WATH QUARRY, HOVINGHAM

J.K. Wright

OS Grid Reference: SE674750

Introduction

Wath Old Quarry comprises a large quarry 0.7 km east of Hovingham in the Howardian Hills, and is one of several large working and non-working quarries that extend eastwards for 1.5 km along the south side of the B1257 from Hovingham to Slingsby (Figure4.37). Whilst these various exposures were first generally described byBlake and Hudleston (1877), the earliest specific reference to Wath Old Quarry is that provided byFox-Strangways (1892). Arkell (1933) and Wilson (1933, 1936) mentioned the quarry only briefly. Twombley (1965) undertook detailed palaeoenvironmental studies of the Oxfordian strata exposed in this area. The locality figures prominently in Wright's (1972) stratigraphy of the Yorkshire Corallian. Wath Old Quarry is now disused, and a large new quarry, showing a more expanded succession than than seen in the old quarry, has been opened up half a kilometre to the ESE (Figure4.40). This will be referred to as ‘Wath New Quarry'.

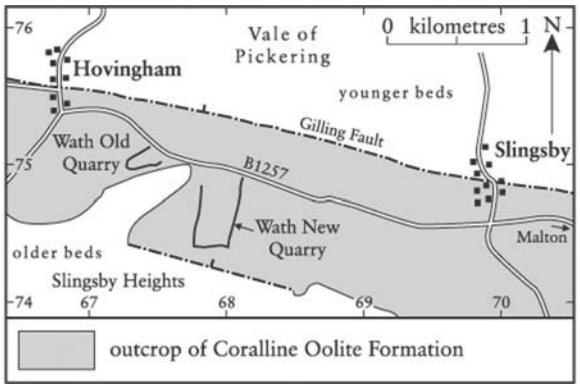

Figure 4.37: Locality map of the Wath Quarries. Outcrop of the Coralline Oolite from BGS Sheet 53 (Pickering) (1973).

