
Barton Cliff, Hampshire

[SZ 218 930]–[SZ 252 925]

Highlights

Barton Cliff has yielded the most productive Mid Eocene reptile fauna in Britain. The material includes specimens of 10 species of turtles, a lizard and a snake, and these are associated with rich fossils of marine shellfish, plants, birds and mammals.

Introduction

The stretch of sea cliffs in Christchurch Bay between Chewton Bunny (on the Hampshire–Dorset border) eastwards to Becton Bunny, known as Barton Cliff, has produced a good fauna of reptiles of Mid-Late Eocene age. Fossils from the Barton Beds have been collected for more than two centuries and the site has excellent potential for further finds.

The stratigraphy of the marine Barton Beds (Figure 9.2) at Barton Cliff has been discussed in detail by Gardner *et al.* (1888), Burton (1929, 1933), Hooker (1986) and Edwards and Freshney (1987). The succession was divided by Gardner *et al.* (1888) into the Lower, Middle and Upper Barton Beds on the basis of faunal changes through the sequence. Burton (1929) provided vertebrate and invertebrate faunal lists and lettered the Barton Beds A1–L based on different lithologies and faunal content. Hooker (1986) formally designated the Barton Clay Formation and erected the new unit, the Becton Sand Formation, for the Barton Sand of earlier stratigraphic schemes. Reptiles from Barton have been described by Burton (1929, 1933), Hooker (1972, 1986) and Moody (1980a, 1980b).

Description

The Barton Clay Formation (*sensu* Hooker, 1986, pp. 203–5) is exposed in the cliff section between Friar's Cliff, Mudeford in the west to just east of Barton-on-Sea in the east [SZ 194 927]–[SZ 242 927]. The beds (c. 40–60 m thick) consist of grey to brown silty, usually shelly, sometimes moderately to very sandy, clay, occasionally with some subordinate clayey, sandy silts. There are several layers of calcareous phosphatic and sideritic nodules. The faunal list is large, including a fauna of shark teeth and teleosts, malacostracan crustaceans, ostracods, foraminifera, brachiopods, molluscs (bivalves and gastropods), asteroids and ophiuroids, marine mammals, turtles and land-derived mammals, birds and reptiles (Burton, 1929; Hooker, 1986). An associated flora of fruits, seeds, cones and wood indicates the close proximity of land, and the marine aspect of the fossils and the sediments suggest a predominantly low-energy near-shore marine environment for the formation.

The Becton Sand Formation (c. 25 m) (Hooker, 1986, p. 205) occurs in the cliff section to the west of Sea Road Gap, and may be traced eastwards to Long Mead End (Taddiford Gap) at the eastern end of Beacon Cliff [SZ 229 931]–[SZ 262 922]. The lithology is fine sand which is clayey and silty at the base of the formation. The biota is sparse, but essentially the same as that of the Barton Clay below. Terrestrial fossil material is similarly reduced and no mammals have been found. Towards the top of the sequence, the molluscs give an indication of shallowing waters with a change to brackish conditions, leading to the non-marine Totland Bay Member of Hordle (Hordwell) Cliff that succeeds conformably to the east.

The reptiles come from a number of levels, but have most frequently been obtained from horizons in the Lower and Middle Barton Beds, where they are commonly associated with shell-rich clays and silts. Burton (1933, p. 140) notes that in Horizon B (Lower Barton Beds), a 'grey sandy and glauconitic clay, four feet thick, ... portions of the costals and marginals of *?Argillochelys* sp. are fairly common, but as so happens in respect of such material in the Barton Clay, it is fragmentary and renders even generic determination somewhat speculative.' Vertebrae of fishes and remains of *Chelonia* in a fragmentary condition were obtained from Horizon E ('Earthy' Bed, Middle Barton Beds), from a 'thin but

persistent seam of *Ostrea* (*Ostrea* cf. *flabellula* Lamark). . that occurs at the base of the unit (Burton, 1929, p. 229). Burton (1933, p. 135) further notes ?*Argillochelys* from Horizon A1, the lowest unit of his Lower Barton Beds. A specimen of 'chelonoidean' carapace in the British Museum (Natural History) (BMNH R8358) is labelled 'Horizon B' (= *Pholadomya* Bed), the highest bed attributed to the Lower Barton Beds of Burton (1929).

