

## NEWBRIDGE

J.K. Wright

OS Grid Reference: SE800860

### Introduction

Newbridge Quarry is a large limestone quarry situated 2 km north of Pickering (Figure 4.24). It was first referred to by Blake and Hudleston (1877) as part of the 'Pickering Quarries' complex, and is currently being operated by RMC Aggregates (Northern) Ltd. There are substantial exposures of Middle Oxfordian rocks in this quarry (Coe, 1995), while Upper Oxfordian rocks are seen in the western and southern faces of the pit. In these areas, Upper Calcareous Grit is stripped off as overburden, leaving easily accessible graded ledges and ramps above the vertical working face of the quarry.

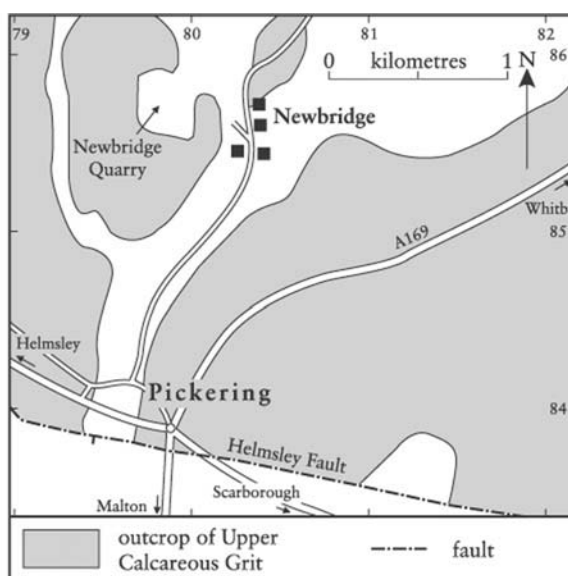


Figure 4.24: Locality map of Newbridge Quarry. Outcrop of the Upper Calcareous Grit from BGS Sheet 53 (Pickering) (1973).

Blake and Hudleston (1877) gave a detailed measured section of the Middle and Upper Oxfordian strata seen in the Pickering Quarries, though they do not state precisely where within the complex their section was measured. Fox-Strangways (1892), Arkell (1933) and Sylvester-Bradley (1953) described the quarry only in general terms. The detailed researches of Hemingway and Twombly (1964), Twombly (1965), Lee (1971) and Coe (1995) were concerned almost entirely with the Middle Oxfordian rocks. Wright (1972) recognized the importance of this exposure for stratigraphical and palaeontological studies of the Upper Oxfordian rocks, and designated Newbridge Quarry the type locality of the Newbridge Member of the Upper Calcareous Grit Formation. Sykes and Callomon (1979) subsequently figured six ammonites from this quarry belonging to a new species, *Amoeboceras newbridgense*. Wright (1996a, b) figured further ammonites from this quarry. A full faunal list from Newbridge Quarry is included in the following measured section.

### Description

The following section, taken from Wright (1996a), is visible at the southern end of the quarry:

	<b>Thickness (m)</b>
<i>Upper Calcareous Grit Formation, Glosense Subzone</i>	
<i>Spaunton Sandstone Member</i>	
4	seen to 0.63
Rubbly, nodular, silicified, very fossiliferous sandstone containing <i>Amoeboceras newbridgense</i> Sykes and Callomon, <i>A. nunningtonense</i> Wright, <i>A. glosense</i> (Bigot and Brasil), <i>A. ilovaiskii</i> (M. Sokolov), <i>A. shuravskii</i> (D. Sokolov), <i>Microbiplices</i> sp., <i>Perisphinctes</i> sp., <i>Myophorella clavellata</i> (Parkinson), <i>Pleuromya uniformis</i> (J. Sowerby), <i>Chlamys midas</i> (Damon), <i>C. fibrosus</i> (J. Sowerby), <i>Lucina lirata</i> Phillips, <i>Nanogyra nana</i> (J. Sowerby), <i>Camptonectes lens</i> (J. Sowerby), <i>Pseudomonotonis ovalis</i> (Blake and Hudleston), <i>Goniomya literata</i> (J. Sowerby) and <i>Pentacrinus</i> sp.	
3	1.5
Fairly tough, flaggy sandstone, strongly bioturbated towards the top. Contains <i>Amoeboceras</i> sp., <i>Perisphinctes</i> ( <i>Perisphinctes</i> ) <i>cautisnigrae</i> Arkell, <i>P. (Pseudari-sphinctes) pachachii</i> Arkell, <i>Decipia decipiens</i> (J. Sowerby), <i>D. lintonensis</i> Arkell and <i>Modiolus pulchrum</i> Phillips	
<i>Newbridge Member, ?Ilovaiskii Subzone</i>	
2	1.26
Very shaly siltstone with occasional <i>Decipia ravenswykensis</i> Wright	
1	2.1
Shaly, sandy, sporadically oolitic marl, with numerous bored pebbles of blue–grey, fine-grained limestone containing <i>Rhabdophyllia</i> . <i>Chlamys</i> sp. is rare	
– Prominent, bored erosion surface –	
<i>Coralline Oolite Formation</i>	
<i>Coral Rag Member ?Tenuiserratum Subzone</i>	
	6.8)
(Blue–grey, fine-grained, laminated limestone with sporadic <i>Rhabdophyllia phillipsi</i> Edwards and Haime	