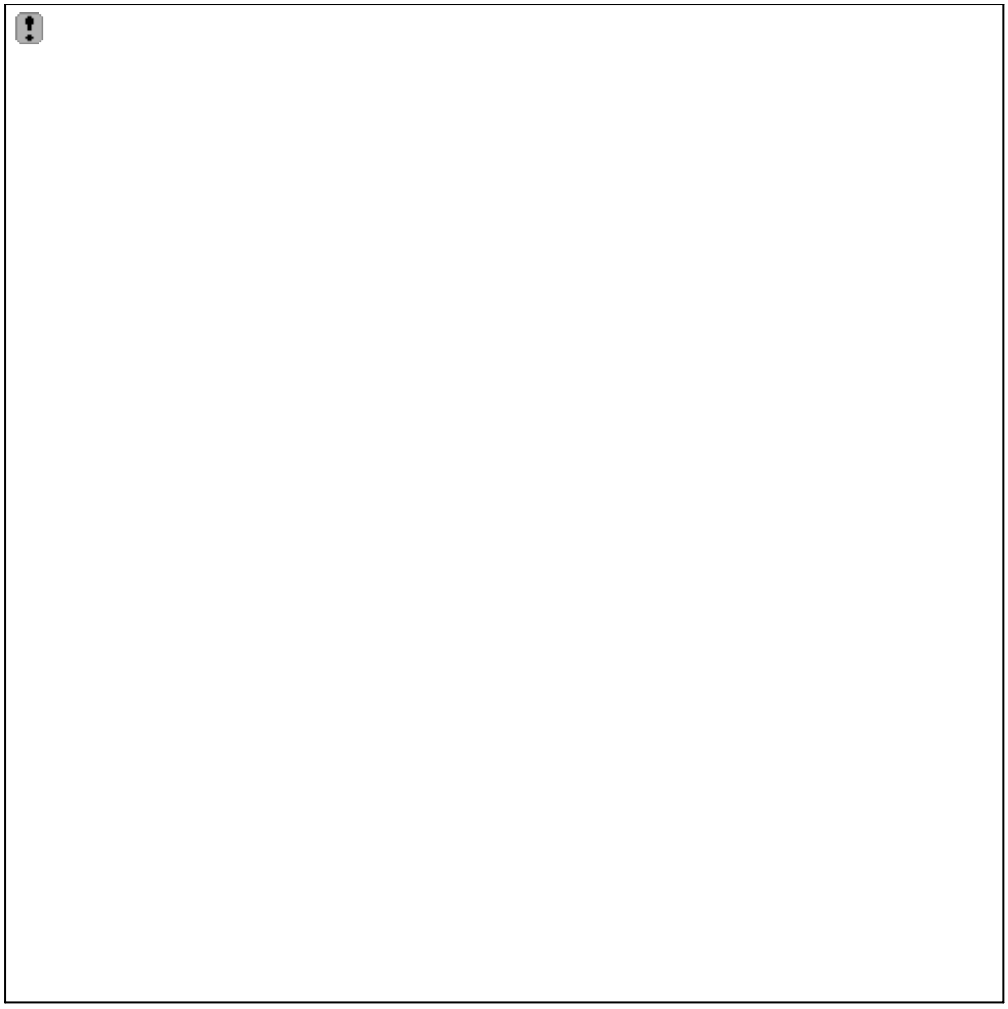

Figure 4.40: View of the eastern face of Wath New Quarry showing, near the base, Malton Oolite dipping gently north (to the left), overlain by giant cross-sets of Malton Oolite dipping south, and at the top of the quarry, Coral Rag dipping gently north. (Photo: J.K. Wright.)

Description

Wath Old Quarry exposes Middle Oxfordian strata of Maltonense Subzone and ?Tenuiserratum Subzone ages, with both the higher part of the Malton Oolite and the Coral Rag members of the Coralline Oolite Formation being present. A weathering profile of the quarry is given in Figure 4.38.

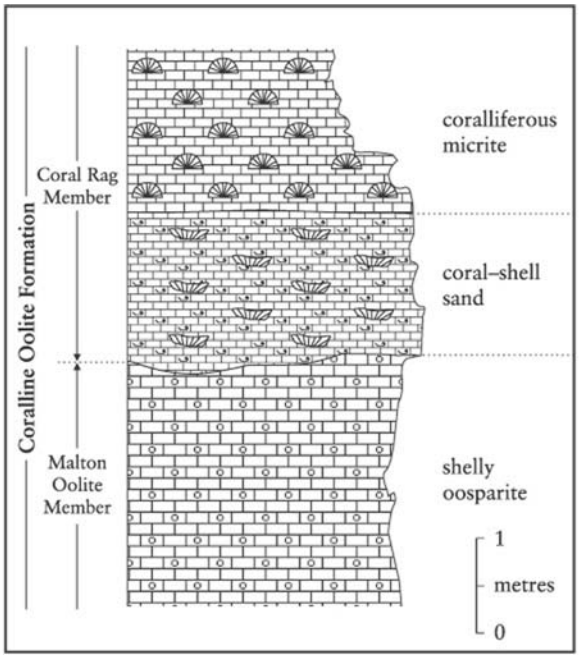

Figure 4.38: Weathering profile of the upper Malton Oolite and Coral Rag at Wath Old Quarry, as measured by J.K. Wright in 1997.

The Malton Oolite is characteristically a thick-bedded bioclastic oolite. Occasional specimens of *Pseudomelania heddingtonensis* (J. Sowerby), *Chlamys fibrosus* (J. Sowerby), *Nanogyra nana* (J. Sowerby), *Gervillella aviculoides* (J. Sowerby), *Chlamys* sp., *Lima* sp., *Perisphinctes* sp. and *Nucleolites scutatus* Lamarck have been found (Wilson, 1933). The member is seen to an approximate thickness of 10 m. Towards the southern end of the quarry, there is a gentle dip to the north, though at the northern end of the quarry the Malton Oolite dips gently south.

At least 3.4 m of rubbly, poorly bedded, micritic limestone of the Coral Rag Member rests on an irregular erosion surface cut in Malton Oolite. The junction is seen particularly well at the southern end of the quarry (Figure 4.39). Two distinct units are clearly visible in the photograph. The lower unit consists of 1.75 m of variably oolitic, shelly biomicrite with only fragmentary corals and bivalves. This is overlain by fine-grained, micritic limestone that is very fossiliferous, containing *Montlivaltia* sp., *Thecosmilia* sp., abundant *Thamnasteria concinna* (Goldfuss) and other corals. Wilson (1933) noted in addition *Isastraea explanata* (Goldfuss), *Fungiastraea arachnoides* (Parkinson) and *Stylina tubulifera* (Phillips). The branching coral *Thecosmilia* is present as rolled fragments infilling the spaces between the massive corals along with bivalves and echinoids. A rich reef-dwelling fauna is present, with 17 species of bivalve including *Chlamys nattheimensis* (de Loriol), seven species of gastropod and three species of echinoid, including *Paracidaris florigemma* (Phillips). Wilson (1933) gives an extensive list of bivalves, gastropods and echinoids recorded from the Coral Rag in the quarries between Hovingham and Slingsby.

