Castle Bytham, Lincolnshire

[SK 990 180]

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Introduction

The disused quarry at Castle Bytham, 11 km NNW of Stamford, Lincolnshire, is a key exposure showing much of the upper part of the Lincolnshire Limestone Formation (Figure 4.35). It is the type locality for Ashton's (1980) Clipsham Member in the Upper Lincolnshire Limestone, and of the Castle Bytham Beds in the upper part of his Lincoln Member (Lower Lincolnshire Limestone). Perhaps most importantly, it has yielded several ammonites crucial to the dating of the Lincolnshire Limestone Formation. The quarry (the 'Castle Lime Works') was alluded to by Hollingworth and Taylor (1951) and described by Richardson (1939a) who recorded some 14 m or so of strata. Kent (in Sylvester-Bradley, 1968) gave slightly more detail; an extended and further elaborated section by Ashton (1977, 1980) forms the basis of (Figure 4.36).

Description

The succession is described in general terms below, with lithostratigraphical terminology and bed numbering following Ashton (1980).

	Thickness (m)
Lincolnshire Limestone Formation	
Upper Lincolnshire Limestone	
Clipsham Member	
15–18: Limestone, pale greyish-brown, cross-bedded (sometimes on giant scale), ooidal grainstone, shelly in parts	seen to 4.8
Sleaford Member	
10–14: Limestone, pale-greyish to brownish, variable; shelly, cross-bedded; massive oolite; well bedded, fossiliferous, fine grained	5.0
Lower Lincolnshire Limestone	
Lincoln Member	
5–9: *Castle Bytham Beds:* Limestone, grey to off-white, ooidal	2.9
3–4: *Scottlethorpe Beds:* Limestone, grey, thinly to massively bedded, fossiliferous, varying from ooidal grainstone to carbonate mudstone	2.8
1–2: Limestone, sparsely ooidal and peloidal wackestone, becoming more massive and ooidal below	1.8

The Lincoln Member comprises three sedimentary rhythms, each commencing with a bed of ooidal grainstone that rests erosively on the underlying beds, and passing up into lower energy facies packstones and wackestones. The basal unit of the member (Bed 1) is quite fossiliferous at the base, notably with corals such as *Thecosmilia.* Much of the middle rhythm of the Lincoln Member (beds 3 and 4), named the 'Scottlethorpe Beds' by Ashton (1980), comprises sparsely peloidal wackestones. The topmost bed (Bed 4) is an oolite with corals, bivalves, nerineid gastropods and brachiopods including *Acanthothiris crossi* (Walker). This bed probably represents the Crossi Bed[s] of Richardson (1939a) and Kent (in Sylvester-Bradley, 1968), which was the lowest unit seen by them.

Beds 5–9 (the Castle Bytham Beds) represent the topmost rhythm of the Lincoln Member. The basal and top parts are ooidal grainstones although, as in the underlying Scottlethorpe Beds, the middle part of the unit includes lower-energy lithofacies, with bi-modal packstones and sparsely peloidal wackestones. The fauna, which is particularly common in the lower part of the unit, includes bivalves such as '*Lucina*' *bellona* d'Orbigny, brachiopods (mainly tere-bratulids), gastropods (mainly nerineids) and corals including *Montlivaltia* and *Thamnasteria.* Most importantly, at least three ammonites have been obtained from the uppermost part of the unit (Richardson, 1939a; Kent, 1966; Ashton, 1977), probably from Bed 8.

The succeeding beds, 10–14, belong to Ashton's (1980) Sleaford Member, the basal unit of the Upper Lincolnshire Limestone. These beds, corresponding approximately with the Roadstone of Richardson (1939a), are mainly ooidal grainstones, cross-bedded in parts, and rest sharply on an erosion surface on the underlying strata. In addition, Bed 12, in the middle of the unit, is a rather nodular, pale-grey, sparsely ooidal wackestone containing common recrystallized corals as well as nerineid gastropods, bivalves and sporadic brachiopods such as *Zeilleria.* The top of the Sleaford Member is an eroded hardground, with a bored and oyster-encrusted surface, of which more details are given by Marshall and Ashton (1980).

Some 4.78 m of the Clipsham Member, probably representing almost its full thickness (*?c. 6–7* m), are recorded beneath the succeeding Rutland Formation that crops out just beyond the boundary of the quarry. The member is composed of well-sorted, ooidal and shell-fragmental grainstones. Both the basal and uppermost parts of the succession are particularly coarse-grained and rich in shell debris. Most of the succession is markedly cross-bedded, with individual sets up to 2 m thick. Ashton (1980) noted that foreset orientations indicate bi-polar currents, trending variously towards the south-west and north-east. Fauna, mostly as broken debris, is dominated by gastropods and bivalves, but also includes echinoderms, corals and bryozoa. An oyster-encrusted hardground occurs about 2 m above the base, and is succeeded by a structureless, bioturbated oolite (Bed 16).

