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# Studley Wood, Hampshire

[SU 227 158]

## Highlights

The prolific, mainly molluscan, fauna of this site represents marine conditions spanning the boundary between the Lutetian and Bartonian Stages. As the only site where this occurs in southern Britain, it is of considerable international importance.

## Introduction

The site comprises a stream section near the source of the Latchmore Brook in the Studley Wood Inclosure (around grid reference [SU 227 158]). Including sections both upstream and downstream from the latter, something around 10.5 to 11.5 m of mainly fossiliferous, sandy muds and muddy sands are present. Their precise stratigraphical assignment is not entirely agreed, although it is clear that they occupy a position adjacent to the Selsey Sand/Barton Clay boundary. A map of the exposures is given in Todd (1990, fig. 1), whose account is the most recent and comprehensive guide to the locality.

As Todd (1990) has pointed out, the section was rather surprisingly unknown to Keeping, Fisher and other 19th century workers who discovered other fossiliferous sites in the New Forest, such as that at Shepherd's Gutter. Todd referred to the discovery of typical 'Huntingbridge bed' fossils at the north-eastern end of the site by J.G. Turner some time before August 1956, although much of the section was re-discovered by C. King, following his consultation of notes made by Wrigley (currently lodged in the Natural History Museum), who noted fossils in the banks of the Latchmore Brook in the 1930s. Following current usage, the 'Huntingbridge bed' (Hunting Bridge bed of Fisher, 1862, p. 79) has informal stratigraphical status.

Apart from Todd's (1990) paper on the stratigraphy and correlation of the site, few descriptions have been published. Brief stratigraphical resumes appear in Curry (1968, in French), Stinton (1970) and Kemp *et al.* (1979), but despite the prolific fauna, no comprehensive palaeontological account has as yet been published. Certain aspects of the site are referred to by Edwards and Freshney (1987a, pp. 54–6), whilst it was sampled by Costa *et al.* (1976) in their broader study of the dinoflagellate palynostratigraphy of middle Eocene sections in the Hampshire Basin and later by Aubry (1983, 1985, 1986) as part of her investigation into the calcareous nannoplankton of western Europe.

## Description

Although limited in its stratigraphical range, the Studley Wood site has contributed considerably to our knowledge and understanding of this part of the Palaeogene succession in the Hampshire Basin. It has a rich and varied fauna and, in an area of limited exposure, it provides an opportunity to investigate aspects of stratigraphy and palaeoenvironment, inland from the better known coastal exposures. However, its primary value is in providing a more or less complete, very fossiliferous sequence across the Lutetian/Bartonian boundary.

## Lithological succession

The succession (Figure 6.23) comprises a little in excess of 10.5 m of mainly glauconitic muds (mostly silty, sandy clays but sometimes silts). Sand laminae and lenses are not uncommon and Todd (1990) mentioned a thicker lenticular sand which may reach as much as 1 m in thickness.

## Stratigraphy

Stinton (1970) recognized three beds: in ascending order, Bed A (the Nummulite Bed), Bed B (the Huntingbridge Bed) and Bed C (the Coral Bed). More recently, Todd (1990) has recognized six 'units' at this locality. The lowest two (Units SW1a and 1b) comprise his Studley Wood Member (equivalent to Bed A above), for which the latter is the stratotype. Todd's (1990) remaining units are assigned to the Elmore Member (formerly the Elmore Formation of Kemp *et al.*, 1979), with Units SW2, 3a and 3b representing the 'Huntingbridge (Shell) Bed', Bed B of Stinton (1970). Stinton's 'Coral Bed' occurs at the base of Todd's Unit 4 (J.A. Todd, pers. comm., 1993) and not within Unit 3b as he originally thought (Todd, 1990).

## Palaeontology

The site has a varied and well-preserved biota. The Studley Wood Member contains a rich and diverse foraminiferal and ostracod fauna. *Nummulites* is abundant, comprising numerous *N. aff prestwichianus* sp. nov., a new and as yet undescribed taxon (T. Hennah, in Todd, J.A., pers. comm., 1993), and much rarer *N. variolarius*. In this communication, Todd referred to a rich macroinvertebrate fauna including sponges, corals (seven species including *Stylocoenia emarciata*, *Dendrophyllia* sp. and *Turbinolia sulcata*), serpulids, crabs, echinoids and ophiuroids, but dominated by bivalves (106 species) and gastropods (264 species). Ten species of shark have been recognized, whilst teeth and otoliths of other fish have also been found.