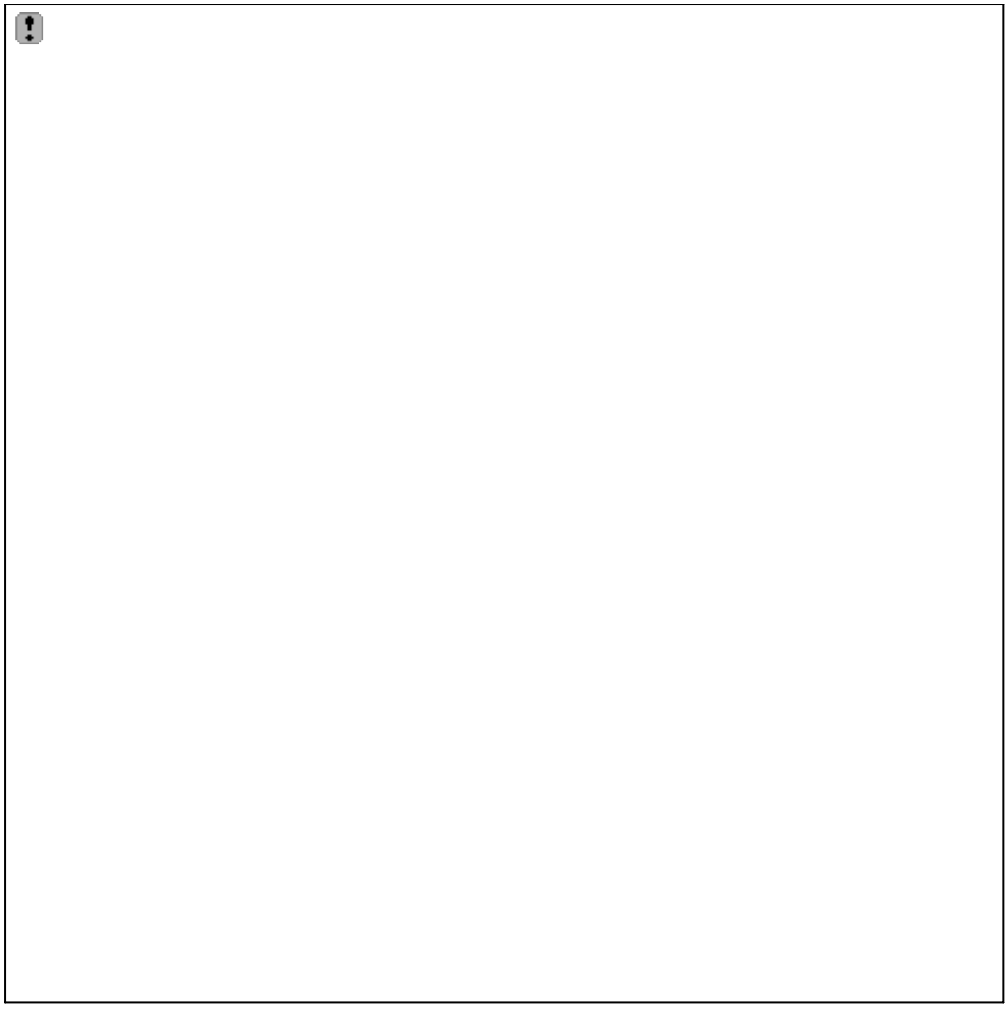

Figure 4.39: Wath Old Quarry, showing the irregular, erosive junction of Coral Rag resting on Malton Oolite. The lower rubbly coral–shell bed of the Coral Rag and the upper coralliferous micritic limestone are easily distinguished. Hammer shaft is 32 cm long. (Photo: J.K. Wright.)

Interpretation

The lower Malton Oolite, as seen in Wath New Quarry (SE 680 745) (Figure4.40), consists of shelly, sparsely ooidal micrite laid down rapidly in deeper water. Delicate bivalve shells are unbroken, and there are silty and argillaceous laminae. Conditions were thus similar, though somewhat deeper, to those at Leysthorpe Quarry. The micrites pass up into oomicrites and shelly oosparites laid down in much shallower water, and exposed in the old quarry (Figure 4.39). There, the highest Malton Oolite comprises a shelly oosparite full of abraded, micrite-coated shell fragments and occasional coral fragments.

