Manton Stone Quarry, East Riding

[SE 940 025]

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Introduction

The succession at Manton Stone Quarry, in the East Riding of Yorkshire (formerly Humberside), was first described by Ashton (1975) when the section exposed the lower part of the Lincolnshire Limestone Formation and the boundary with the underlying Grantham Formation (see (Figure 4.45)). The lithological character of the lower part of the Lincolnshire Limestone Formation hereabouts is different from that of the Lincoln, and other more southerly, areas (see Greetwell Quarry, Metheringham and Castle Bytham GCR site reports, this volume), and the section at Manton Stone Quarry provided the first opportunity to determine the stratigraphy of the variable package of strata referred to by Kent (1966) as the 'Santon Oolite and Ravensthorpe Beds' (now the Santon Oolite Member and the Ravensthorpe Member), as well as the overlying Kirton Cementstone Member.

Description

The details of the section given below are based on Ashton (1975) and a recorded section held on file by English Nature; the lithostratigraphical classification of the Lincolnshire Limestone Formation follows Gaunt *et al.* (1992). The lowest beds have been seen only in excavations in the quarry floor.

	Thickness (m)
Lincolnshire Limestone Formation	
Kirton Cementstone Member	
Mudstone, grey, weathered to pale-brown	0.6
Scawby Limestone	
Limestone (pelsparite–biopelsparite), hard, massive, fine grained, grey, weathering honey-yellow, minor marl-mudstone intercalations; ooids and oncoids most common in upper part, those in brown-weathering shale, about 1 m from base, weather from white to brown; most beds have gradational soft, brown, shaly bases; diverse and patchily abundant fauna, mainly bivalves *Lucina*' *bellona* d'Orbigny, 'myids' in growth position, oysters, trigoniids), cerithiid gastropods and recrystallized corals; shell debris including bryozoans, echinoderms and serpulids	2.0
Mudstone, dark-grey, weathering brown, well laminated, slightly bituminous; abundant white, weathering brown, ooids and oncoids	0.6

Limestone (pelsparite usually with micrite-microspar matrix), hard, grey, splintery, thinly bedded or nodular, poorly fossiliferous, alternating with black or dark blue-grey mudstone-marl; limestones have subsidiary amounts of shell debris, accretionary grains, silt-grade, angular to subrounded quartz grains, and wood, are strongly bioturbated, with rare *Pleuromya;* abundant *Chondrites* in both limestones and mudstones, especially at their bed boundaries; mudstones have rich microfauna of ostracods and juvenile oysters, large amounts of montmorillonite, and minor amounts of mica, kaolinite and quartz; small, black, ooid-like grains in lower mudstone beds	2.35
Santon Oolite Member	
Limestone (oopelmicrite with recrystallized matrix), blue-hearted, weathering honey-yellow; well-preserved wood, sometimes bored, in pieces up to 1 m long; elaborate and dense burrow-systems including horizontal, vertical and oblique forms with individual burrows varying up to 10 mm in diameter and highly variable in length	*c.* 0.7
Limestone (pelmicrite with matrix recrystallized to microspar), cream-coloured with peloids, and sparsely scattered ooids; fossils (mainly concentrated in pockets) including bivalves such as bakevelliids and *Pholadomya* (in growth position), *Natica, Nerinaea,* cerithiid and other gastropods, serpulids and crustaceans; burrows (*Thalassinoides* and *Zoophycos*) present near top; shell debris	*c.* 0.9
Limestone (bio-oosparite), yellowish-brown; minor amounts of peloids; becoming increasingly micritic towards top; shelly with bivalve, gastropod and echinoderm debris, and thick-shelled bivalves, mainly preserved convex-side uppermost; beds have retort-shaped burrows in their top *c.* 0.15 m; gradational base	*c.* 0.4
Ravensthorpe Member	
Variable sequence of buff-coloured limestone (similar to underlying unit but with less quartz), brown clay, and orange-green sand with silt and clay lenses, and wood; *Chondrites* and large horizontal burrows	*c.* 1.1
Limestone (variably recrystallized micrite), grey, silty (quartz) with micaceous and clay-rich layers; clays with kaolinite dominant, minor quartz, mica and montmorillonite, and traces of felspar and pyrite; poorly fossiliferous except for abundant burrows (most common in upper part) such as *Chondrites, Thalassinoides, Zoophycos*	*c.* 1.3
Mudstone, calcareous, grey with ooid-like grains at base; very shaly at top; mainly kaolinite with minor mica and quartz, and trace of montmorillonite; poorly fossiliferous with small oysters, serpulids and isolated *Chondrites*	*c.* 1.3
Cleatham Limestone	

