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# Ferry Cliff, Suffolk

[TM 278 486]

## Introduction

The GCR site of Ferry Cliff, near Woodbridge in Suffolk preserves a sequence of Early Eocene sediments, including the mammal-bearing Suffolk Pebble Beds. The site was discovered by George and Vincent (1976) in the 1970s, and a fauna of molluscs, shark teeth and (probably reworked) mammal bones and teeth was obtained (Hooker, 1980, 1991b; Hooker *et al.*, 1980; King, 1981). The site is geographically close and stratigraphically identical to the classic site of Kyson, which has long been unavailable and built over.

## Description

The Suffolk Pebble Beds are exposed along the banks of the River Deben on the foreshore (George and Vincent, 1976; (Figure 3.4)). There is a prominent stone band in the cliff, the Harwich Stone Band, and some 6.7 m below it in the foreshore section is a pebble bed, the 'Suffolk Pebble Bed' of George and Vincent (1976). This horizon is a thin (1–3 m) glauconitic sand that contains rounded flint pebbles as well as clay and limonite clasts. In places it is cemented to form a conglomerate. It occurs sandwiched between the London Clay Formation (above) and the Reading Formation (below), and it is interpreted to represent the initial transgressive phase of London Clay Formation deposition similar to the Blackheath Beds at Abbey Wood ((Figure 3.5); see the Abbey Wood GCR site report in the present chapter).

## Fauna

The Suffolk Pebble Beds at this site have produced many fossil specimens, including shark teeth and rarer molluscs and mammal teeth (King, 1981). Mammal names are taken from the listing in Hooker (1998).

MAMMALIA

Marsupialia

Herpetotheriidae

Herpetotheriidae indet.

Leptictida

Leptictidae?

Leptictidae? indet.

Rodentia

Paramyidae

*'Microparamys' nanus* (Teilhard, 1927)

*Paramys* sp.

*Pseudoparamys* sp.

*Meldimys* sp.

Lipotyphla

Adapisoriculidae

*Pontifactor* sp.

Amphilemuridae

cf. *Macrocranion* sp.

Archonta undiff.

Nyctitheriidae

Nyctitheriidae indet.

Plesiadapiformes

Plesiadapidae

*Platychoerops georgei* Hooker, 1994c

*Chiromyoides* sp.

Primates

Omomyidae

*Teilhardina belgica* (Teilhard, 1927)

Pantolesta

Pantolestidae

Pantolestidae indet.

Carnivora

Miacidae

Miacidae indet.

Viverravidae

Viverravidae indet.

'Condylarthra'

Arctocyoniidae

*Landenodon woutersi* Quinet, 1968

Hyopsodontidae

*Hyopsodus wardi* Hooker, 1979

Family and order attribution uncertain

*Paschatherium dolloi* (Teilhard, 1927)

*Microhyus musculus* Teilhard, 1927

Perissodactyla

Equoidea

*Cymbalophus cuniculus* (Owen, 1842)

To date, 8 named mammal species have been described from Ferry Cliff, together with 12 other less precisely identified mammalian taxa. The fauna is diverse and includes a typical array of Neustrian forms (cf. Savage and Russell, 1983, pp. 65–70), including an opossum-like marsupial (Herpetotheriidae indet.), a few primitive insectivorans, two plesiadapiforms ((Figure 3.6)a), a basal primate, two early carnivorans and Europe's oldest horse relative, *Cymbalophus cuniculus* (Owen, 1842) ((Figure 3.6)b,c), together with a number of other archaic mammalian types. *Cymbalophus cuniculus* was originally considered to be a species of *Hyracotherium*, but Hooker (1984) erected the new genus *Cymbalophus* for it, originally relating it to tapirs and rhinoceroses, but subsequently returning it to the equoid clade (Hooker, 1994a).

## Interpretation

Problems have been encountered in determining the age of the Suffolk Pebble Beds. The mammalian fauna from Ferry Cliff compares best with that from Dormaal in Belgium, which is the reference locality for Mammal Paleogene Reference Level MP7 (Schmidt-Kittler, 1987). Try in France and Erquelinnes on the French–Belgian border also have similar faunas. All four are reference localities for the Zone PEI (Hooker, 1996a), which immediately post-dates the Mammalian Dispersal Event (MDE). The Suffolk Pebble Beds share the following taxa with Dormaal: *Paschatherium dolloi*, *Landenodon woutersi*, *Platychoerops georgei*, *Teilhardina belgica*, *Microhyus musculus* and '*Microparamys*' *nanus*. However, the stratigraphical position of the Suffolk Pebble Beds at the base of the London Clay Formation implies an age nearly a million years younger than the mammal fauna (Hooker, 1998).

