
BRACKLESHAM BAY

OS Grid Reference: SZ823951–SZ825947

Highlights

This locality in the mid-Eocene Bracklesham Group of the Hampshire Basin in West Sussex has yielded over 160 described species of fossil fish. It continues as a productive site, even after intense collecting for over 100 years. The number of chondrichthyans is unsurpassed for beds of this age in Britain.

Introduction

Historically, Bracklesham Bay has been an important Tertiary fossil fish site since the mid-19th century. The numerous fish species have been listed from the Bracklesham Group exposed along the foreshore, and Bracklesham Bay is the type location for a great many of these. Fish material is still actively collected from the foreshore exposures and there is still some potential for future finds to be made.

In recent years, the introduction of coastal defence measures has greatly reduced the exposure of the fossiliferous beds above high tide levels on the beach. However, scattered vertebrate debris can still be collected from combing the strandline and exceptionally low tides expose the fish beds.

Description

As recorded by Curry (*in* Curry and Wisden, 1958) and Curry *et al.* (1977), the Bracklesham Beds occur along the sea coast of the Selsey Peninsula from Chichester Harbour to Pagham Harbour, though they are locally much obscured by recent beach deposits. Exposure of the solid geology depends on the state of the tide and the shifting beach sands and shingle. The map (Figure 14.13) provided by Curry (*in* Curry and Wisden, 1958. and updated Curry *et al.*, 1977) remains a useful guide to the locality where a total section of about 105 m is revealed. The current stratigraphical practice is to recognize both marine and continental beds within the Bracklesham Group throughout the central part of the Hampshire Basin. To the east the section is increasingly marine; to the west it is more continental. The full sequence is divided into Wittering, Earnley, Marsh Farm and Selsey (Divisions) Formations (Cooper, 1976b), said to correspond to the Cuisian, Lutetian and Auversian stages of the Paris Basin. At Bracklesham Bay this section is about 90 m thick. The marine fauna is rich and diverse, with some 500 species of molluscs, mostly indicative of shallow, warm, clear water.

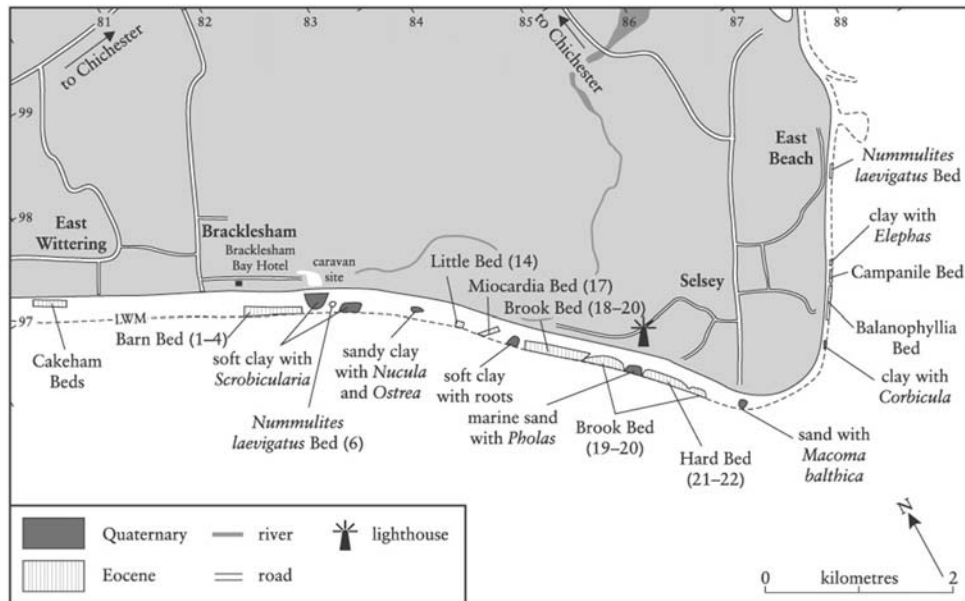


Figure 14.13: Sketch map of the foreshore at Bracklesham Bay, West Sussex (after Curry *et al.*, 1977).

The section begins some way south-east of Chichester Harbour entrance, not far above the top of the London Clay. There are few exposures between here and the foreshore below the site of the Bracklesham Hotel (now a block of flats). Eastwards are glauconitic sands, silts and clays, thin-bedded and with lignitic bands. A history of research here is given by Curry *et al.* (1977), who reported some uncertainty in the correlation and employed the terminology now used (see also Melville and Freshney, 1982). The stratotypes are defined at Whitecliff Bay, but Curry *et al.* (1977) have presented a log of the Bracklesham Bay succession based on detailed mapping of the foreshore of the Bay and on East Beach, Selsey. Vertebrate fossils are present at many levels, commonly in coarse sands. Although reptiles and mammals are represented by a variety of bones and teeth, the fish remains are preponderantly isolated teeth.

Fauna

Fauna in the Bracklesham Group at Bracklesham Bay:

W = Wittering Formation; E = Earnley Sand Formation; M = Marsh Farm Formation; S = Selsey Sand Formation.

