Whitwell Quarry, North Yorkshire

[SE 734 670]

B.M. Cox and M.G. Sumbler

Introduction

The GCR site known as Whitwell Quarry' comprises a face in a disused quarry, *c.* 7 km south west of Malton, North Yorkshire (Figure 5.5). It coincides with the Site of Special Scientific Interest (SSSI) known as 'Mount Pleasant Quarry' and provides the only significant exposure of the Whitwell Oolite. The overlying beds of the Upper Limestone are also exposed. The Whitwell Oolite (first named by Hudleston (1874) as Whitwell Limestone') occurs throughout the Howardian Hills and the southern part of the Hambleton Hills. It was once extensively quarried, mainly as a source of lime for agricultural use (Kent, 1980b) and its lower beds also for road metal. The GCR site is representative of the quarries at Mount Pleasant and Crambeck, near Whitwell-on-the-Hill, where the Whitwell Oolite reaches its maximum thickness (*c.* 9 m) and which may be regarded as the type area. Once owned by the Castle Howard Estate, the quarry has been partially infilled and restored, and is now occupied by a landscaped caravan park. The latter is named after a topographical feature (Jamie's Crags) that has developed where quarrying over many years has modified the angular escarpment overlooking the valley of the River Derwent (Hudleston, 1874).

Description

The succession exposed within the quarry complexes at Mount Pleasant and Crambeck, near Whitwell-on-the-Hill, have been cited by Wright (1860), Hudleston (1873), Fox-Strangways (1892), Richardson (1911c), Bate (1967b) and Hemingway (1974) but the only published measured section is that of Bate (1967b). The SW-facing quarry face (*c.* 200 m long) at the GCR site is up to *c.* 5 m high. The exposed strata (ooidal limestone overlain by calcareous sandstone) generally dip gently in an easterly direction such that the oldest beds are exposed only in the north-western part of the quarry. A section, recorded by the authors at approximately the midpoint of the main face in July 1997, is given below.

	Thickness (m)
Cloughton Formation	
Upper Limestone	
Limestone, very sandy, to weakly calcareous sandstone; grey to yellowish-brown with ferruginous mottling; essentially medium-grained, well-sorted quartz sand with variable 'doggery' cementation; strongly cross-bedded throughout in small-scale troughs and cross-sets with variable current directions; sporadic fine-grained, silty and clayey laminae particularly abundant in upper part; decalcified to almost loose sand in parts; locally, secondary, limonitic, ironstone segregations at sharp, probably slightly channelled, base	c. 3.5
Whitwell Oolite	
Limestone, greyish-brown, poorly sorted, medium- to coarse-grained, peloidal and ooidal packstone to grainstone with scattered shell-debris; hard, well cemented, markedly cross-bedded in topmost 0.6 m, becoming less strongly cemented and more massive downwards; sporadic laminae of quartz silt	*c.* 1.4

The maximum thickness of the Upper Limestone (*c.* 4 m) is seen in the eastern part of the quarry face. The maximum thickness of the Whitwell Oolite (*c.* 1.8 m) is seen in the western part of the face.

The fauna of the Whitwell Oolite includes the echinoids *Pygaster semisulcatus* Phillips and *Stomechinus germinans* Phillips; the bivalves *Ceratomya bajociana* (d'Orbigny), *Gervillella, 'Lima', Modiolus imbricatus* J. Sowerby, pectinids and trigoniids; crinoid columnals; the brachiopod *Acanthothiris;* the bryozoan *Collapora straminea* (Phillips); and the serpulids *Galeolaria socialis* (Goldfuss) and *Vermicularia nodus* Phillips. Early fossil collectors appear to have made no distinction between the Whitwell Oolite and the overlying sandy beds of the Upper Limestone; the extensive faunal list given by Fox-Strangways (1892) does not differentiate between these two units.

Interpretation

The Whitwell Oolite is now included in the Lebberston Member of the Cloughton Formation. This member comprises a 'wedge' of calcareous sandstone and ooidal limestone that was deposited during a marine transgression that advanced northwards from the East Midlands Shelf (see Chapter 4) into the Cleveland Basin, thinning out against the fluvio-deltaic area to the north (Kent, 1980a). In the Whitwell-on-the-Hill area, and in the Howardian Hills generally, the Whitwell Oolite comprises a basal, poorly fossiliferous, calcareous sandstone that passes up into an ooidal grainstone with abundant fragments of bivalves, crinoids, corals and gastropods. The cross-bedding that is seen in places, such as at the GCR site, suggests a high-energy depositional environment, most probably an offshore carbonate sand-bank (Hemingway, 1974) or shoreface zone (Powell *et al.,* 1992). Where the bedding is more massive and apparently lacking in bedding structures, the limestones may contain plano-convex lenses of quartz sand up to 5 m long and 0.6 m thick; these may well represent advancing sand-dunes suggesting a depositional environment of comparable energy (Hemingway, 1974). Many of the individual ooids, particularly in the lower part, are little more than quartz grains with a thin carbonate coating.