The Elmore Member also contains a rich fauna. Todd (1990) referred to the concentration of molluscs and other invertebrates in lenticles in SW3a. Most of the macrofossils are abraded and extensively bored, whilst *Nummulites* derived from Units SW1 is also present. J.A. Todd (pers. comm., 1993) referred to a smaller fauna than in Units SW1. Amongst the fossils present are corals (6 species), bivalves (52 species), gastropods (112 species.) and one species of cephalopod. The 'Coral Bed' contains the coral *Paracyathus* and large calcareous annelid tubes.

A comprehensive review of the fossil biota of Studley Wood will be published by Todd, Tracey and Le Renard in due course.

## Biostratigraphy

In a palynological study by Costa *et al.* (1976), material from this site was found to contain some 50 to 60 species of dinoflagellate, including the useful zone fossil *Wetzeliella*. Costa *et al.* (1976) found that the section could not be older than Eaton's (1976) microplankton Zone 5 (now the *Cyclonephelium intracatum* Assemblage Zone (B-5) of Bujak *et al.*, 1980). Two samples, from Stinton's (1970) Beds B and C respectively, did however yield some specimens resembling *Heteraulacysta?* sp. A, which raised the question of whether the section is in part of B-5 age or younger (see later discussion).

Aubry (1983, pp. 71–2) recorded an abundant and diverse nannoflora of 51 species from Studley Wood. Her section (Aubry, 1986, fig. 14) is difficult to relate to that of Todd (1990) but indicated that NP15 was represented at the base, with NP16 above and including the Studley Wood Member. J.A. Todd (pers. comm., 1993) has, however, pointed out that a detailed study of her 1983 paper shows that she did not appreciate the faulted nature of the succession and that the nannoplankton flora indicates an NP16 age throughout.

## Interpretation and evaluation

There is no doubt that, with its prolific and mainly well-preserved fauna, Studley Wood is a palaeontologically significant site. Its importance now as far as the 'Huntingbridge bed' is concerned is emphasized by the fact that Edwards and Freshney (1987a) were unable to find it near the locality after which it was named in King's Garn Gutter (around [SU 251 143]). There, only material reworked by collectors can be found in the extensive pits on both sides of the stream.

## Invertebrate palaeontology

According to Stinton (unpublished work), most of the molluscan species present at Studley Wood only occur in this area of the New Forest, except for the former section at Afton Brickyard (Curry, 1942). However, J.A. Todd (pers. comm.,

1993) has referred to fossiliferous sediments in Whitecliff Bay, whose fauna indicates an almost certain correlation with Beds SW2–3 of Studley Wood. Unfortunately, the exposures at Whitecliff Bay are limited by slipping, with the consequence that fossiliferous Bartonian samples are difficult to collect.

## Stratigraphical significance

Notwithstanding the richness of the fauna, it is the stratigraphical significance of the latter which is perhaps the most important aspect of the site. Todd (pers. comm., 1993) has pointed out that it provides a complete and very fossiliferous (foraminifera, ostracods, nannoplankton, etc.) marine sequence across the Lutetian/ Bartonian boundary. As this is the only site in Britain where this occurs, it is therefore of international importance. Furthermore, Todd considers that the basal Elmore Member of Studley Wood provides the only really fossiliferous exposure of basal Auversian sediments in the UK.

## Litbostratigraphy

The lithostratigraphical assignment of the Studley Wood succession has been a matter of some disagreement. Stinton (1975) referred the succession to his Huntingbridge Formation, although the latter was undefined and hence remained informal. Todd (1990, p. 47) is clearly at variance with Edwards and Freshney (1987a) as to where the boundary between the Selsey Sand and Barton Clay should be placed at Studley Wood. Whilst he considers it to be at the base of the Elmore Member (i.e. the base of the 'Huntingbridge bed'), they place it some 16 m higher (Edwards and Freshney, 1987a, fig. 29), having presumably decided that the 'coarsely glauconitic sandy silty clays' of the Elmore Member (Todd, 1990, p. 47) are more appropriately mapped as Selsey Sand. The differing views may reflect a preference for an 'event'-generated boundary by Todd, with Edwards and Freshney following Hedberg (1976) to select a lithological boundary between two different mappable units.

