
East Wear Bay, Folkestone, Kent

[TR 243 366]

Highlights

East Wear Bay, Folkestone is the most productive British Gault Clay reptile site (Figure 8.17). Abundant specimens of turtles, pterosaurs, ichthyosaurs and plesiosaurs have been reported, including the first specimens of two species. This is one of the best mid-Cretaceous fossil reptile faunas in the world.

Introduction

The Gault on the coast east of Folkestone has been known as a good source of fossil vertebrates for 150 years. The fauna of turtles, ichthyosaurs, plesiosaurs, pliosaurs and pterosaurs (Figure 8.18) includes many good specimens, and the types of two species. The section is currently well exposed, with new portions revealed by marine erosion and land-slipping, and the site continues to yield reptile bones.

The Gault section has been described by many authors, such as De Rance (1868), Price (1875), Topley (1875, pp. 145–7), Jukes-Browne and Hill (1900, pp. 69–83), Smart *et al.* (1966, pp. 56–8, 99–101, 112–13) and Owen (1971, pp. 11–15; 1976). Reptile fossils have been discussed by Owen (1874a), Seeley (1877), Woodward and Sherborn (1890) and Persson (1963).

Description

The Gault section is best seen just east of Copt Point. To the west, towards Folkestone Harbour, the underlying Folkestone Beds and Sandgate Beds of the Lower Greensand crop out, and to the north, on the shore of East Wear Bay, the Gault is broken up by landslips. The section at Copt Point (from Price, 1875 and Jukes-Browne and Hill, 1900, p. 71) is as follows:

Upper Gault

XIII. Pale grey and buff-coloured marl	7.3
XII. Dark, glauconitic sand	1.0
XI. Pale bluish-grey, marly clay	10.8
X. Grey, marly clay	5.1
IX. Hard, manly clay	2.8

Lower Gault

VIII. Junction bed	0.2
VII. Dark-grey clay	1.9
VI. Mottled, grey clay	0.3
V. Mottled clay	0.5
IV. Light-grey clay	0.1
III. Light buff-coloured clay	1.4
II. Very dark clay	1.3
I. Dark clay and glauconitic sand with nodules at base	3.1
la. Yellowish sand with phosphatic nodules	1.9

These lithological divisions of the 30–35 m thick section are readily determined in the field, and Owen (1971, 1976) gives more detailed logs. An ammonite biostratigraphy has been worked out (Jukes-Browne and Hill, 1900; Spath, 1923–43; Smart *et al.*, 1966; Owen, 1971) and the section is dated as Mid-Late Albian (*dentatus* to *dispar* Zones). There is a clear break between the Lower and Upper Gault here, between beds VIII and IX. Fossils include common molluscs, fishes and crustaceans.

Reptiles have been found throughout the whole section, and the horizons are compiled below from Price (1875), Topley (1875, p. 436), Jukes-Browne and Hill (1900), Smart *et al.* (1966, pp. 112–13) and museum records. Most of the museum specimens and described fossils were not localized to an horizon.

XII. Turtle bones and jaw, ichthyosaur and plesiosaur vertebrae (Topley, 1875, p. 436).

XI. Ichthyosaur remains (BGS(GSM)).

X. 'Bones of Chelonians and fish, and the eggs of a species of Crocodylian' (Jukes-Browne and Hill, 1900, p. 79).

IX. Turtle remains (BGS(GSM)), *Polyptychodon* (Price, 1874).

VIII. Turtle remains (BGS(GSM)), ichthyosaur and plesiosaur vertebrae (Topley, 1875, p. 436).

VII. *Polyptychodon* (Price, 1875), turtle (CAMSM).

IV. Pterosaur remains (BGS(GSM)).

II. Large plesiosaur (Smart *et al.*, 1966, p. 112).

I. Ichthyosaur and plesiosaur vertebrae (Topley, 1875, p. 436).

la. *Polyptychodon* (Gault/Folkestone Beds junction: BMNH); turtle (BMNH).