There is a distinct difference in dip between the Malton Oolite and the Coral Rag as seen at the north end of Wath Old Quarry. Twombley (1965) attributed this to uplift, tilting and erosion of the Malton Oolite prior to deposition of the Coral Rag, and this view was repeated byWright (1972). However, the extension of Wath New Quarry in the 1990s, with the production of a huge, 300 m long north–south section through the Corallian beds (Figure4.40), has revealed that the southerly dip of the Malton Oolite is due to the presence of giant, southward-dipping foresets. During deposition of the Malton Oolite, the Wath area must have been subject to sudden localized subsidence of the order of 20 m. Fine-grained, shelly carbonate sediment poured into this basin from the north, infilling it with southerly prograding foresets of amplitude as much as 10 m. When carbonate sediment was not available, dark-grey silty clay-drapes up to 0.2 m thick were laid down over the oolite, emphasizing the cross-bedding.

The Coral Rag at Wath excellently displays its characters as a transgressive sequence (Wright, in press, fig. 1). An initial deposit of shelly, ooidal biomicrite was laid down under quite high-

energy conditions upon an undulating hardground surface in Malton Oolite (Figure4.39). As the sea transgressed over the hardground surface, corals colonized the sea floor as soon as they could, but the high energy of the shallow sea, which resulted in the precipitation of ooids, also broke up the corals and shells, producing an ooidal coral–shell sand. Such a bed is also present at Leysthorpe Quarry (see Figure 4.36), but unfortunately access is very difficult.