Interpretation

From beneath Bed 1, signs of marly clay are thought to mark the top of Ashton's (1980) Greetwell Member. The characteristic facies of his Leadenham Member, which, in central Lincolnshire, overlies the Greetwell Member (see Metheringham and Greetwell Quarry GCR site reports, this volume) are absent in south Lincolnshire (but see Sproxton Quarry GCR site report, this volume), and thus beds 1–9 are assigned to his Lincoln Member. This unit, classified as Middle Lincolnshire Limestone by Ashton (1980), is herein considered to be the topmost part of the Lower Lincolnshire Limestone. Within the Lincoln Member, the Scottlethorpe Beds probably correlate with the Kirton Shale of central and north Lincolnshire (see Cliff Farm Pit GCR site report, this volume). The 'Crossi Bed or Beds', defined by the occurrence of A. *crossi,* were at one time thought to be a regionally correlative unit, used by some workers to subdivide the Lincolnshire Limestone Formation, but A. *crossi* is now known to be of limited biostratigraphical value (Ashton, 1979). 'Crossi Beds' occur at different stratigraphical levels and are of no great stratigraphical significance. The quarry is the type locality of the succeeding Castle Bytham Beds (beds 5–9), which regional correlation (Ashton, 1980, fig. 4) suggests correspond with Ashton's (1980) Metheringham Member (?and Blankney Member) of central Lincolnshire (see Metheringham GCR site report, this volume). At Castle Bytham, this unit was termed the 'Bastard Freestone' by Richardson (1939a), and included in the Ancaster Beds' by Kent (in Sylvester-Bradley, 1968). The ammonites that probably come from Bed 8 were originally identified merely as *Sonninia* sp. and assigned to the Discites Zone, but the specimens were subsequently determined as *Sonninia* (*Fissilobiceras*) cf. *ovalis* (S.S. Buckman ex Quenstedt) indicating the Lower Bajocian Ovalis Zone (Parsons, 1974b, 1980a; Ashton, 1977).

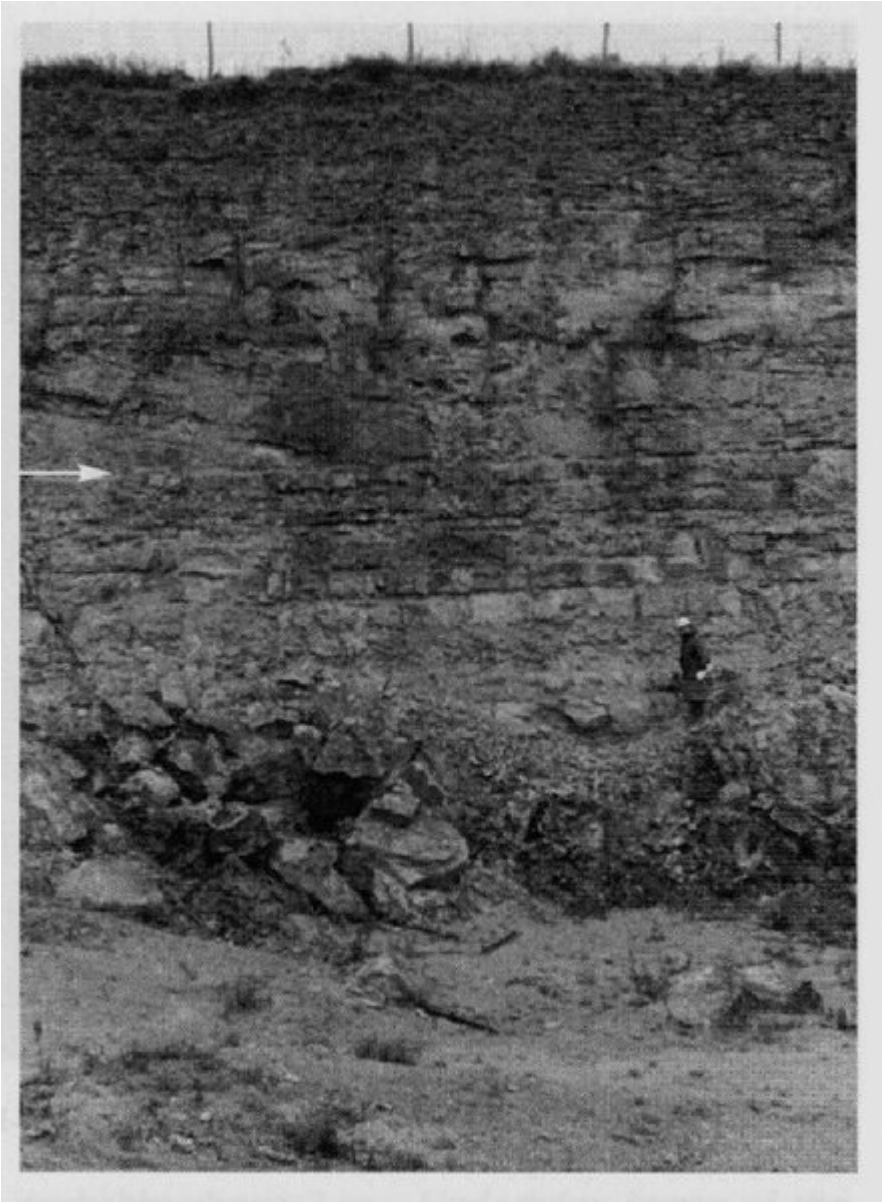
The quarry at Castle Bytham is designated a reference section for the overlying Sleaford Member (Ashton, 1980), Bed 12 of which constitutes the so-called 'Castle Bytham Coral Bed' of Richardson (1939a). Although the latter appears to be lenticular, it does not form a continuous bed; similar coralline 'patch reefs' occur within the member at several other localities (Ashton, 1980). An ammonite originally recorded as *?Hyperlioceras* (Spath in Kent, 1966) probably from the middle part of the member (?Bed 12) is now identified as *Shirburnia* cf. *fastigata* S.S. Buckman, indicating the Lower Bajocian Laeviuscula Zone (Ashton, 1977; Parsons, 1980a).