The bones are relatively well preserved, with delicate processes intact, and the skeletons are often partly articulated. These facts suggest that the carcasses were often buried where the animals died, without post-mortem transport.

Fauna

Fossil reptiles from the Gault of Folkestone are preserved in several museums: BMNH, BGS(GSM), CAMSM and OUM. In the following list, all species are listed, and type specimens noted where relevant. An estimate for the total number of specimens of each is also given as an approximate guide to the relative abundance of each species.

	Numbers
Testudines: Cryptodira: Chelonioidae:	
Protostegidae	
<i>Rhinochelys elegans</i> Lydekker, 1889	1
<i>Rhinochelys</i> sp.	24
<i>Cimocheilus benstedii</i> (Mantell, 1847)	1
Archosauria: Pterosauria: Pterodactyloidea:	
Ornithocheiridae	
<i>Ornithocheirus daviesi</i> (Owen, 1874) Type specimen: BMNH 43074	4
<i>Ornithocheirus</i> sp.	6
Ichthyopterygia: Ichthyosauria:	
Ophthalmosauridae	
<i>Ophthalmosaurus campylodon</i> (Carter, 1846)	6
<i>Ophthalmosaurus</i> sp.	20
Sauropterygia: Plesiosauria: Plesiosauroidea	
<i>Cimoliasaurus cantabrigiensis</i> Lydekker, 1889	1
<i>Mausisaurus gardneri</i> Seeley, 1877 Type specimen: BMNH 47295	1
Sauropterygia: Plesiosauria: Pliosauroidae	
<i>Polyptychodon interruptus</i> Owen, 1841	5

Interpretation

The Gault is a low-energy basinal mud unit. The environment of deposition is interpreted as 'a fairly shallow muddy-bottomed sea' (Smart *et al.*, 1966, p. 102). It forms part of the major mid-Cretaceous marine transgression over much of north-west Europe, which began with deposition of the coarse sands of the Lower Greensand (Aptian), followed by deepening of the basin in the early Albian. The Lower Greensand progressively overstepped older Mesozoic deposits, and the Gault Clay Formation was the first unit completely to cover the Palaeozoic London Platform (Owen, 1971).

The turtles from Folkestone, originally ascribed to *Chelone*, *Protostega* and *Rhinochelys*, all probably belong to the last genus. The material consists mainly of carapace and plastron elements, as well as limb bones, and a skull of *R. elegans* (BMNH R27). *Rhinochelys* had a 30–60 mm long skull which is characterized by its short snout and other features. It is classed in the family Protostegidae, a group of turtles mainly from the Late Cretaceous and Early Palaeogene of North America (Collins, 1970). A specimen of a partial plastron (BMNH 47210) from Folkestone is assigned to *Cimochelys benstedii* by Collins (1970, p. 375) and is, she suggests, possibly the postcranial material of *Rhinochelys*.

A few slender bones of pterosaurs have been found at Folkestone. *Ornithocheirus daviesi* is represented by a mandible (BMNH 43074, the type specimen; (Figure 8.18)B and some limb bones, while *Ornithocheirus* sp. is also based on limb bones. The type mandible is 47 mm long, has five alveoli on each side and the jaw end is rounded. Referred limb bones include a 220 mm tibia from Folkestone, as well as specimens from the Cambridge Greensand (Owen, 1874a; Lydekker, 1888a, pp. 23–4). Wellnhofer (1978, pp. 56–7) accepts *O. daviesi* as a valid species, but the distinguishing characters are not made clear.

Ichthyosaurs are represented by teeth, vertebrae, and limb elements of *Ophthalmosaurus*. *O. campylodon* is known from the Cambridge Greensand and the Chalk of Kent and Cambridgeshire. Similar material has been found in the Gault of France, Germany and Russia (Lydekker, 1889a, pp. 15–20). *Ophthalmosaurus* was a large genus, with centra 100 mm in diameter and a skull 2.5–3.0 m in length. McGowan (1972) ascribed all Cretaceous ichthyosaurs, including *Ophthalmosaurus*, to *Platypterygius*.

