ABBEY WOOD

OS Grid Reference: TQ480786

Highlights

Bulk sampling of an unconsolidated shell bed in the Oldhaven Formation at Abbey Wood in Greater London has yielded an unique microvertebrate assemblage, which includes many teleost otoliths, one type species of shark and one ray. The Lessness Shell Bed is particularly rich in fossil vertebrates, and continues to be worked by members of the Tertiary Research Group on a regular basis.

Introduction

The temporary 'fossil pit' situated in the grounds of the Lessness Abbey Wood Nature Reserve has yielded a rich vertebrate fauna, including land-derived mammals, birds and reptiles, in association with abundant fish remains. Excavations of the site for Tertiary vertebrate remains were made in the early part of the 20th century, yielding much material which was documented in the classic paper by White (1931). Since then excavation has been sporadic, until 1992, since when the Tertiary Research Group has undertaken a twice-yearly venture to recover as much information about the unique Lower Eocene assemblage as possible.

The fossiliferous horizon at Abbey Wood (Figure 14.6B), is the Lessness Shell Bed, an unconsolidated shelly horizon in the Blackheath and Oldhaven Formation, which can be bulk processed by wet sieving. Most of the fossil recovery is done on site, and the yield of fossil vertebrate material is exceptionally high (S.M., pers. obs.). The fish assemblage is particularly rich in teleost otoliths and Abbey Wood is the type locality for several species of these microfossils. There is also an abundant fauna of shark teeth and some undescribed bony fish remains. The geology of the site has been described by Dewey *et al*. (1924), Rundle (1970), Cooper (1976b). Fish remains (otoliths) have been described by Frost (1931) and Stinton (1965c). The site is also important for the abundance of Eocene mammals recovered during bulk sampling (Collinson and Hooker, 1987; Hooker, 1979, 1991), and the site has been designated an SSSI for its fossil mammals. Fossil reptile remains have also been recorded from this site (Walker and Moody, 1974).

Figure 14.6: (A) Upnor sand pit, the eastern face exposing the upper part of the Oldhaven Formation (Photo: S.J. Metcalf.). (B) Exploratory trench in the Blackheath and Oldhaven Formation in Abbey Wood, Blackheath, (Photo: S.J. Metcalf, 1994).

Description

The strata that crop out in the nature reserve range from the Chalk to the Blackheath Beds, although no complete or natural exposures through the section occur in the woods. There were previously many trial pits on Lessness Abbey Heath, but all were disused by the time the site was recorded the British Geological Survey in the early 20th century (Dewey *et al*., 1924). The fossil pit occurs within the lower beds of the Blackheath and Oldhaven Formation, which in this area unconformably overlie the Woolwich Bottom Bed (Priest, 1919; Hooker, 1992). The Blackheath Beds are recorded as attaining a thickness of around 8 m in the Lessness area (Dewey *et al*., 1924).

The Blackheath Beds of the Blackheath and Oldhaven Formation typically form cross-bedded, unconsolidated pebble units and cemented ‘puddingstone' conglomerates, which occur in eastern Kent and the Greater London district and pass into the sands of the Oldhaven Beds in eastern Kent (Cooper, 1976b). At Lessness Abbey Wood the upper part of the Blackheath Beds consists of massive pebble beds, but the lower units are unusual in comprising sands with only scattered pebbles and a shell coquina known as the Lessness Shell Bed (Cooper, 1976b). This bed has yielded the vertebrate fauna. The coquina occurs as impersistent lenses lying upon the channelled surface of the underlying Woolwich Beds and is, in places, at least 1.6 m in thickness (J. Hooker, pers. comm., 1994).

The Lessness Shell Bed occurs as impersistent lenticles that can be rapidly exhausted by excavation, hence the Tertiary Research Group, in co-operation with the Bexley Ranger Service which maintains Lessness Abbey Wood Nature Reserve, monitor and supervise limited excavations in the woods on a twice-yearly basis. Fish teeth can be recovered from the fossil

pit, by passing the matrix and overlying topsoil through a standard 500 mm sieve (D. Ward, pers. comm., 1994). The excavations are written up in a series of newsletter reports (Hooker, 1992, 1993a, 1994) and the position of the sampled shell-bed lenses mapped out for future reference. It is hoped that by attempting to stop uncontrolled excavations, restricted and carefully monitored sampling will preserve the fossil site for the future. As most of the finds made at the legal digs are deposited in the NHM and subsequently described by members of the Group (e.g. Hooker, 1993b, 1993c) new or important material will not be lost.