Osteichthyes: Actinopterygii: Chondrostei: Acipenseridae

Acipenser toliapicus Agassiz, 1844 E; S

Osteichthyes: Actinopterygii: Neopterygii: Ginglymodi

Lepisosteus suessionensis Gervais,

1888 W; E; M; S

Osteichthyes: Actinopterygii: Neopterygii: Amiiformes

Amia sp. E; M; S

Osteichthyes: Actinopterygii: Neopterygii: Siluriformes

Arius egertoni (Dixon, 1850) W; E; S

Osteichthyes: Actinopterygii: Neopterygii: Elopomorpha

Albula owenii Leriche, 1905 W; E; S

Egertonia cf. *isodonta* Cocchi,

1866 W; E; M; S

Phyllodus sp. W; E; S

Osteichthyes: Actinopterygii: Neopterygii: Pycnodontiformes

Pycnodus toliapicus Agassiz,

1833 W; E; M; S

Osteichthyes: Acanthopterygii: Percomorpha: Scombroidei

Aglyptorhynchus sp. E; S

Brachyrhynchus sp. S

Cybius excelsum Woodward, 1901 W; E; S

C. proosti (Storms, 1876) E; S

C. stormsi Leriche, 1905 S

Cylindracanthus rectus Dixon,

1850 W; E; S

Enniskillensus cf. *radiatus* Casier,

1966 S

Eutrachiurides winkleri Casier,

1946 W; E; M; S

E. sp. W; E

Sphyraenodus lerichei ?Agassiz, 1844 E; S

Palaeogodus (*Trichiurides*) *sagittidens* (Winkler, 1874) W; E; M; S

Trichiurus gulincki Casier, 1967 W; E; S

Xiphiorhynchus sp. E; S

Osteichthyes: Acanthopterygii: Perciformes: Labroidei

Labrus eocaenus ?Casier, 1966 S

Platylaemus coleii Dixon, 1850 W; E; M; S

Pseudosphaerodon antiquus Casier,

1966 E; S

Osteichthyes: Acanthopterygii: Perciformes: Percoidei

Prolates sp. E; S

Sparus sp. W; E; M; S

Osteichthyes: Acanthopterygii: Perciformes: Sphyraenidei

Sphyraena striata ?Agassiz, 1843 E; S

Osteichthyes: Acanthopterygii: Tetradontiformes: Tetradontoidei

Eotrigodon serratus (Gervais, 1852) W; E; S

E. sp. S

Ostracion cf. meretrix Daimeries,

1888 E; S

Triodon antiquus ?Agassiz, 1844 W; E; S

Chondrichthyes: Elasmobranchii: Neoselachii: Squalomorphii

Heterodontus vincenti (Leriche, 1905) E

Isistius trituratorus (Winkler, 1874) E; S

Squalus minor (Leriche, 1902) W; E; S

Chondrichthyes: Elasmobranchii: Neoselachii: Squatinomorphii

Squatina prima (Winkler, 1874) W; E; S

Chondrichthyes: Elasmobranchii: Neoselachii: Galeomorphii

Carcharocles (Procarcharodon) auriculatus (de Blainville, 1818) E; S

Carcharias hopei (Agassiz, 1843) W; E; M; S

Galeocerdo latidans Agassiz, 1843 W; E; S

Galeorhinus minor (Agassiz, 1843) W

G. recticonus (Winkler, 1873) W

G. formosus Arambourg, 1952 W

Isurus novus Winkler, 1874 W; E; M

Isurolamna affinis (Casier,

1946) W; E; M; S

Jaekelotodus trigonalis (Jaekel,

1895) W; E; S

'*Lamna*'*lerichei* Casier, 1946 W; E; M; S

Nebrius thielensi (Winkler, 1873) W; E; S

Odontaspis winkleri Leriche,

1905 W; E; M; S

Physogaleus secundus (Winkler,

1874) W; E; S

P. tertius (Winkler, 1874) W

'*Scyliorhinus*' *minutissimus*

(Winkler, 1873) W

'*S.*' *biauriculatus* (Casier, 1950) W

Synodontaspis macrotus (Agassiz, 1843) W

S. striatus (Winkler, 1874) W

Chondrichthyes: Elasmobranchii: Neoselachii: Batomorphii

Aetobatus irregularis Agassiz,

1843 W; E; M; S

Archeomanta melenhorsti Herman,

1979 W; E; M; S

Burnhamia daviesi (Woodward,

1889) W; E; M; S

Dasyatis duponti (Winkler, 1874) W; E

D. jaekeli (Leriche, 1905) W; E

D. tricuspidatus Casier, 1946 W; E; M; S

D. spp. W

Gymnura sp. M

aff. *Gymnura* sp. M

Heterotorpedo fowleri Ward, 1983 M

Myliobatis dixonii Agassiz, 1843 W; E; S

M. latidens Woodward, 1888 E; S

M. *nzadinensis* (Darteville and

Casier, 1943) W

M. striatus Buckland, 1837 W; E; S

M. toliapicus Agassiz, 1843 W; E; M; S

M. sp. W; M

Pristis lathamii Galeotti, 1837 W

P. sp. W

Rhinobatos bruxelliensis Jaekel, 1894 W

Rhinoptera sherborni White, 1926 W; S

Rhynchobatus vincenti (Jaekel,

1894) W; E; M; S

Chondrichthyes: Holocephalii: Chimaeriformes

Amylodon sp. S

Edaphodon bucklandi Agassiz, 1843 E; S

E. leptognathus Agassiz, 1843 E; S

E. minor S

E. munsteri E

E. kemp Ward, 1976 S

Interpretation

