Littlemore Railway Cutting

[SP 532 028]

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Introduction

Littlemore Railway Cutting lies 0.7 km west of Littlemore Station, where it is crossed by the A423. The cutting was mentioned briefly by Blake and Hudleston (1877), and was first described in detail by Cobbold (1880). Woodward (1895) and Pringle (in Buckman, 1923–1925, pp. 61–2) each gave detailed accounts of the succession. Arkell (1927) was the first to name the argillaceous parts of this sequence the 'Littlemore Clay Beds'. Further descriptions of the cutting followed (Arkell, 1933, 1947b). McKerrow and Baden Powell (1953) also described the locality briefly, as did Fürsich (1973). Callomon (1960) examined all ammonites collected from the cutting and gave a definitive list of species present. Wilson (1968a) discussed the environment of deposition of these beds. Horton *et al.* (1995) gave a thorough description illustrated by photographs of the sections as they were when first cut.

Description

The beds in the cutting dip slightly to the west (Pringle, 1926, pl. IIIB; Horton *et al.,* 1995, pls 7, 8), and are presently buried beneath a façade of loose talus and undergrowth. The description below is thus based on those of Arkell (1947b) and Pringle (in Buckman, 1923–1925, pp. 61–2), as modified by Horton *et al.* (1995), but using Pringle's bed numbers.

	Thickness (m)
Stanford Formation	
Littlemore Clay Member	
8.–27. Alternating bands of blue-grey clay and nodular, white weathering mudstone or argillaceous limestone, in layers a few centimetres thick	5.0
7. Shelly limestone with *Perisphinctes* (*Perisphinctes*) sp.	0.6
Kingston Formation	
Beckley Sand Member	
6. Buff, shelly sand, crowded with dwarf *Chlamys fibrosus* (J. Sowerby) and *Nanogyra nana* (J. Sowerby)	0.25–0.3
5. Brownish-grey, marly limestone	0.15–0.3
4. Brown, shelly sand with *Chlamys fibrosus* resting on an irregular surface of Bed 3	0.35
3. *Littlemore Shell Bed:* dark grey, gritty limestone containing many ammonites. At the base is a shelly layer with small pebbles of chert and quartzite	approx. 0.3
2. Dark grey, calcareous sandstone	0–0.25
1. Buff sands, with spherical and elongated calcareous concretions on three levels	seen to 4.5

The shallow marine sands at the base, once regarded as part of the Lower Calcareous Grit, are now taken, together with beds 3–6, as the equivalent of the Beckley Sand (Wright, 1980). Bed 3 is the highly fossiliferous Littlemore Shell Bed. Beds 7 to 27 can conveniently be grouped as the Littlemore Clay Member. Fourteen ammonite species have been identified from this cutting (Callomon, 1960). The vast bulk of the fauna occurs in Bed 3, which is clearly a condensed deposit. Owing to the importance of these ammonite records in correlating the Littlemore sequence, the full faunal list as published by Callomon (1960) is given below:

Littlemore Clay Member

Beds 21,27

Perisphinctes (*Dichotomosphinctes*) *buckmani* Arkell

Bed 15

P. (*Kranaosphinctes*) sp.

Beckley Sand Member

Bed 7

P. (*Perisphinctes*) sp.

Bed 3 (Littlemore Shell Bed)

P. (*Dichotomosphinctes*) *rotoides* Ronchadzé

P. (*Arisphinctes*) cf. *cotovui* Simionescu

P. (*A.*) *pickeringius* (Young and Bird)

P. (*A.*) *belenae* de Riaz

P. (*Kranaosphinctes*) cf. *trifidus* (J. Sowerby)

P. (*K.*) *cymatophorous* (Buckman)

P. (*K.*) *decurrens* (Buckman)

Cardioceras (*Subvertebriceras*) *densiplicatum* Boden

C. (*Vertebriceras*) cf. *vertebrale* (J. Sowerby)

C. (*Scoticardioceras*) sp.

Goliathiceras cf. *chamoussetiforme* Arkell

The fauna of Bed 3 is clearly that of the Vertebrale Subzone; the sandy beds 4 to 7 may belong to the Antecedens Subzone, while the higher beds belong to the Parandieri Subzone.

Interpretation

The Littlemore Shell Bed represents a fine example of a remanie deposit laid down during a period of intense sediment starvation and is one of a number of such deposits occurring in the highly attenuated Middle Oxfordian succession in Oxfordshire, where deposition was controlled by the Birmingham–Oxford Block, the principal tectonic structure of the region (Horton *et al.,* 1995) (see site report for Cumnor, this volume). The Shell Bed has a pebbly base indicating an erosive contact with the underlying strata, and derived ammonites suggest a considerable stratigraphical break with the overstep of this horizon onto progressively older rocks.

The site is best known as the stratotype section of the Littlemore Clay Member, a predominantly argillaceous equivalent of the Coral Rag and Wheatley Limestone, developed under relatively low-energy conditions. The lithologies comprise interbedded clays and limestones. The outcrop is restricted to a belt 2–3 km wide running ESE–WNW along the Thames Valley for a distance of at least 10 km. At the only other exposure in similar facies (Hillmarton, North Hinksey), Arkell

(1947b) recorded interbedding of coralliferous with argillaceous lithologies, and suggested that inhibition of coral growth may have been due to blanketing with clay (see also Wilson, 1968a).

Following Cobbold (1880), Arkell (1927) suggested that the clay of the Littlemore Clay Member was derived from rivers flowing from the south-east off the London Platform. However, borehole evidence, according to Wilson (1968a), shows that coralliferous limestone facies extends in this south-easterly direction, and that it is more likely that the terriginous clay was derived from the north-west. The channel through the coral reef facies in which the clay is thought to have been deposited has characteristics similar to modern tidal channels traversing the coral reefs of the Trucial Coast.

The transition from the normal reef-dominated carbonate sequences of the Oxford district to the clay-rich Littlemore Clay Member is reflected in the nature of the latter's bivalve fauna. This provides a typical example of a soft-sediment infauna (Arkell, 1927; Fürsich, 1976b). *Astarte* sp., *Isocyprina* sp. and *Pholadomya* sp. occur together with the ubiquitous *Nanogyra nana.* Such forms provide extremely useful environmental indicators, being tolerant of the terrigenous influxes that characterize the member.

Conclusions

The site is an important locality in any study of Jurassic sedimentation and facies change. The Littlemore Member, the argillaceous equivalent of the Coral Rag–Wheatley Limestone succession, comprises a clastic-dominated sequence of impure limestone and clay units laid down in a channel in between carbonate coral reefs. The Littlemore Shell Bed, laid down during a period of intense sediment starvation, contains a stratigraphically valuable ammonite fauna displaying Boreal as well as Tethyan affinities.

References