Fox-Strangways (1892) also recorded '*Liostrea bullata*' (a synonym of *Gryphaea dilatata* J. Sowerby), *Perna* sp., *Protocardia* sp. and *Thracia* sp. from this section.

A log of the section is given in Figure 4.25. The Newbridge Member beds are soft, weathering readily, and forming sloping ledges. Bored pebbles of Coral Rag encrusted by *Nanogyra nana* are common. The Spaunton Sandstone is tough and forms vertical faces at the top of the quarry. *Thalassinoides* burrowing is intense. The highest bed (Bed 4) contains silicified masses of chert. The silica was introduced into the bed by *Rhaxella*, spicules of which are readily visible in thin section. Ammonites and bivalves are abundant in this bed, the shells gently washed together so that breakage is frequent. Distortion has also occurred during compaction.

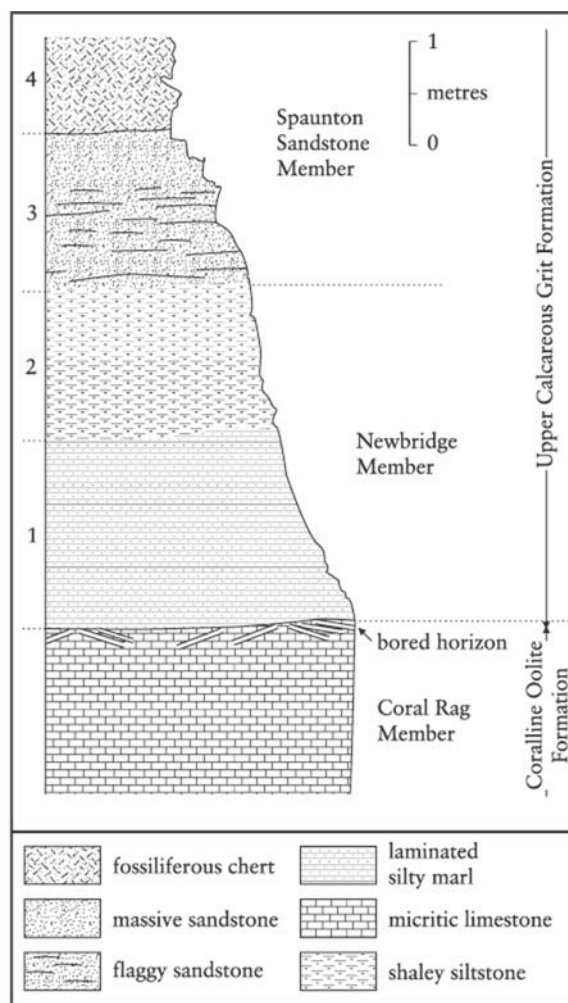


Figure 4.25: Log of the Upper Calcareous Grit at Newbridge Quarry, as measured by J.K. Wright in 1998.

## Interpretation

The facies of the Coral Rag is unusual here: a grey, sparsely fossiliferous, laminated limestone. As this splintery, flaggy, series of beds is traced westwards it takes on its normal coralliferous shelly micrite facies as seen in quarries at Wrelton and Spaunton (Wright, 1972). This was thus a lagoonal back-reef area with stagnant, muddy conditions.

There was a considerable period of non-deposition between the Coral Rag and the Newbridge Member, allowing the Coral Rag to be lithified and gently planed off in a marine bench. The bored erosion surface is seen particularly well at Newbridge, and also in nearby Wrelton Quarry, where Wright (1980) described an undulating bored erosion surface cut in micritic Coral Rag. The change from marine erosion to marine sedimentation was sluggish. The lowest beds thus consist of pebbly marl. Periodic surges apparently swept pebbles of limestone from beaches fringing low cliffs into the shallow, muddy sea.

