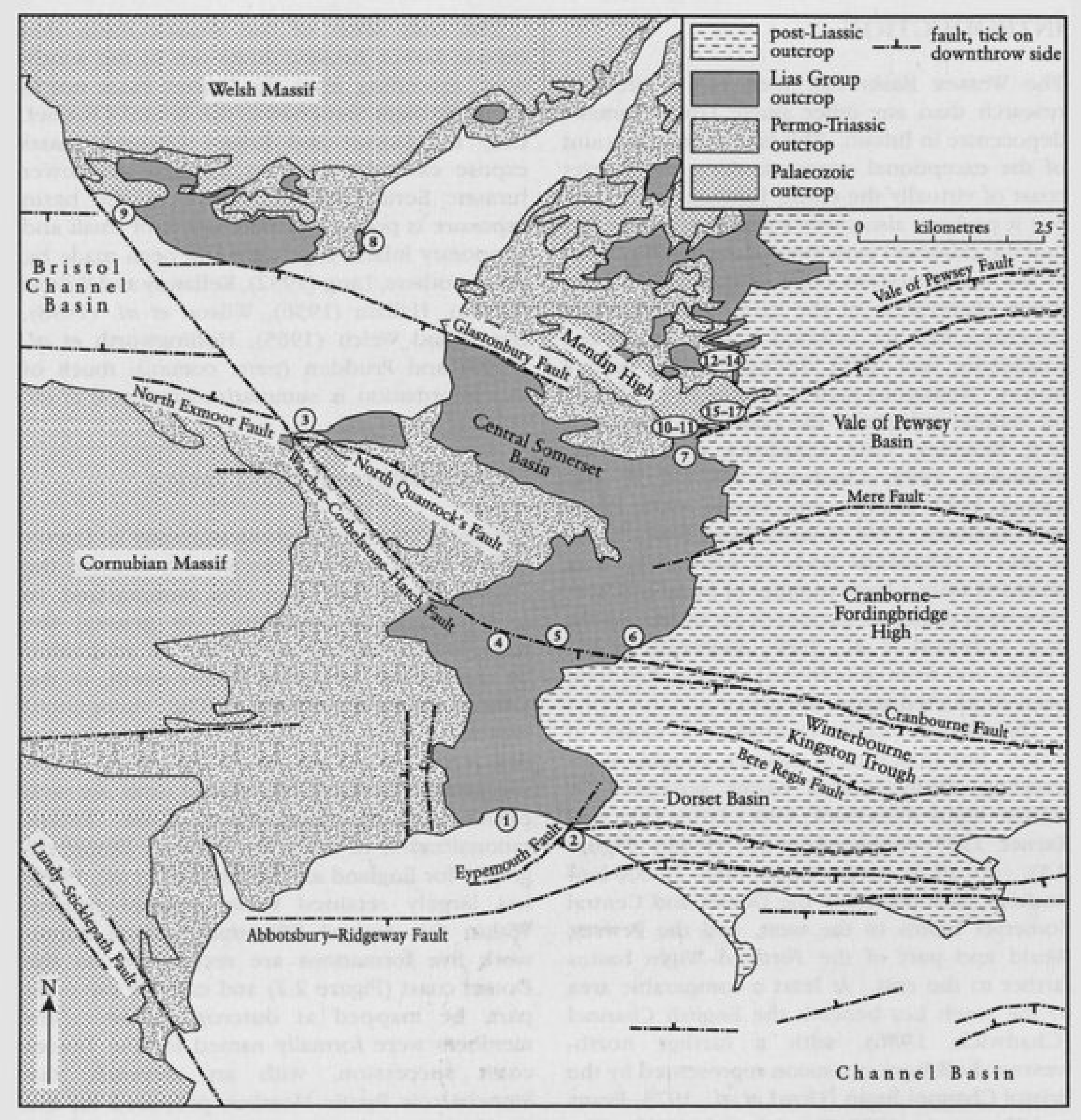


(Figure 3.9) Sketch map of the geology in the area around Viaduct Quarry and Hobbs Quarry.

(Figure 3.10) Marginal facies of the Hettangian and lowermost Sinemurian stages exposed in the main face of Viaduct Quarry, Shepton Mallet. (Photo: M.J. Simms.)



(Figure 3.11) Sketch section through the marginal facies of the Lias Group at Viaduct Quarry. Bed thicknesses in the upper part of the quarry face are only approximate.



(Figure 2.1) The major structural elements and sub-basins of the Wessex Basin and its margins. Numbers correspond to the locations of the GCR sites: 1— Pinhay Bay to Fault Corner and East Cliff; 2 — Cliff Hill Road Section; 3 — Blue Anchor—Lilstock Coast; 4 — Hurcott Lane Cutting; 5 — Babylon Hill; 6 — Ham Hill; 7 — Maes Down; 8 — Lavernock to St Mary's Well Bay; 9 — Pant y Slade to Witches Point; 10 — Viaduct Quarry; 11 — Hobbs Quarry; 12 — Bowldish Quarry; 13 — Kilmersdon Road Quarry; 14 — Huish Colliery Quarry; 15 — Cloford Quarry; 16 — Holwell Quarry; 17 — Leighton Road Cutting. After Lake and Karner (1987).