The Bracklesham (= Bournemouth) Group comprises a number of distinct lithological units of Early to Middle Eocene age, represented in both the London and Hampshire Basins. It is locally a series of clayey sands in a quartet of cycles containing fresh, brackish and marine environments. These cycles occurred on a shallow-marine shelf with a fluctuating but unbroken input of sediment from the west and north-west. Water movement was gentle and depth was generally less than 100 m, with widespread seaweed thickets and lawns, and areas of local calcareous and foraminiferal production. The sea was relatively clear and warm (about 18°C) and of slightly reduced salinity. Water movement was gentle. The molluscan fauna was locally very prolific and indicative of a high organic productivity. This provided a substantial food base for both chondrichthyan and osteichthyan fishes, with abundant opportunity to occupy all manner of shallow-water environments and feeding niches, whether bottom or midwater sited.

The sheer variety and number of chondrichthyan taxa and individuals suggest that populations were high, feeding easy and climatic conditions stable. The preserved fish fauna was at its most diverse and abundant during Wittering Division time and diminished to a minimum by that of the Selsey Division. Changing environment affecting modes of life and fossil preservation may have been responsible. The batomorphs and galeomorphs predominate, but there is a good representation of chimaeroids throughout. There are fewer osteichthyans but the numerous teeth suggest both predators (*Albula*, *Egerton*, etc.) and shell-crushing feeders (*Eutrachiurides*, *Sphyraenodus*, etc.) abounded.

Comparison with other localities

This locality is unique in its productivity of fossils and is the same age as others nearly as fossiliferous in the Paris Basin and in Belgium. In localities to the west, as at Alum Bay, Isle of Wight, and in Dorset, the beds are sandier and less fossiliferous; plants are, however, common there. In the London Basin, the Bagshot Formation is far less fossiliferous.

Conclusions

The conservation value of this highly fossiliferous site is derived from its unique record of chondrichthyan species of this Early–Mid-Eocene age. It remains worthy of further collecting and attention to its palaeoecology.

Reference list

- Blainville, H.M.D. (1818) Sur les ichthyolithes ou les poissons fossiles. *Nouvelle Dictionnaire d'Histoire naturelle*, Paris, **37**, 310–95.
- Buckland, W. (1837) On the occurrence of Keuper-Sandstone in the upper region of the New Red Sandstone formation or Poikilitic system in England and Wales. *Proceedings of the Geologists' Association*, **2**, 453–4.
- Casier, E. (1966) *Faune ichthyologique du London Clay*. British Museum (Natural History), London, 2 vols, 496 pp.
- Casier, E. (1967) Le Landanien de Dormaal (Brabant) et sa faune ichthyologique. *Institut royal des Sciences naturelles de Belgique*, Memoire **156**, 1–66.

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- Cooper, J. (1976b) British Tertiary stratigraphical and rock terms formal and informal, additional to Curry 1958, *Lexique Stratigraphique International. Tertiary Research Special Paper*, **1**, 37 pp.
- Curry, D. and Wisden, D.E. (1958) *Geology of the Southampton Area*. Geologists' Association Guide, 16 pp.
- Curry, D., King, A.D., King, C. and Stinton, F.C. (1977) The Bracklesham Beds (Eocene) of Bracklesham Bay and Selsey, Sussex. *Proceedings of the Geologists' Association*, **88**, 243–54.
- Dixon, F. (1850) *The Geology and Fossils of the Tertiary and Cretaceous Formations of Sussex*. Longmans, Brown, Green and Longmans, London, 422 pp.
- Leriche, M. (1905) Les poissons éocènes de la Belgique. *Memoires du Museum d'Histoire naturelle Belgique*, **III**, 49–228.
- Melville, R.V. and Freshney, E.C. (1982) *The Hampshire Basin and Adjoining Areas, British Regional Geology*, HMSO, London, 138 pp.
- Ward, D.J. (1976) A temporary exposure of Harefield Member (Palaeocene, Oldham Formation) at Bignell's Corner, South Mimms, Herts. *Tertiary Research*, **1**, 37–40.
- White, H.J.O. (1926) *The Geology of the Country near Lewes* (Sheet 319). Memoirs of the Geological Survey England and Wales, HMSO, London, 97 pp.
- Woodward, A.S. (1901) *Catalogue of the fossil fishes in the British Museum. Part IV. Containing the actinopterygian Teleostomi of the suborders Isopondyli (in part), Ostariophysii, Apodes, Percosoces, Hemibranchii, Acanthopterygi and Acanthini*, British Museum (Natural History), London, 636 pp.