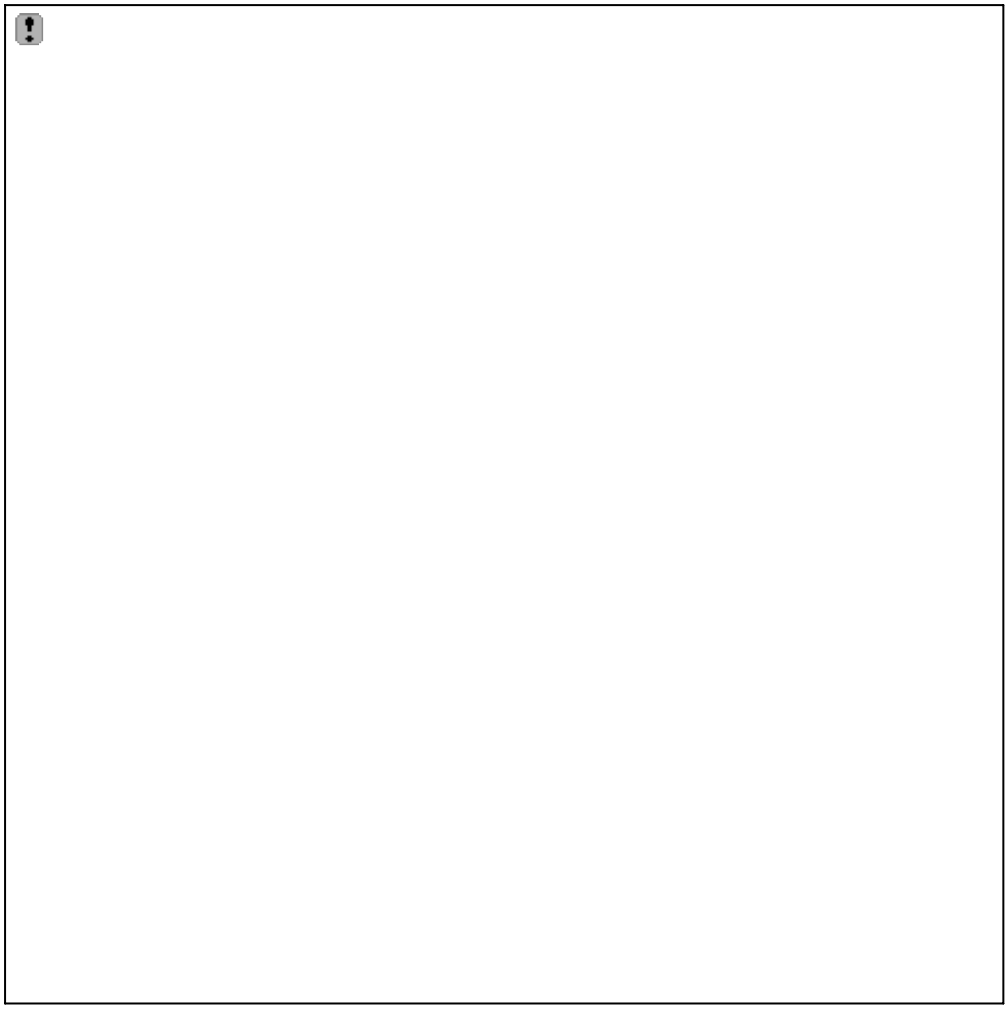

Figure 4.36: View of the northern face at Leysthorpe Quarry, showing the thick Malton Oolite sequence, with, at the top, a thin development of Coral Rag overlain by thin-bedded, flaggy Upper Calcareous Grit. (Photo: J.K. Wright.)

As the transgression progressed, deeper marine conditions led to the proliferation of coral growth in the areas that were reached by nutrient-supplying currents. Shelly micrite was deposited around the coral colonies. The coral fauna consists predominantly of lamellar and fungioid forms, the common occurrence of *T. concinna* with its small, densely spaced corallites suggesting limpid water and gentle sedimentation (Negus and Beauvais, 1979). However, other features suggest more active sedimentation. *Stylina* is a plocoid form adapted to active conditions, and dendroid corals are only present as broken fragments, suggesting moderate-energy conditions.

Conditions became slightly deeper and more sheltered northwards, encouraging the growth and preservation of dendroid corals (*Thecosmilia* at Nunnington Railway Cutting Quarry, see site report for Nunnington, this volume). On the north side of the Vale of Pickering, there are much more delicate *Rhabdophyllia* forming arboresques at Highfields House Quarry (SE 7115 8736) (Wright, 1972). Eastwards, conditions in the centre of this lagoonal area were too stagnant for prolific coral growth, with the occurrence of almost unfossiliferous, argillaceous limestone with scattered *Rhabdophyllia* at Newbridge Quarry (see site report, this volume). In contrast, the Wath area is characterized by a shallow-water reef-top environment with a wide variety of colonial and encrusting corals. Some, e.g. *Stylina tubifera*, are found only in this

Howardian area in Yorkshire. This reef-top facies of the Coral Rag extends as far as Malton on the NNE flank of the Howardian Hills, separating areas to the north (Pickering) and to the south (Hildenly), which were predominantly back-reef and micritic (Wilson, 1933).

Conclusions

Wath Old Quarry is of great importance in studies of the stratigraphy and palaeontology of the Upper Jurassic of the Cleveland Basin. The locality shows the best, most accessible section anywhere in Yorkshire of the widespread discontinuity that occurs between the massive-bedded Malton Oolite and the overlying reef carbonates of the Coral Rag. The latter contains a prolific fauna of corals and their associated bivalve and echinoid faunas, including species that are not present in any other preserved site in Yorkshire.

Reference list

Arkell, W.J. (1933) *The Jurassic System in Great Britain*, Clarendon Press, Oxford.

Blake, J.F. and Hudleston, W.H. (1877) On the Corallian rocks of England.*Quarterly Journal of the Geological Society of London*, **33**, 260–405.

Fox-Strangways, C. (1892) *The Jurassic Rocks of Britain, I. Yorkshire*, Memoir of the Geological Survey of the United Kingdom, HMSO, London.

Negus, P.E. and Beauvais, L. (1979) The corals of Steeple Ashton (English Upper Oxfordian), Wiltshire. *Proceedings of the Geologists' Association*, **90**, 213–27.

Twombley, B.N. (1965) Environmental and diagenetic studies of the Corallian rocks in Yorkshire, west of Newtondale. Unpublished PhD thesis, University of Newcastle.

Wilson, V. (1933) The Corallian rocks of the Howardian Hills (Yorkshire).*Quarterly Journal of the Geological Society of London*, **89**, 480–509.

Wilson, V. (1936) The Upper Jurassic rocks of the country between Malton and Castle Howard, Yorkshire. *Proceedings of the Geologists' Association*, **47**, 254–64.

Wright, J.K. (1972) The stratigraphy of the Yorkshire Corallian.*Proceedings of the Yorkshire Geological Society*, **39**, 225–66.

Wright, J.K. (in press) Discussion on fault activity and sedimentation in a marine rift basin (Upper Jurassic, Wessex Basin, UK). *Journal of the Geological Society, London*.