STEEPLE ASHTON

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OS Grid Reference: ST91605598

Introduction

The Steeple Ashton GCR site is Britain's richest Jurassic coral locality. It has been renowned since the earliest years of geological study for its extremely localized Upper Oxfordian coral bed. No permanent exposure of the bed exists at the time of writing. The area of interest is in a field *c*. 300 m WSW of 'Spiers Piece', a farm lying *c*. 1 km south-east of Steeple Ashton village (Figure 2.31). The bulk of the coral fauna has been collected from this field and a valuable temporary trench was excavated in 1975 (Negus and Beauvais, 1979) in order to establish the relationship of the corals and the general stratigraphy.

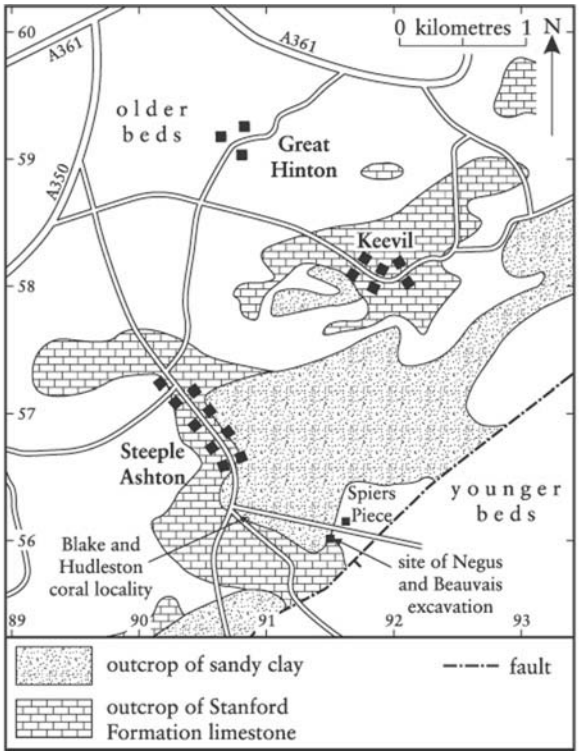

Figure 2.31: Locality map for the Steeple Ashton GCR site. Geological information from BGS Sheet 281 (Frome) (1965).

The site was described by Parkinson (1804–1811) and briefly mentioned by Lonsdale (1832, pp. 261, 263, 275). Corals from the locality were monographed by Milne-Edwards and Haime (1851) and the site described at length by both Blake and Hudleston (1877, pp. 286–7) and Woodward (1895, pp. 72, 111–12). More recently, authors such as Arkell (1928, 1933, 1935, 1935–1948), Negus (1975), and especially Negus and Beauvais (1979) have each emphasized the considerable stratigraphical, palaeogeographical and palaeoecological value of this site to Oxfordian geology.

Description

No actual exposure of the Steeple Ashton Coral Bed had ever been seen prior to the excavation carried out by Negus and Beauvais (1979). Blake and Hudleston (1877) noted that corals occurred in the field on the north side of the road that led south-eastwards south of Steeple Ashton (Figure 2.31). Woodward (1895) recorded an exposure of Calne Freestone at the Limekilns south of Steeple Ashton, 2 m of marly oolite and pisolite resting on 2 m of cross-bedded oolite. Corals were then found at a stratigraphically higher level, occurring loose in the

ploughed field between the roads leading south-east and east from here (Figure2.31).

In July 1975, Negus and Beauvais carried out an excavation at a locality 0.75 km east of Blake and Hudleston's and Woodward's site, at (ST 9160 5598), which falls within the GCR site (Negus and Beauvais, 1979). A detailed record of the coral bed was made, and the sequence in the trench was as follows:

		Thickness (m)
6	Coarsely crystalline coralline limestone, iron stained, with a layer of oysters at the base	seen to 0.05
5	Ferruginous, rust-coloured marl with many corals, shell fragments and much shell debris including *Nanogyra nana* (J. Sowerby) and serpulids	0.18
4	Rubbly, impersistent, pale-grey limestone with soft, marly patches and rare bivalves	at maximum 0.10
3	Grey, slightly rust-coloured marl, weathering cream-coloured	0.40
2	Irregular, rubbly, pale-grey limestone with rare bivalves	at maximum 0.10
1	Cream-coloured marl	0.20
	(hard limestone in base of trench)	

A log of the section is given in Figure2.32. This shows a thickness of at least 1.05 m of carbonates, with the scleractinian coral fauna restricted to Bed 5, a ferruginous marl deposit (Negus and Beauvais, 1979, fig. 1, p. 214). The coral colonies were observed to lie only 0.3 m below the field surface, a fact that readily accounts for such large numbers formerly being ploughed up so easily. The fine external preservation of the corals at the site has been noted by many authors, although the internal structure has been largely recrystallized, and a typical specimen shows replacement by sparry calcite or, to a lesser extent, micrite.

