Creechbarrow Hill, Dorset

[SY 922 824]

Introduction

The site of Creechbarrow Hill in Dorset has produced a rich and abundant late Mid Eocene (Bartonian) vertebrate assemblage. The fossils are preserved in a pisolitic and tufaceous sandy limestone, the Creechbarrow Limestone Formation.

The first work at Creechbarrow Hill was undertaken by Hudleston (1901, 1902a,b, 1903), who discovered the capping limestone. Subsequent investigations of the site included studies of the bivalves and vertebrates (Keeping, 1910) and correlation and comparison with the Bembridge Limestone Formation of the Isle of Wight (Bury, 1934; Arkell, 1947; Curry, 1958). The first mammal bone, 'part of the tooth of a '*Palaeotherium',* was reported by Keeping (1910). As a result of excavations by a team from the British Museum (Natural History) in 1975–1978, many mammals are now known from the site, including marsupials, insectivorans (lipotyphlans), primates, rodents, artiodactyls and perissodactyls (Hooker, 1977b, 1986).

Description

Creechbarrow Hill is a conical hill that forms an easily identified landmark in the Purbeck landscape (Hooker, 1986). The Creechbarrow Limestone Formation consists of a white to cream sandy limestone with a pisolitic and tufaceous texture. These sediments rest conformably on sands, clays and gravels of the lower and middle sections of the Creechbarrow Beds. The upper surface of the Creechbarrow Limestone Formation is truncated by an erosion surface (Hooker, 1977b; Collinson and Hooker, 1987). The sedimentary log shown in (Table 3.1) is taken from Hooker (1986, pp. 209–10).

The mammal specimens come from bed 12, the Creechbarrow Limestone Formation (Hooker, 1986). Specimens are disarticulated, and some show signs of abrasion. The mammalian remains are dominated by teeth; only a few bones have been described. The teeth display a variety of preservational characteristics: some are fresh, with mahogany enamel and dark-brown dentine, others are very worn. The bones also range from well- to poorly-preserved. It is thought that the land vertebrate remains were brought into a paludal to lacustrine depositional environment by periodic flooding events (Hooker, 1986). Some of the bones show the parallel tooth patterns produced from gnawing by rodents (Hooker, 1986).

Fauna

The Creechbarrow Limestone Formation has produced a mixed fossil assemblage, including reworked Cretaceous bryozoans (marine) as well as indigenous shelled terrestrial gastropods (Preece, 1980), prosobranch snail opercula, slug plates, bivalves, fishes and reptiles (crocodile). The faunal list is taken from Hooker (1986), with minor emendations from Hooker (1989b, 1991a; Hooker and Weidmann, 2000) and Harrison (2002).

MAMMALIA

Marsupialia

Herpetotheriidae

Amphiperatherium aff. *goethei* Crochet, 1980

Amphiperatherium fontense Crochet, 1980

Rodentia

Paramyidae

Plesiarctomys curranti Hooker, 1986

Plesiarctomys huerzeleri Wood, 1970

Manitshinae indet.

Ailuravus stehlinschaubi Wood, 1976

Gliridae

Glamys hookeri Harrison, 2002

Pseudosciuridae

Sciuroides rissonei Hooker, 1986

Treposciurus preecei Hooker, 1986

Suevosciurus authodon Hooker, 1986

Lipotyphla

Amphilemuridae

Gesneropithex figularis Hooker, 1986

Chiroptera

Hipposideridae

?Pseudorhonolophus sp.

Family indet.

Three genera and species indet.

Archonta undiff.

Nyctitheriidae

Nyctitheriidae indet.

Primates

Adapidae

Europolemur collinsonae Hooker, 1986

Leptadapis aff. *magnus* (Filhol, 1874)

Omomyidae

Nannopithex quaylei Hooker, 1986

Nannopithex sp. 1

Pseudoloris cf. *crusafonti* Louis and Sudre, 1975

Microchoerus wardorum Hooker, 1986

Microchoerus creechbarrowensis Hooker, 1986

Pantolesta

Pantolestidae

Pantolestidae indet.

Apatotheria

Apatemyidae

Heterohyus cf. *sudrei Sigé*, 1975

Heterohyus aff. *nanus* Teilhard, 1922

Heterohyus morinionensis Hooker, 1986

Carnivora

'Miacidae'

Paramiacis sp.

?Miacidae indet.