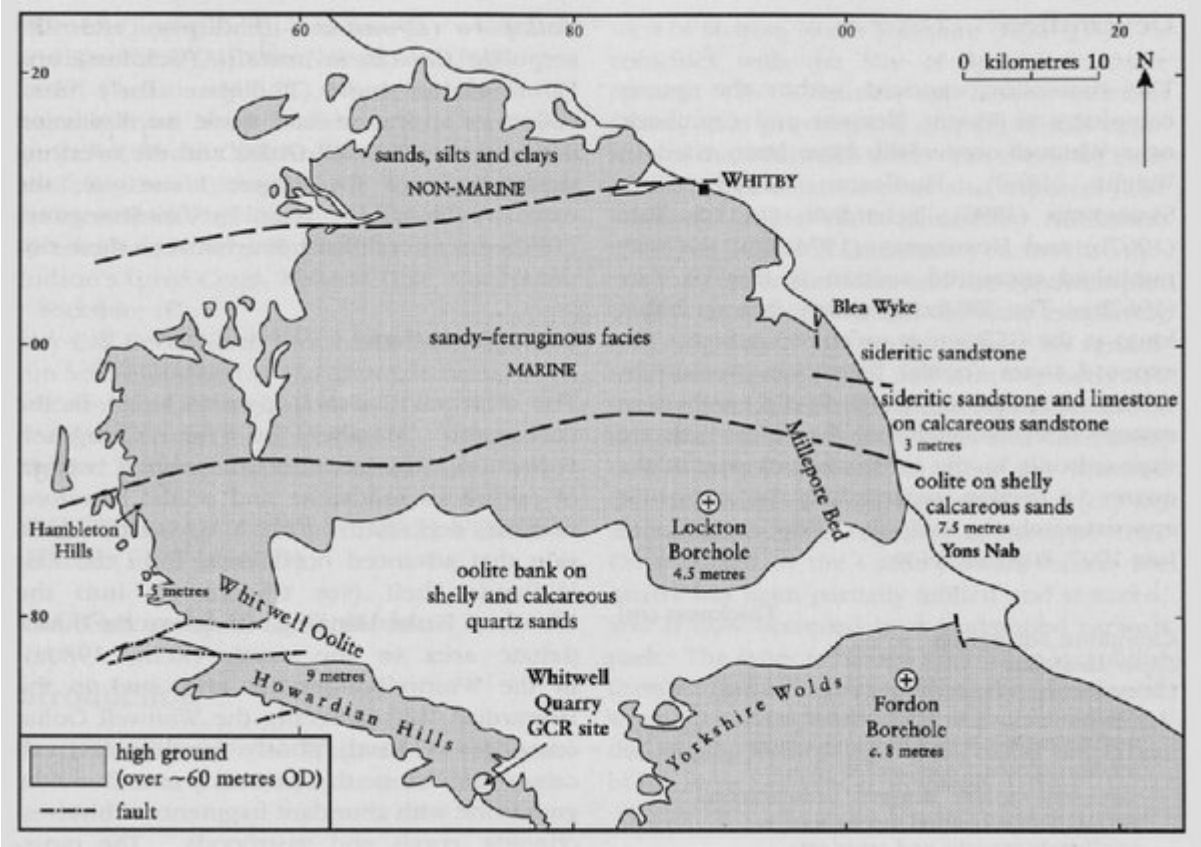
Elements of the faunal assemblage, notably the bryozoan *Collapora* (formerly *Entalophora, Haploecia, Millepora* or *Spiropora*) *straminea,* also occur in the Millepore Bed of the Yorkshire coastal exposures (see — Gristhorpe Bay, Yons Nab and Red Cliff–Cunstone Nab GCR site report, this volume), which, on that basis, has long been recognized as a correlative of the Whitwell Oolite (Wright, 1860) (Figure 5.6). Indeed, some authors (e.g. Powell *et al.,* 1992) have described these two stratal terms as synonymous and their usage has certainly overlapped (e.g. Fox-Strangways, 1892). The Upper Limestone is correlated with the Yons Nab Beds of the coastal sections. The latter were previously included, with the Millepore Bed, in the Lebberston Member but, following a suggestion by R.W.O'B. Knox (in Rawson and Wright, 1995), they are now included in the overlying Gristhorpe Member because, in places, they are scarcely marine (see Gristhorpe Bay, Yons Nab and Red Cliff–Cunstone Nab GCR site report, this volume). Ammonites are unknown in the Whitwell Oolite but its ostracod fauna has been assessed by Bate (1967b) who found it to be basically similar to that of the Lower Lincolnshire Limestone and thereby deduced that the Whitwell Oolite belonged to the Lower Bajocian Discites Zone. Stratigraphical position and macrofaunal assemblages identify the Cave Oolite Member of the Market Weighton area (see Eastfield Quarry GCR site report, this volume) as a correlative of both the Whitwell Oolite and Millepore Bed and a product of the same Early Bajocian marine transgression (Kent, 1980a).

Conclusions

Whitwell Quarry exposes the once extensively quarried Whitwell Oolite and overlying Upper Limestone. The Whitwell Oolite, together with the Millepore Bed of the coastal sections (see Gristhorpe Bay, Yons Nab and Red Cliff–Cunstone Nab GCR site report, this volume), bear witness to a marine incursion from the south that resulted in a 'wedge' of marine rocks (Lebberston Member) in an otherwise non-marine succession (Cloughton Formation). Stratigraphical position and macrofaunal content show that the Cave Oolite Member, which occurs south of Market Weighton (see Eastfield Quarry GCR site report, this volume), is also associated with this event. The present site is thus an important one for understanding the relationship between the different facies that occur within the Middle Jurassic succession of the Cleveland Basin and East Midlands Shelf, as well as the Early Bajocian palaeogeography.

References

(Figure 5.5) Part of the old quarry face at the Whitwell Quarry GCR site showing Whitwell Oolite overlain by Upper Limestone. The figure's hand rests on the top surface of the Whitwell Oolite. (Photo: M.G. Sumbler.))



(Figure 5.6) Facies distribution sketch map of the Whitwell Oolite and the Millepore Bed which together form the transgressive leaf of the Lebberston Member. (After Hemingway, 1974, fig. 51.))