Source areas were rejuvenated now, and quantities of sand and silt were brought into the area, forming Bed 3 of the Spaunton Sandstone. The fauna consists of scattered *Nanogyra* and frequent perisphinctids, with very rare *Amoeboceras*. Offshore marine shelf conditions were then established as the spicular sands of the upper Spaunton Sandstone were laid down (Bed 4). The association of prolific sponge growth with a prolific cardioceratid–bivalve fauna, seen previously in the Lower Calcareous Grit at the Tenants' Cliff site, was repeated, though whether this is an ecological or a preservational association, or a combination of the two, is not clear.

This exposure is relevant to both the Boreal and the Sub-Boreal ammonite zonal schemes. In the former case, the exposure has yielded numerous specimens of the Upper Oxfordian zonal index *Amoeboceras glosense*, along with *A. newbridgense* (Figure 4.5E) and *A. ilovaiskii* (Figure

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4.5D). Sykes and Callomon (1979) considered this an early Glosense Zone (Ilovaiskii Subzone) fauna, succeeded by a fauna with prolific *Decipia*. However, Wright (1996b) demonstrated that the fauna with *A. glosense* and *A. newbridgense* (Bed 4) occurs above the *Decipia* fauna (Bed 3), and that *A. newbridgense* is here an indicator of the Glosense Subzone, not the earlier Ilovaiskii Subzone (see site report for Leysthorpe Quarry, Nunnington, this volume). Newbridge Quarry has produced the richest Glosense Subzone ammonite fauna found anywhere in the Yorkshire Corallian. The assemblage is dominated by Boreal *Amoeboceras* and it has allowed this horizon within the Upper Calcareous Grit to be correlated with equivalent beds not only on Skye and in Greenland (Sykes and Callomon, 1979), but also in Canada, Alaska and Russia.

