Cross Roads Quarry

[SP 550 064]–[SP 550 065]

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Introduction

This quarry lies in the once heavily quarried Headington area of Oxford (Figure 2.47), and has played a prominent role in most accounts of Corallian stratigraphy since it was first described by Arkell (1927). The quarry is no longer in active use and is conserved as part of a public park by Oxford City Council, who have renamed it 'Rock Edge Quarry'. It presents a fine NNE–SSW-trending exposure some 100 m in length where lateral facies changes in carbonate rocks can be closely followed. Arkell's original description, his later papers (Arkell, 1936b, 1947b) and his book *Oxford Stone* (1947c), emphasize the stratigraphical and sedimentological value of the site. Cross Roads Quarry has subsequently figured briefly in the works of McKerrow and Baden Powell (1953), Wilson (1968a), McKerrow and Kennedy (1973) and Johnson (1983), and was well illustrated by Horton *et al.* (1995).

Description

Three major stratigraphical units have been recognized in the 7 m succession of Corallian rocks recorded at this site. Present exposure does not permit all of Arkell's (1927) observations to be verified as the basal unit in the quarry, the Beckley Sand Member, is not currently exposed. The following section was measured by the present author at the southern end of the quarry. Details of the Beckley Sand Member are taken from Arkell (1927):

	Thickness (m)
Stanford Formation	
Wheatley Limestone Member	
4. Massive, rubbly-weathering, bioclastic limestone, a coral–shell sand with coral clasts up to 5 mm diameter, and occasional transported masses of *Thamnasteria concinna* (Goldfuss) bored by *Lithophaga inclusa* (Phillips)	seen to 1.0
3. Rubbly-weathering, bioclastic limestone packed with coral clasts, up to 10 mm diameter in the lower part, becoming finer grained upwards	seen to 2.3
(not exposed — ?Wheatley Limestone — 2.2 m)	
Kingston Formation	
Beckley Sand Member	
(2. *Headington Shell Bed*	0.3)
(1. Soft sand seen to	1.2)

Though there was at one time a substantial exposure here of the Headington Shell Bed, Arkell (1927) does not refer to it, and it is unlikely the bed was visible in Arkell's day. However, it is very likely that many of the ammonites in museums located simply as 'Headington' came from this quarry. The following ammonites are listed by Arkell (1935–1948) as occurring in the shell bed at Headington (i.e. not specifically at Vicarage or Magdalen quarries, these being listed below; see site report for Magdalen Quarry, this volume):

Perisphinctes (*Dichotomosphinctes*) *rotoides* Ronchadzé, *P* (*Arisphinctes*) *maximus* (Young and Bird), *P* (*A.*) *cotovui* Simionescu, *P* (*A.*) *pickeringius* (Young and Bird), *Cardioceras* (*Cuneicardioceras*) *cuneiforme* Arkell, *C.* (*Subvertebriceras*) *densiplicatum* Boden, *C.* (*S.*) *zenaidae* Ilovaisky, *C.* (*Vertebriceras*) *dieneri* Neumann and *Goliathiceras titan* Arkell.

Rubbly, thick-bedded Wheatley Limestone containing large coral clasts occurs at the southern end of the quarry. In the central and northern sectors of the face, thinly bedded limestone with smaller coral clasts predominates (Figure 2.48). The fauna of the Wheatley Limestone is dominated by corals. Clasts and larger masses of the colonial reef coral *Thamnasteria concinna* are profusely abundant, and some layers are crowded with fragments of the branching coral *Thecosmilia annularis* (Fleming). Amongst the bivalves, *Nanogyra nana* (J. Sowerby) is extremely abundant, along with fragments of *Trichites* and *Chlamys,* and there is a variety of echinoid spines, including *Paracidaris florigemma* (Philips) and numerous smaller spines. This fauna occurs variously rolled, bored and abraded. It is clear that a rich and diverse assemblage of invertebrate taxa, dominated by corals, echinoids and bivalves, can be collected here.