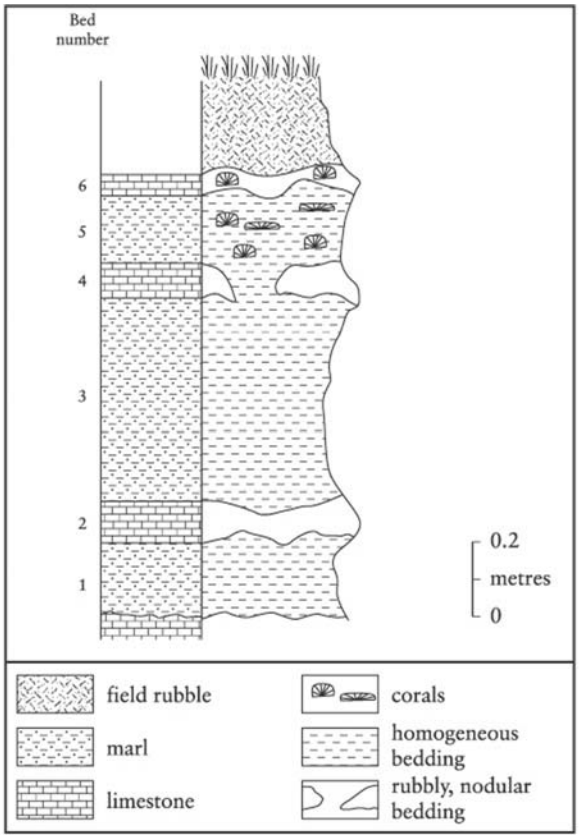

Figure 2.32: Log of the Corallian succession at Steeple Ashton (after Negus and Beauvais, 1979, fig. 1).

As was noted above, the Steeple Ashton Coral Bed is present in only a small area south-east of Steeple Ashton village, having apparently been removed by erosion over much of the area beneath overstepping sandy clay (Figure 2.31). This sandy clay was correlated with the ? Rosenkrantzi Zone Red Down Ironsand of north-west Wiltshire by Arkell (1951). Blake and Hudleston (1877) noted that the high ground around the village church was charged with red oxide of iron, and that iron ore was said to have been mined there. This may well be a thin representative of the Westbury Ironstone, coming in above the sandy clay as at Westbury (see site report for Westbury, this volume). Two oversteps seem to be involved, one beneath the sandy clay, restricting the outcrop of the coral bed to the area south-east of Steeple Ashton, and one beneath overstepping Ringstead Clay restricting the outcrop of the Westbury Ironstone to the area of Steeple Ashton itself. Stratigraphically, the horizon of the Steeple Ashton Coral Bed comes well above that of the Coral Rag (Figure 2.2). Negus and Beauvais (1979) record *Amoeboceras* sp., of Late Oxfordian age.