From the Middle Barton Beds, Burton (1933, p. 143) records (from Horizon D) that 'Below the actual *Corbula* Bed occasional symphyses of chelonia occur;... encrusted with crystals of selenite cemented together by a ferruginous deposit'.

Although the majority of the Barton reptiles are turtles, other reptile groups are represented by rarer remains. Burton (1933, p. 140) noted: 'Occasionally, vertebrae referred to *Palaeophis* sp. from Horizon A3, in a thin ferruginous seam towards the base which is very seldom exposed.' Hooker (1972, p. 181) reported a lacertilian' humerus (BMNH R8580) after sieving a shelly seam high in Bed H (= *Chama-Bed*), the second unit of the Upper Barton Beds.

The reptile fossils are all preserved as isolated elements and some show signs of abrasion. The turtles are generally represented by carapace fragments, and the snake *Palaeophis* by its vertebrae.

Fauna

Many of the reptile remains from Barton Cliff are curated in the BMNH, and in the collection of Mr J. Athersuch.

	Numbers
Testudines: Cryptodira:	
Cheloniidae	
<i>Argillochelys athersuchi</i> Moody, 1980 Type specimen: KP BA/19/VA	1
<i>Argillochelys</i> sp.	6
<i>Eochelone brabantica</i> Dollo, 1903	1
<i>Puppigerus camperi</i> Gray, 1831	1
Testudines: Cryptodira:	
Podocnemidae	
<i>Podocnemis</i> ?	1
Testudines: Cryptodira:	
Trionychidae	
<i>Trionyx incrassatus</i> Owen, 1849	1
<i>Trionyx planus</i> Owen, 1849	1
<i>Trionyx</i> sp.	1
trionychid indet.	1
'chelonian'	4
Lepidosauria: Squamata:	
Sauria	
'lacertilian'	4
Lepidosauria: Squamata: Serpentes:	
Palaeophiidae	
<i>Palaeophis</i> sp.	3

Interpretation

The depositional environments of the Bartonian of the Hampshire Basin are divided into marine and non-marine provinces by Hooker (1986). The Barton Clay and Becton Sands formations in Christchurch Bay were deposited in three large cycles. The erosive base of each cycle has been interpreted as the result of a rapid marine transgression of a shelf sea, which then withdrew over a longer period, hence forming the rest of each cycle (Hooker, 1986). Marine indicators include the mineral glauconite, the trace fossil *Ophiomorpha*, and the shelly faunas of Foraminifera, bivalves and

gastropods. These sediments seem to have been deposited in marine waters up to 100 m deep. Some terrestrial mammal fossils occur, as well as archaeocete whales, which were presumably preserved *in situ* (Hooker, 1986). The non-marine units occur in the Creechbarrow Limestone Formation, a lateral equivalent of the Barton Clay Formation, to be seen outside the GCR site.

The reptile fauna from Barton has never been studied in detail. Chance finds have been noted in various papers on the geology and fossil mammals from the site. Moody (1980a) reviewed the turtle fauna, noting *Puppigerus* sp. and a trionychid indet. from Barton Beds A1–3, *Eochelone brabantica*, *Puppigerus camperi*, *Argillochelys athersuchi* (Figure 9.5), *?Trionyx planus*, trionychid indet., and *Allaeochelys* sp. from Barton Beds B–H, and *Puppigerus* sp. from Barton Beds I–K. Moody (1980b) described *Argillochelys athersuchi*, a new species from bed C in the Barton Clay Formation from Barton Cliff. Other species of *Argillochelys* are known from the London Clay (Early Eocene) of the Thames Valley, and the Late Palaeocene/Ypresian of Belgium (Moody, 1980b).