The topmost part of the succession (beds 15–18) belongs to Ashton's (1980) Clipsham Member (Richardson's (1939a) Clipsham Beds, and the Creeton Member of Ashton (1977)) of which Castle Bytham is the designated type locality.

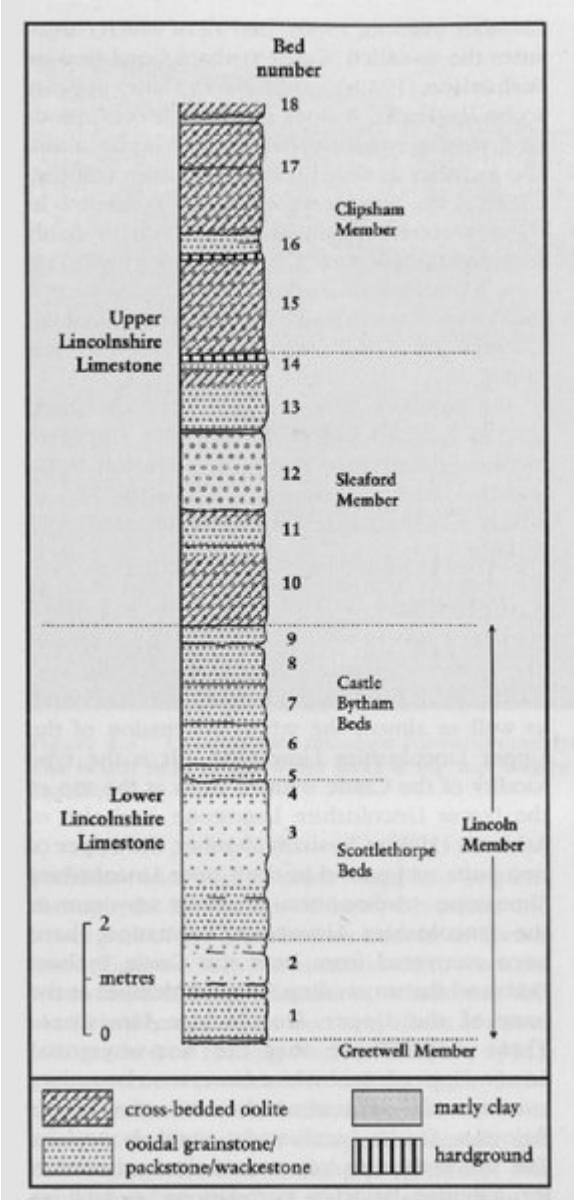
Conclusions

The quarry at Castle Bytham exposes the topmost part of the Lower Lincolnshire Limestone, as well as almost the whole succession of the Upper Lincolnshire Limestone. It is the type locality of the Castle Bytham Beds at the top of the Lower Lincolnshire Limestone, and also of Ashton's (1980) Clipsham Member, the upper of two units recognized in the Upper Lincolnshire Limestone. Ammonites, generally very rare in the Lincolnshire Limestone Formation, have been recovered from both the Castle Bytham Beds and the succeeding Sleaford Member at the base of the Upper Lincolnshire Limestone. These demonstrate that the non-sequential Lower–Upper Lincolnshire Limestone boundary corresponds approximately with the Lower Bajocian Ovalis–Laeviuscula zonal boundary. The site is thus an important reference section for Aalenian–Bajocian correlations as well as lithostratigraphy.

References



(Figure 4.35) Lincolnshire Limestone Formation in the quarry at Castle Bytham. The boundary between the Lower and Upper Lincolnshire Limestone is marked by a white arrow. (Photo: M.G. Sumbler.))



(Figure 4.36) Graphic section of the Lincolnshire Limestone Formation at Castle Bytham. (After Ashton, 1980, figs 6, 9.))