## Age and correlation

The precise age of the sequence in Studley Wood, particularly that of the 'Huntingbridge bed' (Stinton's (1970) Bed B), has been considered at some length by earlier workers. *Nummulites prestwichianus* is normally associated with the base of the Barton Beds, but Curry (1958b) considers the variety present in the Studley Wood succession (*N. aff prestwichianus* — see earlier comment) as somewhat older. Todd (1990) has suggested that this variety, found only in the New Forest and in the Porchfield borehole (Isle of Wight), is associated with marine sediments which, elsewhere in the Hampshire Basin area, were never deposited or soon eroded.

From their study of the dinoflagellates, Costa *et al.* (1976) concluded that the section was probably equivalent to the uppermost Bracklesham Beds (Prestwich Beds 25–29 at Alum Bay and Fisher Beds XVIII–XIX at Whitecliff Bay), whilst conceding that the dinoflagellate evidence is not positive enough to indicate the precise biostratigraphical position of the 'Huntingbridge bed'. The absence of *W. draco* and *Heteraulacacysta* ? sp. A. (? *H. porosa* of Bujak *et al.*, 1980) might suggest a correlation with the Bracklesham Beds, although specimens somewhat resembling the latter species are present in the Elmore Member. Since *H. porosa* gives its name to the overlying BAR–1 assemblage zone, it may be, as Costa *et al.* (1976) suggested, that the Huntingbridge Bed at Studley Wood represents a high position in the underlying B-5 assemblage zone.

Todd (1990) correlated his Studley Wood Member 'in time' with the marshy and shallow lagoonal deposits of Prestwich Bed 27 of Alum Bay. The 'Coral Bed' at Studley Wood has been correlated with 'Unit 6' of Elmore (Kemp *et al.*, 1979), although Todd (1990) has shown the evidence of this to be tenuous.

## Depositional environment

The fauna at Studley Wood reveals a great deal about the environment of deposition. Todd (1990, p. 48) interpreted the fauna of the Studley Wood Member, with its frequent littoral and brackish water molluscs, as representing a shallow marine, regressive environment. The abundance of *Lentidium* indicates very shallow shoreface conditions, whilst the overall fauna is characterized by diverse seaweed/seagrass epiphytes (particularly small herbivorous/detrivorous

gastropods) indicating 'near-seagrass meadow' conditions in a water depth of only a few metres (Todd, pers. comm., 1993). Todd further made the point that after that of Unit S10 of Curry *et al.* (1977) at Selsey, the fauna is the most diverse known from the English Palaeogene.

Todd's (1990) recognition that the Elmore Member here contains clasts derived from the underlying Studley Wood Member led him to conclude that this unit was transgressive, following some erosion of the underlying Studley Wood Member. He considered that the lowest part of the overlying Elmore Member represents a deeper water facies, with depths around 50 m plus. Todd (pers. comm., 1993) relates the large number of carnivorous and scavenging gastropods within this member to a high abundance of soft-bodied biota. Robust shells are particularly noticeable. The frequent concentrations of shells in 'seams' is thought to represent storm lags. Where the upper part of the Elmore Member is less fossiliferous, it may be that deposition was in deeper water with unfavourable bottom conditions and low oxygen levels (Curry *et al.*, 1968).