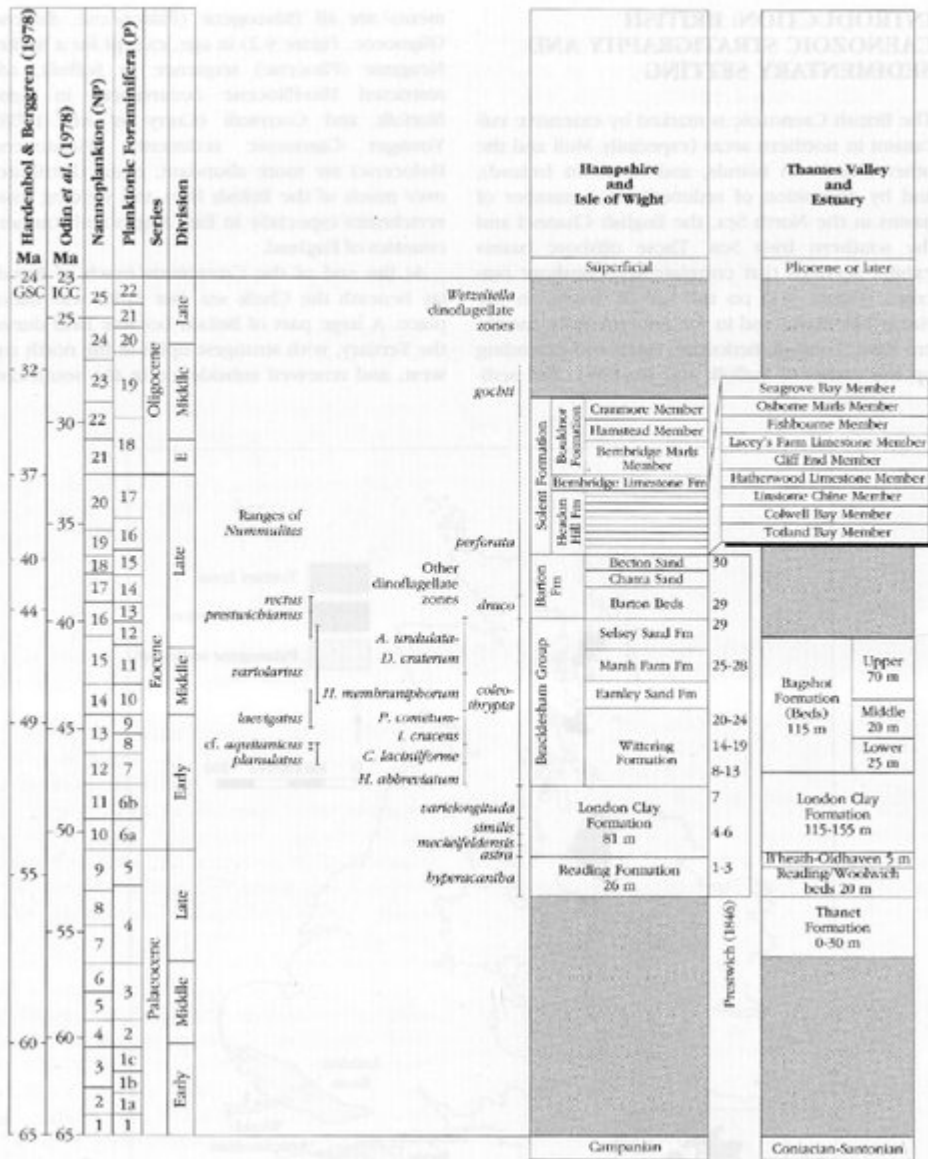
Comparison with other localities

The perissodactyl mammal *Plagiolophus curtisi* from the Middle Barton Beds is shared with the Creechbarrow Limestone Formation. The mammal fauna of the Totland Bay Member of the Headon Hill Formation, which succeeds the Becton Sand Formation, correlates with the upper part of the Calcaire de Fons at Fons; thus the Upper Barton Beds may correlate with the Robiac unit below. The Lower Barton Beds may be Marinesian, perhaps partly equivalent to the Calcaire de St Ouen, since these lie above the Bracklesham Group that are well correlated with Auversian. The reptile fauna so far is insufficiently known to provide clear indications of relations. Its elements are known from a number of European faunas dating from Late Palaeocene to Late Eocene times.