'Condylarthra'

Paroxyclaenidae

Vulpavoides cooperi Hooker, 1986

Artiodactyla

Cebochoeridae

Cebochoerus robiacensis Deperet, 1917

Acotherulum campichii (Pictet, 1857)

Choeropotamidae

Haplobunodon venatorum Hooker, 1986

Choeropotainus sp. indet.

Mixtotheriidae

Mixtotherium aff. gresslyi Riitimeyer, 1891

Mixtotherium sp. indet.

Mixtotheriidae gen. et. sp. nov

Anoplotheriidae

Dacrytherium elegans (Filhol, 1884)

Xiphodontidae

Dichodon cf. *biroi* Hooker and Weidmann, 2000

Dichodon sp. indet.

Dichobunidae

Mouillacitherium cf *elegans* Filhol, 1882

Hyperdichobune sp. 1

Amphimerycidae

Pseudamphimeryx? sp. indet.

Perissodactyla

Palaeotheriidae

Propalaeotherium aff. *parvulum* A (Laurillard, 1849)

Propalaeotherium aff. *parvulum* B (Laurillard, 1849)

Lophiotherium siderolithicum (Pictet, 1857)

Plagiolophus curtisi creechensis Hooker, 1986

(Table 3.1) The sedimentary log for the Creechbarrow GCR site, from Hooker (1986)

	Thickness (m)
Superficial deposits	
D. Modern topsoil	0.01–0.4
C. Soil horizon with limestone fragments and artefacts	0.2–0.4
B. Fine sandy soil horizon, no artefacts	0–0.3
A. Limestone rubble	0–0.3
Creechbarrow Limestone Formation	
12. Buff marl with variable-sized limestone clasts and fossils including shells of land and freshwater snails, snail opercula, slug plates, vertebrates and reworked silicified Cretaceous bryozoans	max. 1.6
Unnamed sands and clays	
11. Pale-brown, sandy silty clay with occasional angular flint fragments	1.0
10. Pale-brown, clayey silty sand	0.3
9. Pale-brown, very sandy silty clay	0.16
8. Pale-grey, silty clay with low sand content	0.16
7. Pale-brown, very sandy silty clay	0.2
6. Pale-grey, very silty clay with low sand content	0.2
5. Pale-grey, sandy silty clay	0.31

4. Pale-brown, slightly clayey silty sand, the clay content reduced in the middle of the bed	0.5
3. Pale-brown, very clayey silty sand	0.18
2. Very pale-grey, calcareous silty sand	0.14
1. Whitish buff, very calcareous sand with small ovoid and tubular calcareous concretions 2–5 mm in diameter	0.14

The marsupials — two species of *Amphiperatherium* — are represented by numerous teeth ((Figure 3.10)a,b); they differ in size and cusp arrangement. A pantolestid is represented by a single tooth. Rodents make up more than 50% of the individuals represented by the specimens from Creechbarrow Hill. Seven rodent taxa were described by Hooker (1986), again all based on teeth, and these included four species named from there: *Plesiarctomys curranti* Hooker, 1986 ((Figure 3.10)c); *Sciuroides rissonei* Hooker, 1986 ((Figure 3.10)d); *Suevosciurus authodon* Hooker, 1986 ((Figure 3.10)e); and *Treposciurus preecei* Hooker, 1986 (the latter was later raised from subspecies level by Hooker, 1991a). An eighth rodent, a dormouse, *Glamys hookeri* was described by Harrison (2002).

A species of amphilemurid, *Gesneropithex figularis,* was named by Hooker (1986) for a fragmentary jaw and isolated teeth of this hedgehog-like animal ((Figure 3.10)f,g). Amphilemurids were once classed as primates, but reconstruction of the dentition of the Creechbarrow Hill species (Hooker, 1986), together with complete skeletons of a related form from Germany (Koenigswald and Storch, 1983), showed them to be erinaceomorph lipotyphlans. The tiny insectivorous nyctitheres and four species of bats also were identified on the basis of broken isolated teeth (Hooker, 1986). Only one of the specimens was good enough for a closer tentative assignment, that of the bat *Pseudorhinolophus* (Hooker, 1989b).

The Creechbarrow Hill site has yielded a remarkable seven species of primates. There are five omomyids, small arboreal insectivores and frugivore-herbivores, including three species for which Creechbarrow Hill is their type locality: *Nannopithex quaylei* Hooker, 1986 ((Figure 3.10)h), *Microchoerus wardorum* Hooker, 1986 ((Figure 3.10)i), and *Microchoerus creechbarrowensis* Hooker, 1986 ((Figure 3.10)j), all of them based on isolated teeth. There are two species of adapid primate, including one species unique to Creechbarrow Hill, *Europolemur collinsonae* Hooker, 1986 ((Figure 3.10)k); both of them are larger than the omomyids and are adapted more for a browsing leaf-eating and fruit-eating diet.