Fauna

The fossil fish assemblage includes 14 type specimens of teleost otoliths, one ray and one of the lamnid shark *Synodontaspis*, which were recovered during excavations in the 1930s (Frost, 1931). The fish fauna recovered from recent excavations at the trial pit includes bony fish remains, a chimaeroid and a rich neoselachian fauna (Ward, 1980; S. Austen, pers. comm., 1995).

Chondrichthyes: Elasmobranchii: Neoselachii: Squatinomorphii

Squatina prima (Winkler, 1874)

Chondrichthyes: Elasmobranchii: Neoselachii: Galeomorphii **Carcharias hopei** (Agassiz, 1843)

Palaeohypotodus rutoti (Winkler, 1874)

Synodontaspis striatus (Winkler, 1874)

S. teretidens (White, 1931)

S. hopei (Agassiz, 1843)

Chondrichthyes: Elasmobranchii: Neoselachii: Batomorphii

Hypolophodon ('*Hypolophus*') *sylvestris* (White, 1931)

Chondrichthyes: Holocephali: Chimaeriformes

Amylodon eocenica (Woodward and White, 1930)

Otoliths

Interpretation

The Lessness coquinas appear to have formed upon the deeply channelled underlying strata of the Woolwich and Reading Beds (Hooker, 1992). Fish remains and other vertebrate material were trapped within the channel infills, which are themselves composed of broken bioclastic material, whole mollusc shells and derived pebbles. The molluscan fauna is a mixture of brackish and marine types, with the former predominating. The shells often provide a cement, and elsewhere the coarser-grained facies are cemented into conglomerates by this carbonate. Terrestrial vertebrate material is well preserved in the coquina, suggesting that the shoreline was fairly close (Hooker, 1992).

The clasts within the Blackheath Pebble Beds are reworked Chalk flints and quartz derived from the underlying Woolwich and Reading Formation. They represent the coarse basal units of the transgressive London Clay sea, and contain a mixed fauna with derived, remanent and new faunal elements. Most of the invertebrates are estuarine species that are either derived from the underlying Woolwich Beds or are Woolwich taxa which have survived the advancing marine conditions. However, there is also a marine component, which includes new forms characteristic of London Clay assemblages, and some species make their first appearances in these beds.

The Blackheath Bed selachian fauna is rather restricted in diversity, and appears to be dominated by nearshore and benthic-generalist taxa, which are also common in the

contemporary Oldhaven Beds and in the underlying Woolwich Beds. Several species of the sand shark *Synodontaspis* are common in the Lessness Shell Bed, including the type specimen of *S. teretidens* (White, 1931). The coastal assemblage also includes the type specimen of the small batoid *Hypolophodon* ('*Hypolophus*') *sylvestris* (White, 1931) and the monkfish *Squatina prima* (Winkler, 1874). Otoliths are common: 14 new species have been described from this site (Stinton, 1965a, 1965b)

Comparison with other localities

Large shark teeth have been recovered from several localities in the Blackheath Beds of Greater London district, but most of these were found in long-disused pits and temporary road cuttings, such as that at Swanscombe (TQ 5973) which exposed an impersistant shell bed with fish material (Dewey *et al*., 1924). Localities in the sandy facies Oldhaven Beds of eastern Kent have yielded abundant fossil fish teeth, in contrast to the Blackheath Beds, but this might be due to a sampling bias, as the former are exposed in large sand pits (Upnor (q.v.) and Shelford quarry: TR 160600) and along the northern Kent coast, e.g. at Herne Bay (q.v.). However, in terms of species richness, the fish assemblages, and in particular the teleosts, are much more representative in the Lessness Shell Bed than those of the other localities. This difference in faunal diversity may in part be on account of the focused sampling of the unit during excavations at Abbey Wood. The depositional environment of the shell coquina in the Blackheath Beds would also have concentrated vertebrate remains.

To the north-east, the Blackheath Beds grade into the marginal marine silts and sands of the Harefield Beds. Limited fish material has also been recovered from these units at Harefield Quarry, Middlesex (TQ 048911; Cooper, 1976b), and a road cutting at Bignell's Corner, Hertfordshire (TL 227007; Ward, 1976).

Conclusions

The conservation value of the temporary 'fossil pit' at Lessness Abbey Wood is derived from its exceptional Early Eocene fish fauna, which has been revealed by sporadic excavation over the past 60 years, and this includes 16 type specimens. Since 1992 regular supervised excavations of the fossiliferous horizon, the Lessness Shell Bed, has controlled the working of the deposit for research purposes. There is much potential for new and undescribed fish material to be recovered during the sampling.

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