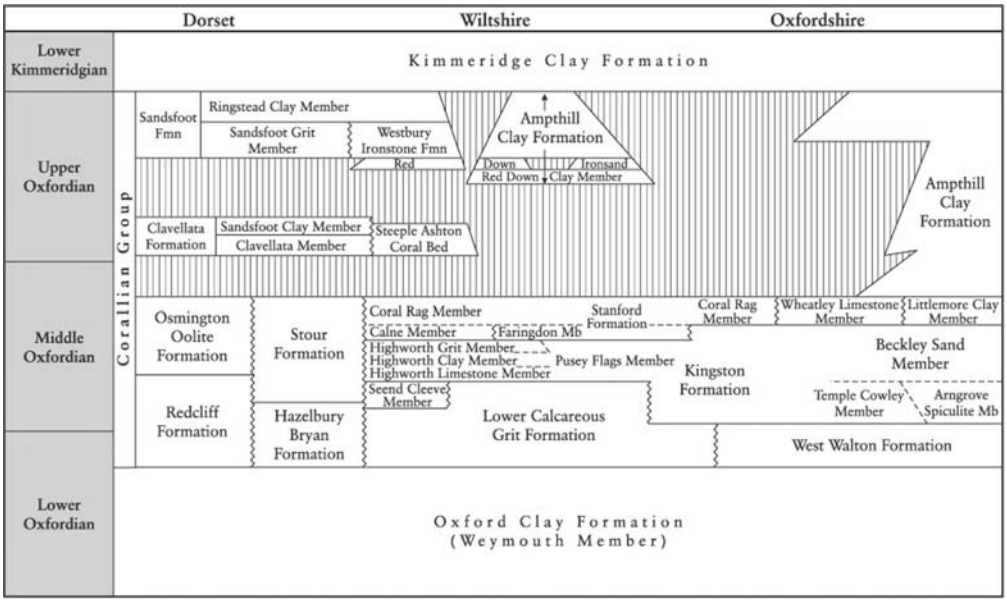

Figure 2.2: Correlation of Oxfordian strata in Dorset, Wiltshire and Oxfordshire.

From this locality, 46 scleractinian species belonging to 23 genera have been recorded. In this fauna, lamellar and fungoid forms are the most numerous, including the genera *Thamnasteria, Morphastraea, Mesomorpha, Protoseris, Fungiastraea, Thamnoseris, Microsolena* and *Comoseris.* No rounded massive forms occur, and only one phaceloid genus (*Calamophylliopsis*) is present. Solitary corals are represented by the genus *Montlivaltia*, which is abundant. Dendroid forms related to *Montlivaltia* (*Cladophyllia*, *Latiphyllia* and *Thecosmilia*) are also relatively numerous. Plocoid corals such as *Stylina, Cryptocoenia* and *Crateroseris* are quite rare. The full species list from the site, with new species, and systematic descriptions of the corals, is given by Negus and Beauvais (1979).

Associated with the corals is a facies-dependent reef-fauna consisting predominantly of attached and encrusting bivalves and serpulids. *Nanogyra nana* is common along with *Chlamys natheimensis* (de Loriol). *Gastrochaenolites* borings into *Thamnasteria concinna* (Goldfuss) contain natural casts of *Lithophaga inclusa* (Phillips). Serpulids occur on many of the Steeple Ashton corals and include tubes of the species *Mucroserpula tricarinata* (J. de C. Sowerby) and *Glomerula gordialis* (Schlotheim). *Myophorella clavellata* (Parkinson) burrowed into muds in between coral colonies. Negus and Beauvais (1979, p. 221) record a quite well-preserved rhynchonellid brachiopod, *Torquirhynchia* cf. *speciosa* (Münster), not previously recorded below the Kimmeridgian, from the site, whilst the echinoids *Acrosalenia angularis* (Agassiz) and *Nucleolites scutatus* Lamarck have been found here associated with cidarid spines.

Interpretation

The Steeple Ashton Coral Bed represents one of the youngest British Oxfordian coral developments. It post-dates the Coral Rag of north-west Wiltshire and Oxfordshire, the Upware Limestone in Cambridgeshire and the Yorkshire Coral Rag, all of Tenuiserratum Zone age (Wright, 1980). However, it pre-dates the Rosenkrantzi Zone Ringstead Coral Bed of south Dorset. Although Arkell referred to Steeple Ashton as a true reef, Negus and Beauvais (1979) advise that the term should be avoided since the precise form and location of the original coral structure is still unknown and dependent upon the outcome of further excavation.

In contrast to the normally impoverished species lists of other British Corallian sites, the unparalleled diversity of the Glosense Zone Steeple Ashton coral fauna, with 46 species, renders this site unique in the British Oxfordian. In a European context, Corallian reefs in the French Boulonnais contain about 17 species (Tomes, 1884) and reefs become more abundant and also richer in coral species southwards until Oxfordian coral growth reaches its acme in the Jura where the Rauracian reefs contain 184 species of coral (Koby, 1881–1889). Portugese localities have yielded 147 Corallian species. Although these numbers, quoted by Arkell (1935), may require revision, they are still useful indicators of the concentration and diversity of

Jurassic corals throughout Europe.