Limestone (bio-oosparite), blue-grey, weathering honey-yellow, passing down with decreasing numbers of ooids into biomicrite; micritic matrix largely recrystallized; shell fragments, particularly bivalves and gastropods (notably cerithiids); burrows including *Chondrites;* oyster-rich, shaly base	*c.* 1.0
Limestone (biomicrite), hard, grey, porcellaneous	*c.* 0.3
Limestone (pelmicrite with matrix variably recrystallized), fine grained, silty, grey, weathering yellow-brown; shelly at base with bivalves (small oysters and trigoniids), belemnites and serpulids; trace fossils including large, horizontal burrows; less shelly above with serpulids predominant, and with shell debris, peloids, silt-grade, angular, detrital quartz grains and minor amounts of mica	0.53
Grantham Formation	
Mudstone	

Interpretation

When originally described by Ashton (1975), the basal 0.53 m (Unit A) of the Lincolnshire Limestone Formation was classified as Basal Hydraulic Limestone Member (following Kent, 1966). This member was based on the Hydraulic Limestone of Ussher *et al.* (1890). However, 1:10 000 scale geological surveying of the Humberside area by the British Geological Survey in the 1960s and 1970s showed that the Lincolnshire 'Hydraulic Limestone' of previous accounts did not extend as far north as previously thought and it was separately named the 'Cleatham Limestone' (Gaunt *et al.,* 1980). In the Manton Stone Quarry section, Gaunt *et al.* (1992) assigned Ashton's (1975) Unit A and Unit B to this stratum, which they considered as part of the Ravensthorpe Member. Originally, Ashton (1975) had identified his Unit B as the lower limb of the Santon Oolite Member which interfingered with the Ravensthorpe Member, and he proposed the site as the type locality for these two members as well as the underlying Basal Hydraulic Limestone Member.

Gaunt *et al.* (1992) also named separately a predominantly limestone unit (the Scawby Limestone), which formed the upper half of Ashton's (1975) Kirton Cementstones Member (this member based on Wilson, 1948) (Figure 4.48). This new unit comprised Ashton's Unit F plus the underlying 0.6 m of dark-grey, brown-weathering oncoidal mudstone, which was included because of its close cyclical relationship with the overlying limestones. The small thickness of mudstone at the top of the section was assigned by Ashton (1975) to the Kirton Cement Shale [Member] following the nomenclature of Richardson (1940), although this term had been published earlier by Muir-Wood (1939). Later, Ashton (1980) modified the name to 'Airton Shale Member', following Kent (1941). However, Gaunt *et al.* (1992) treated this unit as an unnamed third division (above the Scawby Limestone) of the Kirton Cementstones Member. This unit, which is famous for the coral 'patch reefs' that it contains, is fully developed at the nearby Cliff Farm Pit (see GCR site report, this volume). At Manton Stone Quarry, coral knolls have been mapped out within the GCR site boundaries (BGS archives). In his unpublished thesis, Ashton (1977) figured one of them that had been left as an isolated upstanding remnant during the early working of the quarry.

According to Ashton (1975), the section at Manton Stone Quarry provided evidence that the carbonate sea regime, in which the Lincolnshire Limestone Formation was deposited, was at times interrupted by the influence of the delta that occupied the area of North Yorkshire at that time. Supported by observed variations in the quartz content within the succession, and differences in the clay mineralogy between the more clastic-rich (with kaolinite dominant) and carbonate (with montmorillonite dominant) deposits, he suggested that either by southwards prograding or by channel-switching, immature terrigenous clastic sediments were introduced from the north, and not until the retreat or further switching of the delta did carbonate sedimentation re-establish itself.