Unusually, three species of apatemyid are identified, including the species *Heterohyus morinionensis* Hooker, 1986 ((Figure 3.10)1). Apatemyids were small tree-climbing insect-eaters, but with extraordinary long curved incisor teeth, superficially like a rodent but not ever-growing. These dental attributes as well as features of the skeleton are convergent with the modern Aye-Aye (Koenigswald and Schierning, 1987). Flesh-eating mammals are rare, with only a few teeth of miacid carnivorans reported. A paroxyclaenid 'condylarth', *Vulpavoides cooperi* Hooker, 1986, was named on the basis of a couple of teeth. From what we know of other representatives of the family, this was a civet-like climbing animal that may have had a diet of insects, flesh and/or fruit.

Ungulates from Creechbarrow Hill include at least three species of perissodactyls (one of them a subspecies unique to the site, *Plagiolophus curtisi creechensis* Hooker, 1986), all of them small to medium-sized terrestrial browsers or mixed frugivore/browsers that fed on leaves of bushes and low trees and on fallen fruits. *Plagiolophus curtisi creechensis* is based on an associated upper and lower dentition, although more complete material of the type subspecies from Barton allowed a partial skull reconstruction ((Figure 3.10)m–o; Hooker, 1986, fig. 51). Artiodactyls are the most diverse group, with up to 13 species reported so far, mostly founded on teeth but with a few fragmentary jaw bones also and a single astragalus. One new species of artiodactyl has been established from Creechbarrow Hill: *Haplobunodon venatorum* Hooker, 1986 ((Figure 3.10)p), a close relative of *Choeropotamus* in the Choeropotamidae (Hooker and Thomas, 2001).

Creechbarrow Hill preserves specimens of taxonomic groups that normally are rare in European Eocene localities, for example a paroxyclaenid, three apatemyids and two *Plesiarctomys.* The size of mammals from Creechbarrow Hill is strongly skewed to smaller animals (Hooker, 1992). This could represent a collecting bias, because the Creechbarrow Limestone Formation was largely sieved for microvertebrate specimens, but it is more likely that the skew to small size is real (Hooker, 1986, 1992).

The fauna is heavily dominated by plant-eaters (rodents, artiodactyls, perissodactyls), whereas carnivores (carnivorans) are extremely rare. However, this is typical of other correlative faunas in Europe (Savage and Russell, 1983, p. 104) and may reflect a bias to preservation of the rodents and ungulates, which should have had larger populations.

The Creechbarrow Hill locality has provided type materials of 13 species and one subspecies of mammal, namely the amphilemurid *Gesneropithex figularis* Hooker, 1986; the omomyid primates *Nannopithex quaylei* Hooker, 1986; *Microchoerus wardorum* Hooker, 1986; and *Microchoerus creechbarrowensis* Hooker, 1986; the adapid primate *Europolemur collinsonae* Hooker, 1986; the rodents *Plesiarctomys curranti* Hooker, 1986; *Glamys hookeri* Harrison, 2002; *Sciuroides rissonei* Hooker, 1986; *Suevosciurus authodon* Hooker, 1986; and *Treposciurus preecei* Hooker, 1986; the apatemyid *Heterohyus morinionensis* Hooker, 1986; the condylarth *Vulpavoides cooperi* Hooker, 1986; the perissodactyl *Plagiolophus curtisi creechensis* Hooker, 1986; and the artiodactyl *Haplobunodon venatorum* Hooker, 1986.

Most of the mammals in the assemblage are typical of the preceding Lutetian Stage, representing holdover taxa. Differences from the preceding Lutetian Stage are mainly at the species level, whereas some differences from the younger Headonian faunas are at genus level. This interval does not mark a time of major evolution among the mammals on an intercontinental scale, nor, apparently, was there any interchange with faunas outside Europe, a typical feature of the times before and after (Savage and Russell, 1983, p. 104). It represents a time of transition between typical middle and late Eocene European faunas. Thus Creechbarrow Hill has the last member of the primate genus *Europolemur* and one of the last paroxyclaenids. It also has the first members of the rodent genera *Theposciurus* and *Suevosciurus,* which dispersed widely in Europe at the beginning of Late Eocene times. The Bartonian faunas of Creechbarrow Hill, and correlatives in continental Europe, include many essentially endemic taxa, including the cebochoerid, anoplotheriid and xiphodontid artiodactyls. Likewise, the perissodactyls, mainly equoids and tapiromorphs, continued at their previous abundance. One perissodactyl group, the giant lophiodontids, is absent from Creechbarrow Hill, although present in correlative faunas elsewhere in Europe (Hooker and Weidmann, 2000) and in penecontemporaneous strata at Hengistbury (Hooker, 1977a); this was their last appearance before extinction.