Interpretation

The *Vertebriceras* and *Goliathiceras* recorded here from the Headington Shell Bed are indicators of the Vertebrale Subzone. The perisphinctids could indicate either Vertebrale Subzone or Antecedens Subzone (the latter approximately equivalent to the Maltonense Subzone). Evidence from Magdalen Quarry (see below) suggests that the Maltonense Subzone is present at Cross Roads Quarry, and it is likely that the Headington Shell Bed here encompasses in its 0.3 m both Vertebrale and Maltonense Subzones (Callomon, 1960).

The Wheatley Limestone is present here in its coarse-grained coralliferous facies proximal to coral reefs. True Coral Rag with large coral masses was exposed only 500 m to the south at Windmill Quarry (Figure 2.49). The term Wheatley Limestone is used here in preference to Coral Rag for the coralliferous beds at the southern end of Cross Roads Quarry. This is because the massive corals present are transported and preserved in coarse-grained, bioclastic sand, rather than in the fine, micritic limestone laid down within the coral reef complexes. Wilson (1968a) described the reef margin facies here as a coralliferous rock composed of solitary or massive crystalline colonies of *Thecosmilia, Isastraea* and *Thamnasteria.* The coarse-grained nature of the coral clasts indicates the proximity of the true reef.

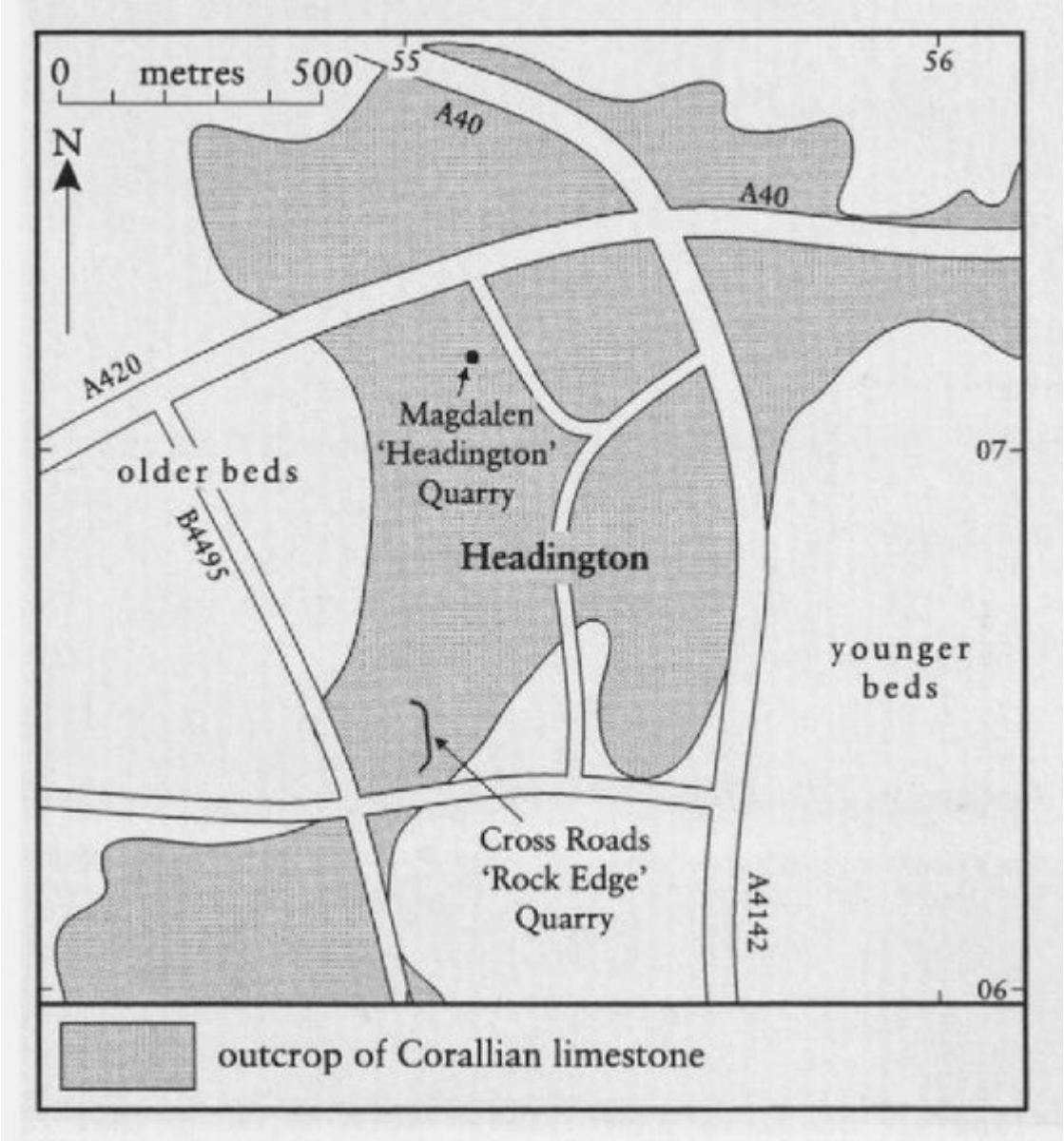
Away from the reef margin, in the central and northern parts of the section (Figure 2.49), finer-grained detrital carbonate facies interdigitates with rubbly coral conglomerate, possibly laid down during storms. Fragments of *Thamnasteria* up to 20 mm in diameter are found in a lens of coral–shell conglomerate occurring about the middle of the length of the quarry face. The Wheatley Limestone here is thus seen both in its rubbly coral debris facies (Wilson, 1968a, Facies 3), and in its shelly, bioclastic facies (Wilson, 1968a, Facies 4). Within the area of the Oxford reef, which was situated to the south and west of the present site, debris biosparites are distributed between the larger coral masses, suggesting penecontemporaneous abrasion of well-indurated reef-rock in a relatively high-energy depositional environment.