The reason for the discrepancy is probably that the mammal remains in the Suffolk Pebble Beds are reworked from a level of Dormaal age, perhaps the Reading Formation, into a level equivalent in time to the Blackheath Beds (which have a PEIII Zone mammal fauna). Hooker (1991b, p. 80; 1996a, p. 213) listed seven pieces of evidence for the proposal that the Suffolk Pebble Beds mammalian fauna is reworked:

1. the Suffolk Pebble Beds specimens are robustly preserved, unlike the delicate bones from Abbey Wood, and many of them seem to have been rolled and abraded;
2. there are large clay clasts in the Suffolk Pebble Beds that could have been reworked from the underlying Reading Formation;
3. there are rare charophytes and bithyniid opercula with oysters and shark teeth — an unlikely assemblage in a near-shore marine high-energy depositional environment;
4. charophytes and bithyniid opercula are found together elsewhere in the London Basin only in the Reading Formation;
5. an old find of specimens of a plesiadapiform and of *Coryphodon* suggest an MP7 age for the Woolwich Formation, and the Woolwich Formation interdigitates with the Reading Formation, which perhaps suggests an MP7 age for them too;
6. Dormaal, and other MP7 mammal faunas from the continent, all occur below, not above, transgressive Ypresian deposits — this suggests perhaps a similar age assignment for the Reading Formation and an interpretation of the Suffolk Pebble Beds as a transgressive unit reworking previously deposited material.
7. The Suffolk Pebble Beds contain an abundance of Woolwich Formation pollen (Jolley and Spinner, 1991).

## Comparison with other localities

The mammal assemblage preserved at Kyson and Ferry Cliff is approximately the same age as the faunas described from Dormaal and Erquelinnes in Belgium and Try in France. These faunas are the oldest of the Eocene, representing the first elements of the MDE. These five sites have produced some of the oldest examples of artiodactyls, perissodactyls and primates in the world, and certainly the oldest in Europe. Of these five, the mammal-producing unit at Ferry Cliff has the benefit of being the one intercalated in the least incomplete succession but at the same time suffers from the problem of reworking. The creodont species *Arfia junnei* is shared with earliest Eocene faunas of Wyoming, USA (*A. gingerichi* Smith and Smith, 2001, named for the European assemblages, is doubtfully distinct), and other species, although distinct, are very similar in the two continents (Hooker, 1998).