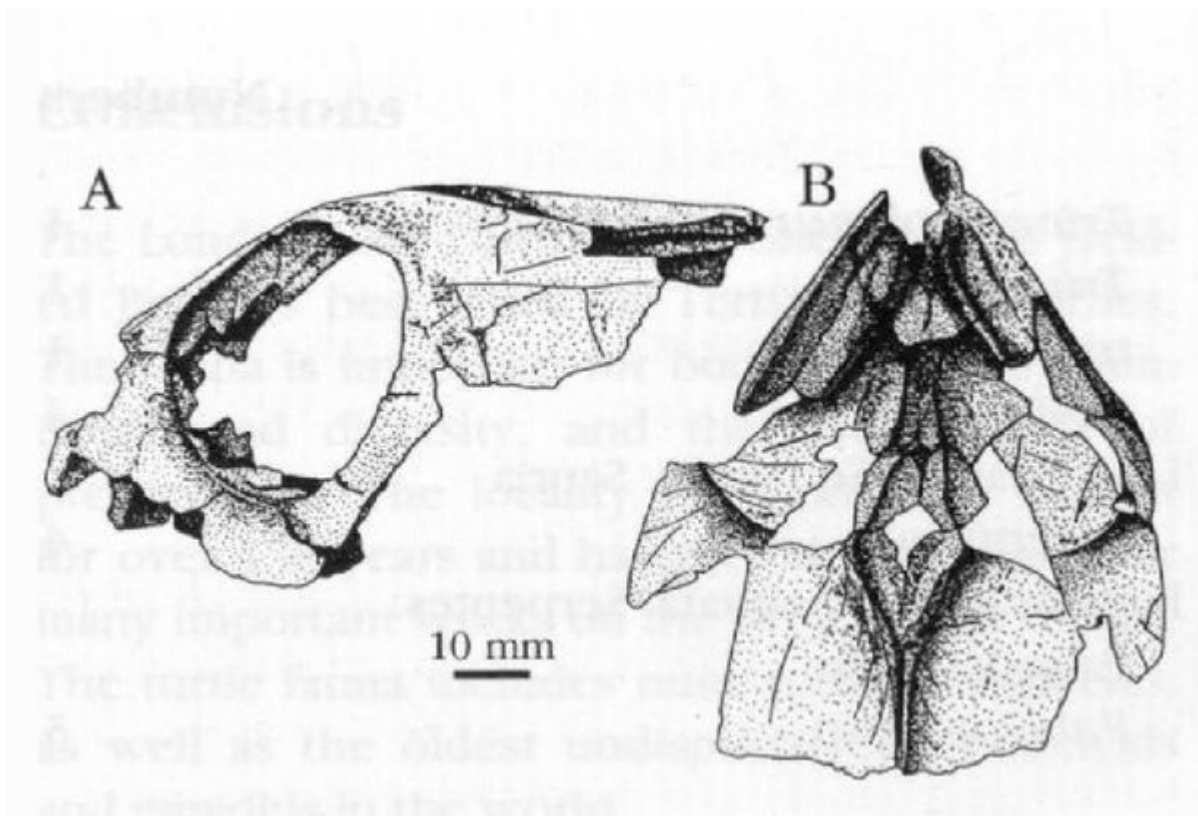
Conclusions

Barton Cliff is the most productive British Mid Eocene site for reptiles, and source of a number of turtles, including one type specimen, as well as lizard and snake fossils. The site still yields abundant remains, and its potential has yet to be fully realized, giving it conservation value.

[References](#)



(Figure 9.2) Summary of Tertiary stratigraphy, showing global standards and some major British formations. Based on Curry et al. (1978).



(Figure 9.5) The turtle *Argillochelys athersuchi* Moody, 1980, from the Late Eocene of Barton Cliff, partial skull in (A) lateral and (B) ventral views. After Moody (1980b).