Interpretation

Different theories have been devised to explain the environment of deposition of the Creechbarrow Limestone Formation. Initially Hudleston (1901) considered the sediments to have been deposited under lacustrine conditions, although the discovery of gastropods (Keeping, 1910) characteristic of terrestrial conditions appeared to deny the lacustrine model. Bury (1934) considered the site to represent deposition in a lime-rich swamp with high levels of evaporation. Preece (1980) reviewed the sedimentological and molluscan evidence and concluded that any interpretation should be tentative, although the presence of features such as a shallow water body, the close proximity of forest cover and flowing water or water seepage indicate a lake. Hooker (1986) concluded that the mammals from Creechbarrow Hill inhabited a forest environment, probably close to the lake where their remains are preserved. The sediments indicate a complex of fluvial, lacustrine and terrestrial deposition. The distribution of body sizes of mammals, with a skew to small size, indicates a forest habitat with a complex structure (Hooker, 1992). The distribution of locomotory modes among the mammals, and the relative abundance of arboreal forms, suggests closest parallels with lowland tropical forests today. Hooker (1992, p. 500) summarized the Creechbarrow Hill habitat as a tropical-type, high-stature forest with glades.

The mammals form the most rapidly evolving taxonomic group seen at Creechbarrow Hill, and they have been used to date the sediments. Key taxa for correlation with continental European sites are *Ailuravus stehlinschaubi, Pseudoloris* cf. *crusafonti, Lophiotherium siderolithicum* and *Acotherulum campichii.* The British endemic *Plagiolophus curtisi* establishes a correlation with the marine stratotype Bartonian Stage. Creechbarrow Hill is dated to Mammal Paleogene Reference Level MP16 and the *lautricense–siderolithicum* Zone, by comparison with continental European faunas. It is close to the well-known Robiac fauna from France (Sudre, 1969), sharing with it a number of species: *Amphiperatherium fontense, Heterohyus* cf. *sudrei, Heterohyus aff. nanus, Cebochoerus robiacensis* and *Dichodon* cf. *biroi* (Hooker and Weidmann, 2000). Many genera also are shared: nearly half the species that were named as new taxa from Creechbarrow Hill belong to typical Robiac genera. The Robiacian European Land Mammal Age traditionally has been correlated with the global Bartonian Stage, although recent evidence suggests that it also extends into the preceding Lutetian Stage (Hooker

and Weidmann, 2000).

Comparison with other localities

No other mammal locality in Britain compares with Creechbarrow Hill. Other Bartonian sites include Hengistbury, Dorset (Hooker, 1977a), and Barton itself, but fossil mammal finds are rare. Barton has yielded only six taxa of whales, terrestrial ungulates and a bat (Halstead and Middleton, 1972; Hooker, 1986) and does not approach Creechbarrow Hill in diversity and abundance of mammalian finds, although the remains are generally more complete. Further afield, comparisons between the mammalian fauna at Creechbarrow Hill and European sites suggest that similarities exist with the locality of Grisolles in northern France (Hooker, 1986), with the famous Robiac locality in southern France (Sudre, 1969; Savage and Russell, 1983, p. 100; Schmidt-Kittler, 1987) and with the *lautricense–siderolithicum* Zone faunas of Mormont (Hooker and Weidmann, 2000). The Robiac locality has produced 55 mammalian species (Sudre, 1969; Mathis, 1987; Legendre, 1989), using prospecting and screenwashing techniques (Sudre, 1969), a comparable diversity of mammals and a comparable relative abundance of specimens.