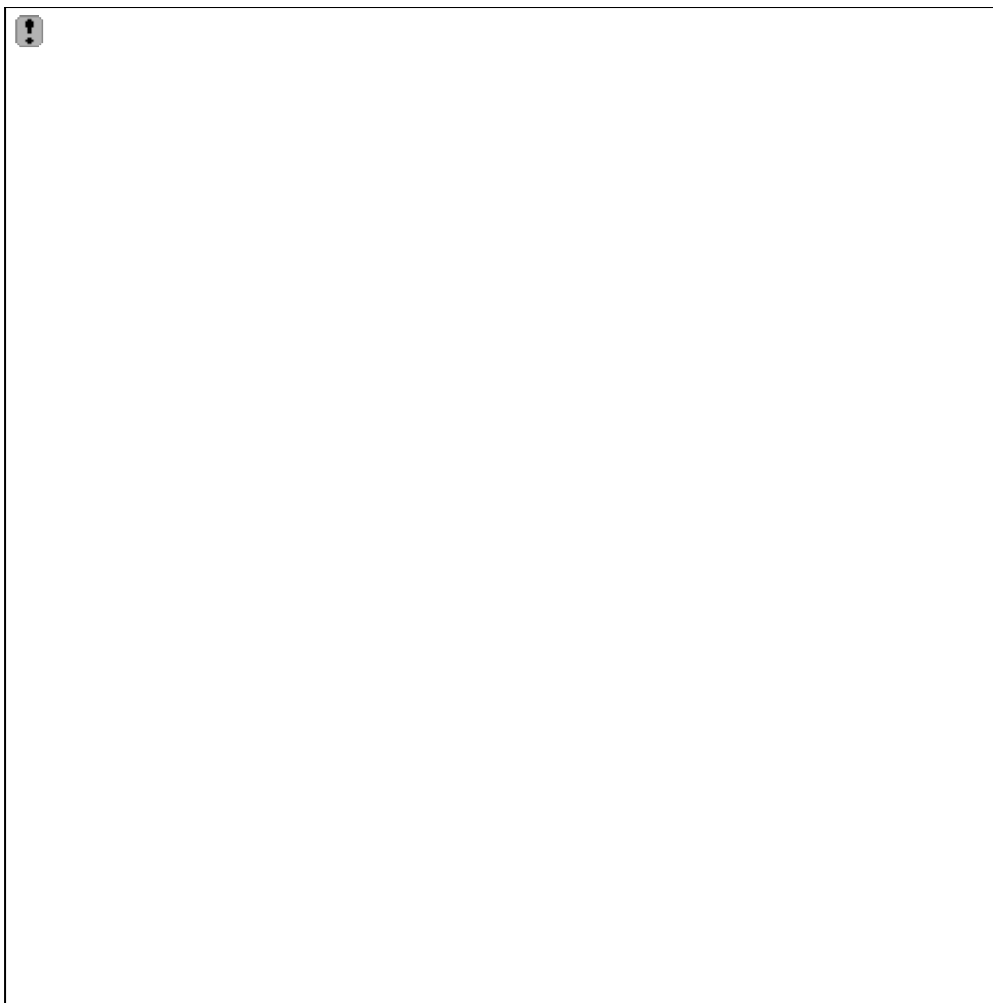


Figure 4.5: Selection of ammonites from the Corallian Group of the Cleveland Basin. (A) *Amoeboceras nunningtonense* Wright (holotype), Spaunton Sandstone, Leysthorpe Quarry, m27, ×1. (B) *A. glosense* (Bigot and Brasil), Newbridge Member, Leysthorpe Quarry, U/1/14, ×1. (C) *A. transitorium* Spath, Newbridge Member, Leysthorpe Quarry, U/1/5, ×1. (D) *A. ilovaiskii* (M. Sokolov), Spaunton Sandstone, Newbridge Quarry, U/2/38, ×1. (E) *A. newbridgense* Sykes and Callomon, Spaunton Sandstone, Newbridge Quarry, U/2/20, ×1. (F) *Perisphinctes* (*Pseudarisphinctes*) *pachachii* Arkell, Spaunton Sandstone, Spaunton Moor Quarry, U/3/63, ×0.33. (G) *P. (Dichotomosphinctes)* sp. Newbridge Beds, Leysthorpe Quarry, U/1/103, ×0.7. (H) *Cardioceras* (*Cardioceras*) *persecans* S. Buckman, Birdsall Calcareous Grit, Filey Brigg, YM1983/45F, ×1. (I) *C. (C.) cordatum* (J. Sowerby), Birdsall Calcareous Grit, Flassen Gill, YM1983/36F, ×1. (J) *C. (Vertebriceras)* aff. *dorsale* S. Buckman, Hambleton Oolite, Spikers Hill Quarry, C/2/17, ×1. (K) *C. (Plasmatoceras)* *popilaniense* Boden, Hambleton Oolite, Spikers Hill Quarry, C/2/59, ×1. (L) *C. (Scarburgiceras)* *harmonicum* Arkell, Tenants' Cliff Member, Tenants' Cliff, YM1983/17F, ×1. (M) *C. (S.) reesidei* Maire, Tenants' Cliff Member, Tenants' Cliff, YM1983/20F, ×1. (N) *C. (Vertebriceras)* aff. *phillipsi* Arkell, Tenants' Cliff Member, Tenants' Cliff, YM1983/23F, ×1. (O) *C. (S.) praecordatum* (Douvillé), Weymouth Member, Cayton Bay Waterworks, YM1983/9F, ×1. (P) *C. (S.) scarburgense* (Young and Bird), Weymouth Member, Cornelian Bay, YM1983/3F, ×1. (Photos: (A–E), (H, I), (L–P), J.K. Wright; (F, G), K. D'Souza; (J, K) K. Denyer. Collections: Prefixes 'U', 'C', J.K. Wright Collection; 'YM', Yorkshire Museum Collection, York; 'm', Woodend Museum, Scarborough.)

In the Sub-Boreal subzonal scheme, the type perisphinctid fauna of the Cautisnigrae Subzone lies in the Clavellata and Sandsfoot Clay Members in Dorset (see site report for Osmington, this volume). At Osmington, however, the Cautisnigrae Subzone fauna occurs in isolation, with non-sequences above and below, whereas at Newbridge the fauna occurs in the Spaunton Sandstone (Bed 3) above the Newbridge Member (Bed 2), which has yielded a slightly older fauna including an early variety of *Decipia*, *D. ravenswykensis* (Wright, 1996a). Correlation between several Upper Oxfordian sections in the Cleveland Basin, including Newbridge Quarry and Leysthorpe Quarry (see site reports, this volume), suggests that the Newbridge Member represents the Ilovaiskii Subzone (Wright, 1996a).

## Conclusions

This locality is one of the key sections in dating the final phase of Corallian sedimentation in the Cleveland Basin. Resting non-sequentially on the Coral Rag is one of the richest ammonite-bearing Upper Calcareous Grit successions in the area. The quarry contains the stratotype section for the Ilovaiskii Subzone Newbridge Member, which is here overlain by highly fossiliferous and bioturbated Glosense Subzone Spaunton Sandstone. The species of *Decipia* and *Amoeboceras* present here allow correlations with both the Clavellata Formation of Dorset and with parts of the upper Staffin Shales of Skye, and are consequently of great significance in correlation between faunal provinces.

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