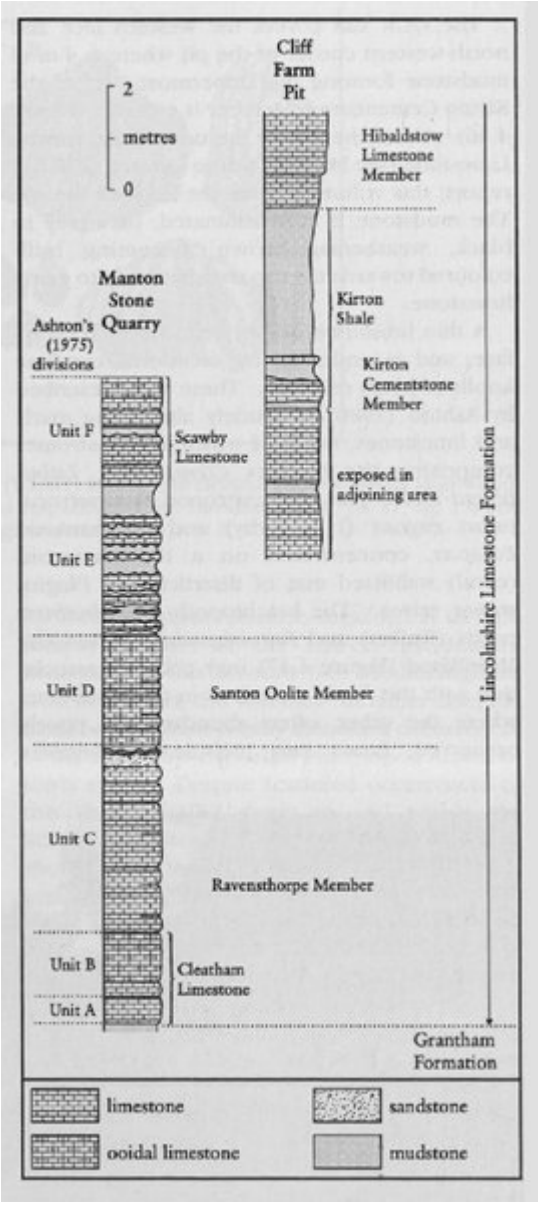
There are no reliably age-diagnostic fossils reported from this site although, according to Ashton (1975), the brachiopod *Acanthothiris crossi* (Walker) is widely recorded from the uppermost bed of his Unit F (= Scawby Limestone). Gaunt *et al.*

(1992) cited an ammonite of '*Witchellia* type' from that stratum at a locality [SK 9685 9348] near Atterby, some 9 km south of Manton Stone Quarry, suggesting that there it belongs to the Ovalis Subzone of the Laeviuscula Zone (now the Ovalis Zone). These authors also considered that the Cleatham Limestone of this area belonged to the Discites Zone, based on ostracod faunas recovered from other localities by Bate in Gaunt *et al.* (1980); at the time of Ashton's (1975) work, practically the whole of the Lincolnshire Limestone Formation was considered to belong to that zone. The precise relationship of the beds exposed at Manton Stone Quarry with the standard ammonite-based zonation must be considered tentative.

Conclusions

Manton Stone Quarry provides a rare section through the lower part of the Lincolnshire Limestone Formation that is unlike the lower part of that formation in the Lincoln, and more southerly, areas. The site is of considerable importance for the interpretation of the local and regional stratigraphy of the formation, as well as palaeoenvironmental analysis that involves the interplay of southerly influenced carbonate deposition and northerly influenced clastic deposition.

References



(Figure 4.45) Graphic sections of the Lincolnshire Limestone Formation at Cliff Farm Pit and Manton Stone Quarry. (Based partly on Ashton, 1975, fig. 3; lithostratigraphy based on Gaunt et al., 1992.))

(Figure 4.48) Kirton Cementstone Member with Scawby Limestone at Manton Stone Quarry (Photo: M.G. Sumbler.))