East Wear Bay

[TR 243 366] (Potential GCR site)

Highlights

East Wear Bay, Folkestone in Kent is the most productive British Gault Clay fish site.

Introduction

The Lower Greensand and Gault Clay which crop out along the coast east of Folkestone, Kent, have been known as a good source of fossil vertebrates for 150 years. It is one of the most productive 'mid'-Cretaceous fish sites in the country yielding scattered shark and bony fish material throughout the succession, although they are especially concentrated in the upper beds. The section is currently well exposed, with new portions revealed by marine erosion and land-slipping. The site continues to yield fish material as the clays can be bulk processed for microvertebrate remains.

Isolated teeth and vertebral discs of sharks are the most common finds, with those of the shark *Cretolamna appendiculata* being the majority. At least ten species of elasmobranchs, three species of chimaeroid and five species of bony fish are common in the Gault at Folkston. Coprolites are also frequently recovered, as are teleost otoliths from sieved residues. Vertebrate material in the Gault Clay at Folkestone is relatively well preserved, with delicate processes intact, and whole and partial fish specimens relatively common. Burrows attributed to terebel-loid worms are commonly lined with fish scales (Smart *et al.,* 1966, p. 112).

The Gault section has been described by many authors, such as De Rance (1868), Price (1875), Topley (1875), Jukes-Browne and Hill (1900), Smart *et al.* (1966) and Owen (1971, 1975).

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, Jukes-Browne and Hill, 1900, p. 71) is as follows:

	Thickness (m)
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 marly 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
Ia. 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, 1975) gives more detailed logs. An ammonite biostratigraphy exists (Jukes- Browne and Hill, 1900; Spath, 1923–1943; 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 Dc. Invertebrates such as molluscs and crustaceans are common throughout.

Fossil fishes have been found throughout the whole section but most of the museum specimens and described fossils were not localized to a horizon. Jukes-Browne and Hill (1900, p. 79) recorded that the 'Bones of Chelonians and fish, and the eggs of a species of Crocodilian' were found in horizon X.

Fauna

Fossil fishes from the Gault of Folkestone are preserved in several museums, including the NHM, BGS(GSM), CAMSM and OUM.

Chondrichthyes: Elasmobranchii: Euselachii: Hybodontoidea

Acrodus levis Woodward, 1887

Chondrichthyes: Elasmobranchii: Neoselachii: Squalomorphii

Hexanchus sp.

Notidanodon (*Notidanus*)*lanceolatus* (Woodward, 1886)

Notorhynchus sp.

Protosqualus sigei Cappetta, 1977

Chondrichthyes: Elasmobranchii: Neoselachii: Galeomorphii

'Brachaelurus' sp.

Carcharias sp.

Cretolamna (*Lamna*)*appendiculata* (Agassiz, 1843)

Cretoxyrhina (*Isurus*)*mantelli* (Agassiz, 1843)

Heterodontus (*Cestracion*)*canaliculatus* (Egerton, *in* Dixon, 1850)

Leptostyrax (*Lamna*)*macrorhiza* (Cope, 1875)

Orectoloboides sp.

Paranomotodon sp.

Paraorthacodus sp.

'*Scapanorhynchus*' *subulatus* Agassiz, 1843

'*Scyliorhinus*'sp.

Squalicorax (*Corax*) *pristodontus* (Agassiz, 1843)

Synechodus spp.

Chondrichthyes: Elasmobranchii: Neoselachii: Batomorphii

Squatirhina sp.

Chondrichthyes: Holocephali: Chimaeriformes

Ischyodus thurmanni Pictet and Campiche, 1858

Edephodon sedgwicki Newton, 1878

E. laminosus Newton, 1878

Osteichthyes: Actinopterygii: Neopterygii: Teleostei

Protosphyraena ferox Leidy, 1857

Apsopelix (*Syllaemus*) *anglicus* (Dixon, 1850)

Xiphactinus (*Portheus*) *gaultinus* (Newton, 1877)

Spratticeps gaultinus Patterson, 1970

Osteichthyes: Actinopterygii: Neopterygii: Euteleostei

Pachyrhizodus (*Thrissopater*) *salmoneus* (Günther)