Conclusions

The mammalian fauna preserved in the Creechbarrow Limestone Formation is abundant and diverse. The use of bulk sampling techniques to study Creechbarrow Hill means that all sizes of fossils have been recovered, not just the more obvious large specimens. This is one of the few late Mid Eocene (Bartonian) faunal assemblages from Britain and is much richer than any other British site of the same age. It is the source of type materials of 13 species and one subspecies, the northernmost Bartonian mammal fauna site in Europe and it has last and first occurrences for several important European genera. It rivals the famous Robiac locality in France, of similar age, and this confirms the national and international significance of Creechbarrow Hill. The wide range of animals, including artiodactyls, perissodactyls, primates, rodents and carnivores, represent a complex forest-dwelling community.

References

	Thickness (m)
Superficial deposits	
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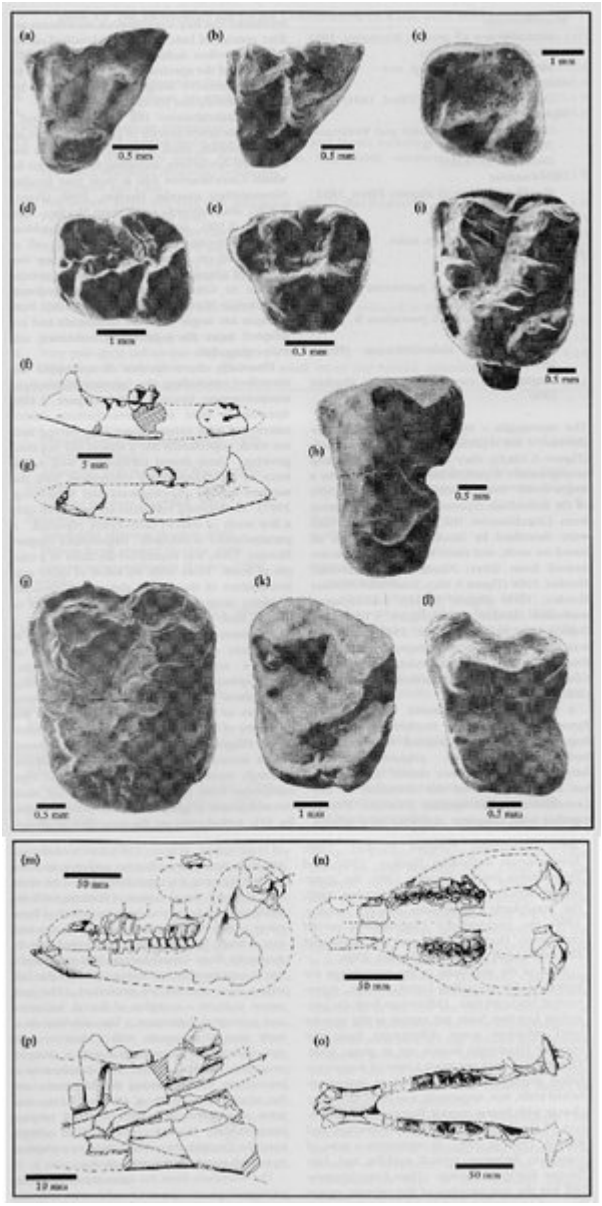

(Figure 3.10) Mammal specimens from the Creechbarrow Limestone Formation of Creechbarrow Hill, Dorset and Barton Clay Formation of Barton, Hants. (a) Upper molar tooth 1 of the marsupial Amphiperatherium aff. goethei in crown view. (b) Upper molar tooth 1 of the marsupial Amphiperatherium fontense in crown view. (c) Lower molar tooth 1 of the rodent Plesiarctomys curranti in crown view. (d) Lower molar tooth 1 or 2 of the rodent Sciuroides rissonei in crown view. (e) Upper deciduous premolar 4 of the rodent Suevosciurus authodon in crown view. (f,g) Lower jaw of the lipotyplan insectivoran Gesneropithex Agularis in external (f) and internal (g) views. (h) Upper premolar tooth 4 of the primate Nannopithex quaylei in crown view. (i) Upper molar tooth 1 of the primate Microchoerus wardorum in crown view. (j) Upper molar tooth 1 of the primate Microchoerus creechbarrowensis in crown view. (k) Upper molar tooth 2 of the primate Europolemur collinsonae in crown view. (1) Upper molar tooth 3 of the apatothere Heterohyus morinionensis in crown view. (m-o) Skull in lateral (m) and palatal (n) views and lower jaws in crown view (o) of the perissodactyl Plagiolophus curtisi curtisi. (p) Lower jaw fragment with molar tooth 3 of the artiodactyl Haplobunodon venatorum. m-o are from Barton, the remainder from Creechbarrow Hill. (After Hooker, 1986).