Several species of plesiosaurs have been recorded. *Cimoliasaurus cantabrigiensis* Lydekker, 1889, *C. constrictus* (Owen, 1850) and *C. smithi* (Owen, 1884) are noted by Woodward and Sherborn (1890) in the BMNH, but only a limb bone of '*C. smithi*' has been found at the site. *C. cantabrigiensis* was based on some vertebrae from the Cambridge Greensand and was distinguished on some minor vertebral characters. This species was regarded as dubious by Persson (1963, p. 18), and he tentatively ascribed it to the Rhomaleosauridae. The type specimen of *Mauisaurus gardneri* is represented by a partial skeleton, a tooth, the vertebrae of the neck and back (Figure 8.18)A, most limb bones and parts of the pectoral girdle (Seeley, 1877). The animal was large with vertebrae up to 100 mm across, but it had a very long neck, typical of an elasmosaurid. Persson (1963, p. 19) retained *M. gardneri* as a valid species of elasmosaurid.

The larger pliosaur *Polyptychodon* is represented by several teeth and limb bones. Similar material is also known from the Upper Greensand and Cambridge Greensand. The species *P. interruptus* was regarded as valid by Persson (1963).

The reptile fauna is essentially coastal marine, containing turtles, fish-eating ichthyosaurs and plesiosaurs, as well as the top carnivore *Polyptychodon*. Pterosaurs may have been washed in from the land, or they may have died while feeding on fish.

Comparison with other localities

Reptiles are known from several sites in the Gault, but none is as rich as East Wear Bay, Folkestone. Other sites in Kent and West Sussex include Wrotham ([TQ 61 59]; *Iguanodon*); Horish Wood, Maidstone ([TQ 786 575]; turtle, ichthyosaur, *Polyptychodon*, pterosaur; Casey, 1959; Worssam, 1963, pp. 6, 58, 62); Henfield ([TQ 21 16]; *Rhinochelys*; White, 1924, p. 28); Upper Beedon Pit ([TQ 205 123]; ichthyosaur vertebra; White, 1924, pp. 27–8); in Oxfordshire: Towersey, near

Thame ([SP 73 05]; ichthyosaur); in Buckinghamshire: Ford ([SP 77 09]; ichthyosaur; Jukes-Browne and Hill, 1900, pp. 277–8), Bishopstone, near Aylesbury ([SP 80 10]; *Ophthalmosaurus*); in Hertfordshire: Puttenham ([SP 88 14]; *Ophthalmosaurus*; Jukes-Browne and Hill, 1900, pp. 280–2); in Cambridgeshire: Barnwell (TI, 4658; ichthyosaur vertebrae; Jukes-Browne and Hill, 1900, p. 292).

An age-equivalent horizon to the Gault is the Red Chalk at Hunstanton, Norfolk ([TF 673 414] to [TF 674 419]; a 1.3 m bed ascribed to the Mid-Late Albian (Rawson *et al.*, 1978) which has yielded teeth, jaws, vertebrae and limb bones of *Ophthalmosaurus*, as well as teeth and vertebrae of *Cimoliasaurus* (Jukes-Browne and Hill, 1900, pp. 302–4). The Red Chalk at West Dereham, Norfolk [TF 65 00] has also yielded an ichthyosaur skull.

Similar plesiosaurs are known from the Mid Cretaceous of northern France (Louppy), central Germany (Langelsheim, etc.), Russia (near Moscow), the United States (Kansas), and Australia (Queensland and New South Wales) (Persson, 1963). Other mid-Cretaceous reptile localities include the French Alps (turtles), and the Meuse and Normandy (ichthyosaurs, plesiosaurs) (Buffetaut *et al.*, 1981). During these times, ichthyosaurs and plesiosaurs had waned from their Late Jurassic diversities, and faunas are rather sparse in all parts of the world where they occur.