Apateodus glyphodus Blake, 1842

Osteichthyes: Actinopterygii: Neopterygii: Elopomorpha

?Casierius gaultinus Estes, 1969

Plethodus expansus Dixon, 1850

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). 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 fish fauna contains many genera that range throughout the Cretaceous, and in particular those which are similar to genera from the Upper Cretaceous Chalk localities of Southerham (q.v.) and Blue Bell Hill (q.v.). For example, the species of the sharks *Cretolamna, Cretoxyrhina, Heterodontus, Leptostyrax, Paranomotodon, Squalicorax* and *Synechodus,* the chimaeroids *Ischyodus* and *Edaphodon,* the halecomorph actinopterygian *Protosphyraena ferox* and the teleosts *Apsopelix, Pachyrhizodus, Xiphactinus* and *Apateodus* are well represented in the British Chalk succession and are described in detail below. However, some species such as the hexanchid shark *Notidanodon* (*Notidanus*)*lanceolatus,* the teleosts *Apateodus glyphodus, Xiphactinus* (*Portheus*) *gaultinus* and *Pachyrhizodus* (*Thrissopater*) *salmoneus* are only found in the Albian succession.

The Grey Chalk (Cenomanian) succession at Folkestone has also yielded scattered fish remains, including the type specimen of the semionotid *Lepidotes ?pustulatus,* described from numerous isolated large flank scales.

Comparisons with other localities

The low cliffs and foreshore between Reighton Gap and Speeton Beck in Speeton Bay [TA 134 753]–[TA 152 756] expose a discontinuous section through the Kimmeridge Clay (Upper Jurassic), the Speeton Clay Formation (Berriasian–Albian), the Hunstanton Formation ('Red Chalk': Albian–Cenomanian) and the Chalk (Upper Cretaceous), and the section represents the best and most complete development of marine Lower Cretaceous in the British Isles (Phillips, 1829; Neale, 1974; Rawson and Wright, 1992). All the beds of the Speeton Clay Formation have yielded sporadic fish material, including a diverse microshark fauna (C. Underwood, pers. comm., 1996). Speeton Clay Beds D2 and D4 (basal Hauterivian) have yielded *Palaeobrachaelurus, Synechodus,* lamniformes and have also yielded similar shark material, with *Notorhynchus* especially common (Cappetta, 1975).

The overlying Red Chalk or Hunstanton Formation (Albian–Cenomanian) is well exposed at Speeton (thickness up to 25 m) and the alternating red marls and limestones have yielded a diverse microshark fauna, including synechodontiformes (*Synechodus* sp., *Paraorthacodus* sp. and possibly a species of *Spenodus*), the hexanchid *Notorhynchus aptiensis,* squatiniformes (*Squatina* spp.), the het-erodontid *Heterodontus ?canaliculatus,* squaliformes (*Protosqualus* sp., *?Squalus* sp. and indeterminate material), lamniformes (*Cretolamna woodwardi, Cretoxyrhina mantelli, Anornotodon* sp., possible species of *Protolamna* and *Archaeolamna, Scapanorhynchus* sp. and indeterminate material), carcharini-formes (*Scyliorhinus* sp., *Pteroscillium* sp. and indeterminate material), orectolobiformes (*Orectoloboides* sp., *Cederstroemia* sp., indeterminate hemiscillids and *Pararhincodon* sp.), and the ray *Squatirhina* sp., which can be collected by bulk sampling and acid preparation of the sediments (C. Underwood, pers. comm., 1996). Otoliths and small, undiagnostic fragmentary bony fish material have also been reported, and may include specimens attributable to *Protosphyraena.* The section is prone to slippage and erosion, so that new outcrops and the foreshore exposures are revealed by the frequent storms. The cliffs and shore are fairly easily accessible from the path down to the shore at Reighton Gap and Speeton. Underwood (pers. comm., 1996) has also noted a similar fauna from the Red Chalk (Upper Albian) of South Ferriby brickpit, North Lincolnshire ([SE 98 20]. Neither of these assemblages have yielded the hybodont sharks and chimaeroids common within the Gault at Folkestone, Kent ([TR 22 35]), and large lamniforme teeth are also rare in contrast to Folkestone. However, *Notorhynchus* is much more common at Speeton and South Ferriby (C. Underwood, pers. comm., 1996).

Aptian and Albian deposits from mainland western Europe have also yielded similar fish faunas. These include those of Perle du Rhone, St. Croix, Pierre Jaune, Neuchatel and Landeron, Switzerland (Pictet and Campiche, 1858a, 1858b, 1860), and Auxerre (Aube) and Alais (Gard), France (Keeping, 1883).

Conclusion

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

References