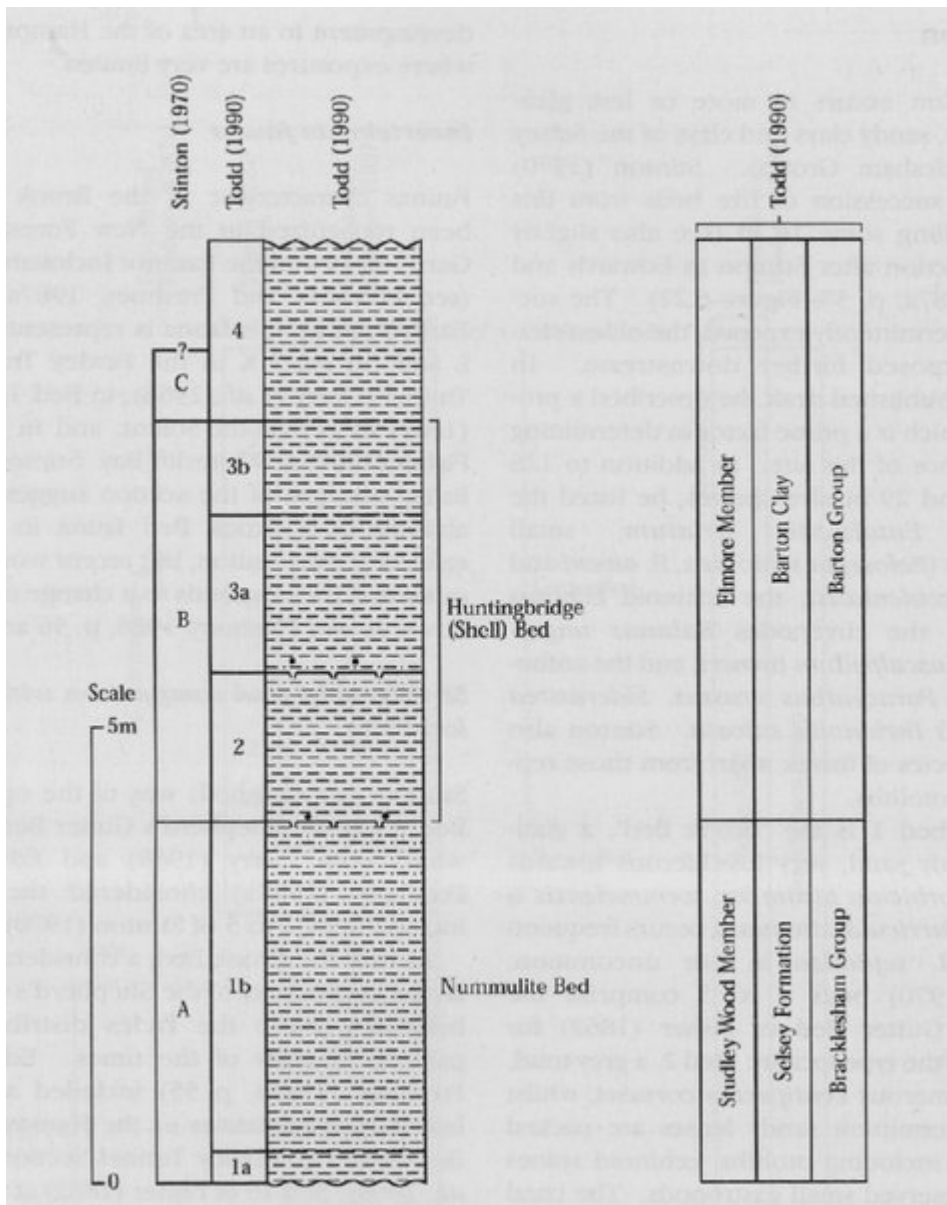
## Conclusions

Studley Wood has a prolific and mainly well-preserved fauna. Over 400 species have been found in the Studley Wood Member alone, of which 375 are molluscs, whilst a smaller but still rich fauna occurs within the Elmore Member. Many of the molluscan species found here, and at the other few New Forest sites, are not present at other extant exposures at this stratigraphical level elsewhere in the Hampshire Basin.

Other groups represented in the Studley Wood succession include corals, sponges, bryozoa, echinoids, serpulids, ophiuroids, crustaceans and fishes. The lowest beds present contain numerous microfossils include a diverse ostracod and foraminiferal fauna. The latter includes *Nummulites* aff *prestwichianus*, a variety thought to be older than *N. prestwichianus* and possibly representing marine strata poorly developed or absent outside the New Forest area.

Notwithstanding its palaeontological, palaeoecological and palaeoenvironmental significance, the site is biostratigraphically unique in being the only locality in Britain to provide a rich and varied marine fauna across the Lutetian/Bartonian boundary.

## [References](#)



(Figure 6.23) Succession across the Selsey Sand/Barton Clay boundary at Studley Wood, Hampshire (after Todd, 1990, text-fig. 2)