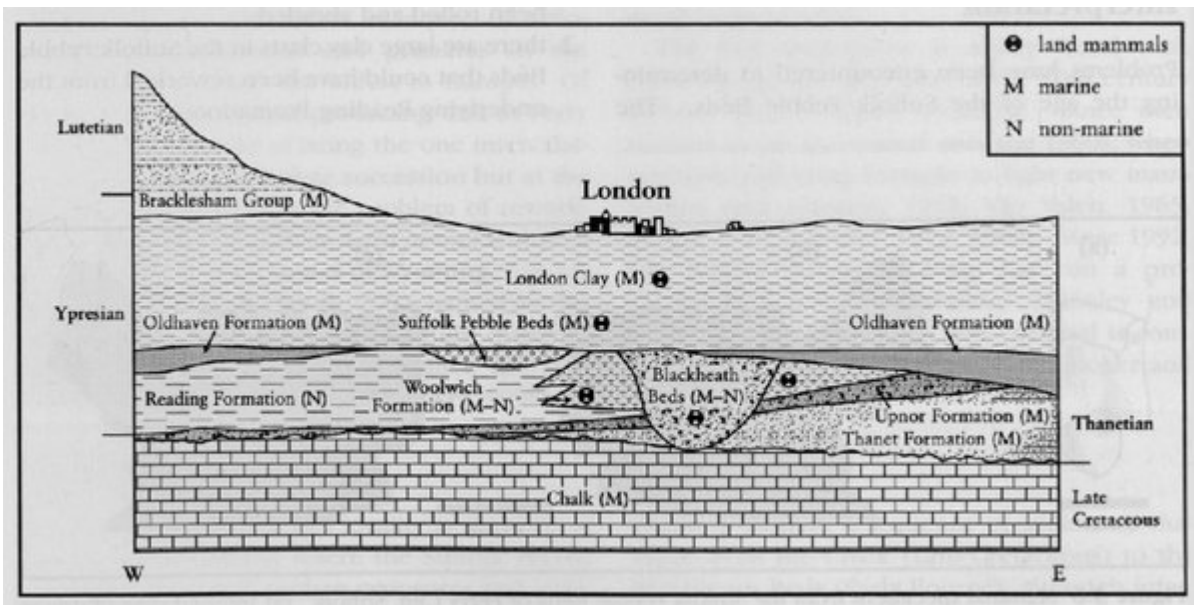
## Conclusions

Ferry Cliff is an important locality as it is one of a few sites in Britain where the Suffolk Pebble Beds can be seen in surface exposures and is the only place where well-preserved material can be collected. The fauna preserved in the Suffolk Pebble Beds shares with only a handful of sites in Europe and North America the oldest world records of primates, artiodactyls and perissodactyls (Hooker, 1998), giving it international importance. It also is the oldest mammal fauna of Eocene age in Britain. Thus, the fauna includes the oldest British records of marsupials, rodents, insectivorans (Lipotyphla), primates, carnivorans, artiodactyls and perissodactyls, as well as the oldest British records of a number of archaic orders, in particular plesiadapiforms, pantolestans, and creodonts. The Suffolk Pebble Beds at nearby Kyson was the type locality for the equoid *Cymbalophus cuniculus* (Owen, 1842), one of the oldest European horse relatives. It is quite likely that continued study at Ferry Cliff will produce more species of mammal.

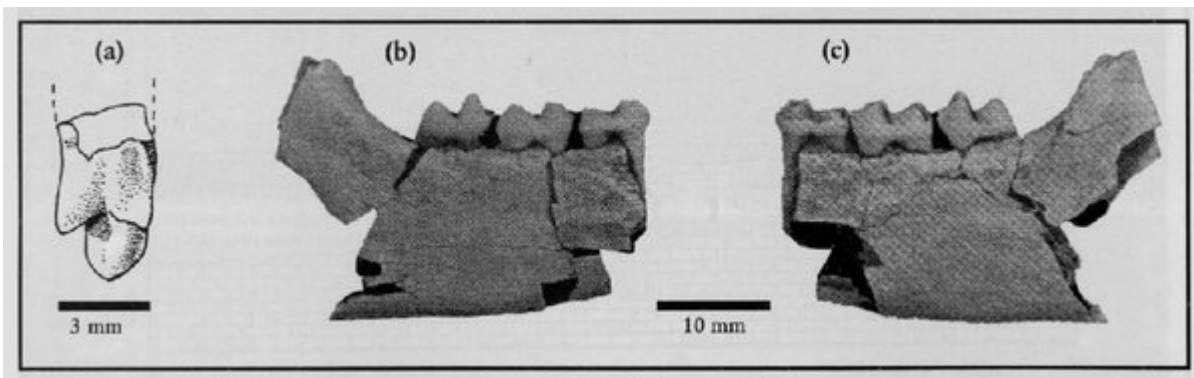
## References



(Figure 3.4) The riverside exposure of the Suffolk Pebble Beds at Ferry Cliff, Suffolk. The notebook is resting on the 25–35cm-thick pebble unit that overlies Reading Formation sands (Photo: J.J. Hooker.).



(Figure 3.5) The Paleocene and Eocene sediments of the London Basin shown in a cross-section running from west to east across London. The Suffolk Pebble Beds are projected in from farther north. (After Savage and Russell, 1983.)



(Figure 3.6) Mammal specimens from the Suffolk Pebble Beds of Ferry Cliff, Suffolk. (a) Internal view of upper incisor tooth of the plesiadapid *Platychoerops georgei* from the Suffolk Pebble Beds of Ferry Cliff, Suffolk; (b,c) Left lower jaw fragment of the early horse relative *Cymbalophus cuniculus* in internal (b) and external (c) views. (After Hooker, 1984, 1991b.)