The highest number of coral species seen elsewhere in the British Corallian is that found in the Upware Limestone of south Cambridgeshire, where nine scleractinian species are now known to occur (see site reports for Upware South Pit and Dimmock's Cote Quarry, this volume). The Coral Rag of southern England and of Yorkshire provides only six or seven species, at best, although the number of individuals is high, especially in Oxfordshire. The greater diversity of scleractinian species at Steeple Ashton is thus in marked contrast to the Coral Rag faunas of sites such as Dry Sandford Quarry (Cothill), Shellingford Crossroads Quarry and the other GCR sites in the vicinity of Oxford, all of which are characterized only by species of*Thecosmilia*, *Rhabdophyllia, Isastraea*, *Fungiastraea* and *Thamnasteria.* Explanations for the paucity of coral species elsewhere in the English Corallian have to take into account the large number of species at Steeple Ashton. While latitude may have played some part in limited coral development and dispersal in the case of the faunally impoverished Oxfordian coral assemblages of Yorkshire (see site reports for Hackness Head and Betton Farm, this volume), latitude alone cannot have been the cause of the impoverishment of the Oxford fauna, situated relatively near to Steeple Ashton. It is difficult to agree withArkell (1947b) that the difference in numbers of species between the British and European faunas was chiefly due to isolation from the main coral build-up in Europe. Steeple Ashton, after all, was almost entirely isolated, the only other corals found in England at this horizon being small fragments of*Thamnasteria* recorded from the Dorset Clavellata Member (Arkell, 1935–1948). Salinity, water temperature, depth and turbulence due to current activity were probably the major features governing the ‘selection' of the scleractinian assemblage that flourished at Steeple Ashton, suggesting unique environmental conditions in the vicinity.

The biological and morphological characteristics of the species in this assemblage give some clues as to the palaeoenvironment. Plocoid corals, known to adapt themselves to active sedimentation, are not numerous. The prevalence of thamnasteroid and cerioid forms seems to indicate both limpid water and gentle sedimentation, whilst the greater number of flat or fungioid colonies may indicate a soft bottom. No massive forms have been recorded here. The overall impression is one of a flourishing, very diverse coral assemblage in which many genera and species had the opportunity to develop in an offshore shelf area of variable depth. The morphology of the foliaceous colonies suggests that growth may have occurred along a vertical face. Negus and Beauvais (1979) suggest that the closest recent analogue is that referred to by Pichon (1972) as ‘l'horizon des formes foliacées' or ‘horizon intermediaire' which is located on the outer slope of the reef-front of the ‘Grand Recif' of Tulear (Madagascar) at about 5–12 m deep. Here currents prevent any deposits smothering the corals, and foliaceous and encrusting forms prevail (see also Laporte, 1974). Insalaco (1996) noted that the presence of foliaceous forms is a good indicator of coral growth in relatively deep water.

Though they are not found in growth position, the preservation and concentration of the corals suggests that it is unlikely they were transported any great distance and were probably derived from the collapse and disintegration of some coral structure less than a kilometre from their position of burial. It has been suggested that the structure may lie*in situ* somewhere in the vicinity (B. Rosen, pers. comm., in Negus and Beauvais, 1979).

Arkell (1927) correlated the Steeple Ashton Coral Bed with the Clavellata Member of Dorset. The occurrence of a fragmentary *Amoeboceras* sp. collected from the field surface in association with the corals by Negus (Negus and Beauvais, 1979) supports this correlation, while a study of the ostracod fauna from the 1975 trench by T. Kilenyi confirms the Glosense Zone age of the fauna (Negus and Beauvais, 1979).

Conclusions

Steeple Ashton has long been renowned for its very localized coral bed which provides Britain's most valuable locality for the study of Jurassic corals. A total of 46 scleractinian species belonging to 23 genera have been recorded from the site, which produces a diverse assemblage list contrasting strongly with the normally impoverished coral assemblages of other British Corallian sites. The standard of preservation of the individuals and the concentration of the coral fauna within an extremely limited geographical area is unique in British Oxfordian stratigraphy. The Steeple Ashton coral fauna can be equated in its composition with the rich

Middle and Upper Oxfordian zonal coral assemblages of the Jura, although it has few affinities with other sites in Europe. The coral bed is a key invertebrate locality bearing considerable stratigraphical, palaeogeographical and palaeoecological interest.

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