On land, dinosaurs were flourishing, with new groups such as pachycephalosaurs and ceratopsians appearing, and the ornithopods and theropods further diversifying. Pterosaurs and crocodylians were also abundant in terrestrial deposits, and new groups were coming on the scene. The Gault of Folkestone contains few terrestrial elements, other than the rare pterosaur bones, but it shows good examples of the rare mid-Cretaceous ichthyosaurs, plesiosauroids and pliosaurs.

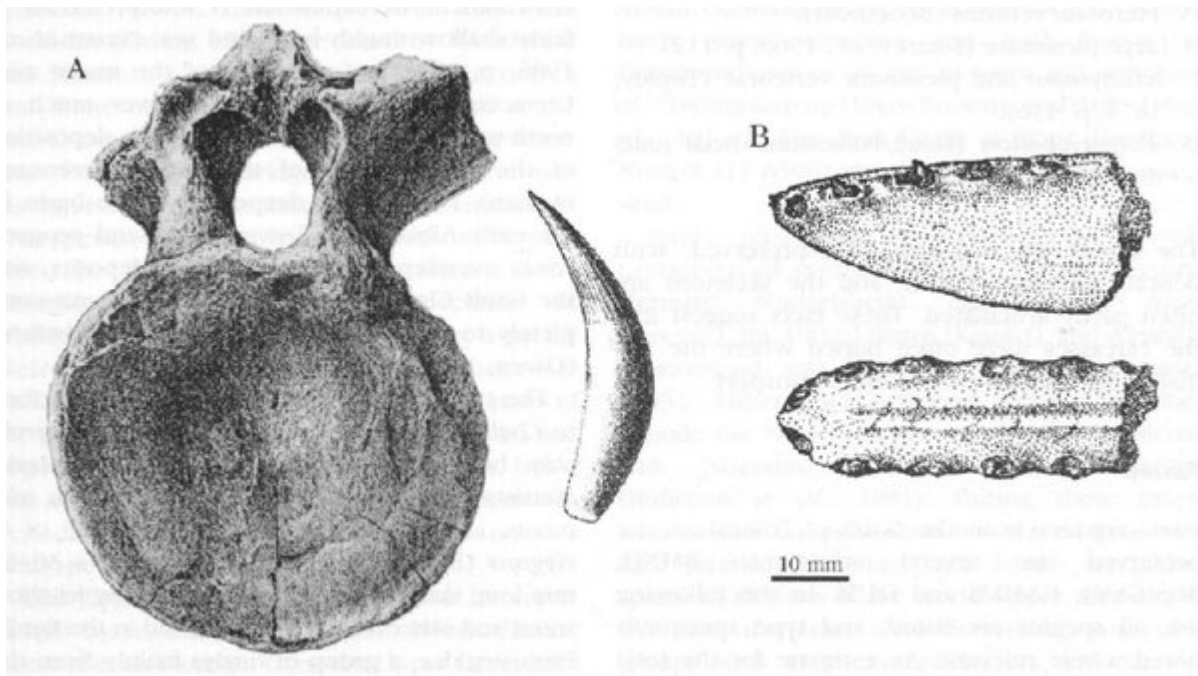
Conclusions

The section at East Wear Bay, Folkestone is Britain's best Gault reptile site. It has yielded one of the best mid-Cretaceous reptile faunas in the world. This international importance and the continuing yield of specimens establishes the site's high conservation value.

References



(Figure 8.17) The Gault clays at East Wear Bay, Folkestone. (Photo: D.J. Ward.)



(Figure 8.18) Reptiles from the mid-Cretaceous Gault of Folkestone. (A) The elasmosaur *Maisaurus gardneri* Seeley, 1877, tooth and dorsal vertebra; (B) the pterosaur *Ornithocheirus daviesi* (Owen, 1874), top of snout in medial and ventral views. (A) After Seeley (1877); (B) after Owen (1874a).