Insalaco (1996) noted that the growth rate of corals in the Oxford reef, as measured by annual growth bands, was much less that that of corals of equivalent age in France. He attributed this to the adverse effects of a larger amount of run-off affecting the Oxford reef from the nearby London Landmass.

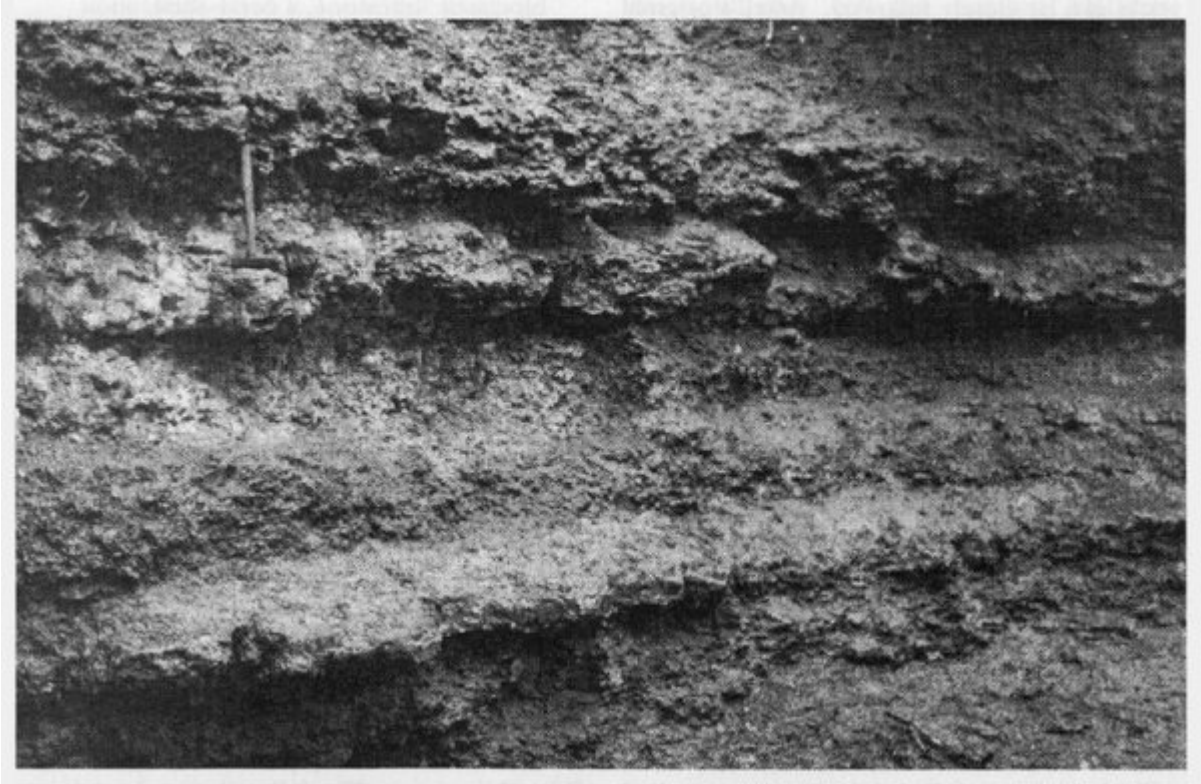
Conclusions

This is a key site in palaeogeographical reconstructions and facies analysis of the Oxfordshire coral reefs of late Jurassic (Oxfordian) age. The complete transition from broken marginal reef to comparatively fine-grained coral–shell sand may be observed here.

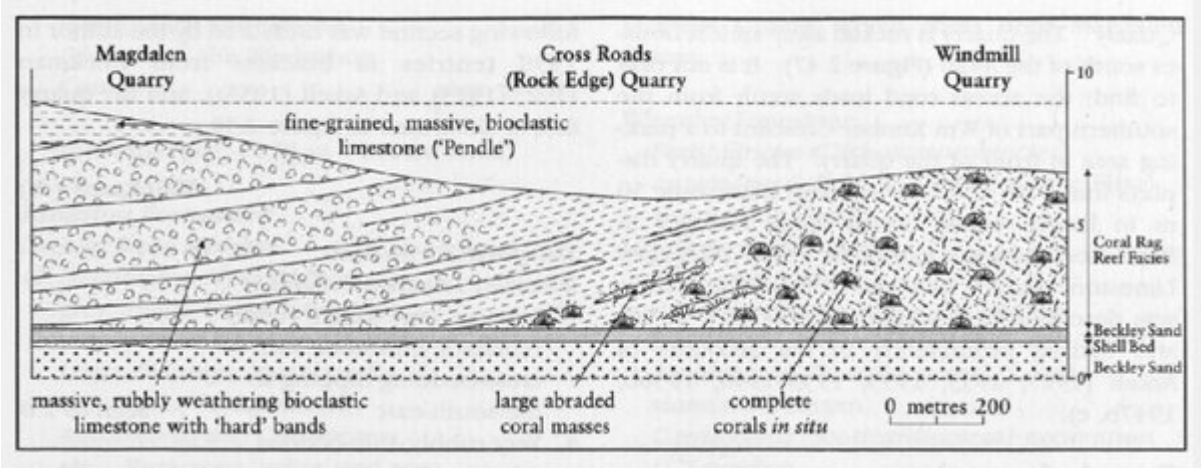
References



(Figure 2.47) Locality map for Cross Roads Quarry and Magdalen Quarry. Outcrop of the Corallian limestones from BGS Sheet 237 (Thame) (1994).



(Figure 2.48) View of the central face at Cross Roads (Rock Edge) Quarry, showing the regular bedding in coralliferous calcarenite of the Wheatley Limestone. The coral clasts rarely exceed 10 mm in diameter. Hammer shaft is 30 cm long. (Photo: J.K. Wright.)



(Figure 2.49) Correlation of sections in Magdalen Quarry, Cross Roads Quarry and Windmill Quarry (after Arkell, 1927, fig. 11), showing the transition from Coral Rag reef facies on the right into Wheatley Limestone facies on the left.