Early ('Mid-') Cretaceous (Aptian–Albian)

The Aptian and Albian stages in Britain are important for their fish faunas, and significant finds have come from the Speeton Clay (Berriasian-Albian), Lower Greensand (Aptian–Early Albian), Gault Clay (Albian), Upper Greensand (Late Albian), 'Red Chalk' (Hunstanton Formation: Albian–Cenomanian), and from the areally-restricted Cambridge Greensand.

The low cliffs and foreshore between Reighton Gap and Speeton Beck in Speeton Bay, North Yorkshire ((Figure 13.10); [TA 143 764]–[TA 152 756]) expose a discontinuous section through the Kimmeridge Clay (Upper Jurassic), the Speeton Clay Formation, the Hunstanton Formation and the Chalk (Upper Cretaceous). All the beds of the Speeton Clay have yielded sporadic fish material (Phillips, 1829; C. Underwood, pers. comm., 1996), although the lower part of the section is much disturbed by cryogenic folding and the upper part (Beds A and B) poorly exposed due to slippage. However, the section (and its fauna) is the best and most complete development of marine Lower Cretaceous in the British Isles (Neale, 1974; Rawson and Wright, 1992).

The Cambridge Greensand is a remanié deposit of early Cenomanian age, containing vertebrate remains reworked from the uppermost Albian (*dispar* Zone; Cookson and Hughes, 1964; Casey, *in* Edmonds and Dinham, 1965; Rawson *et al.,* 1978, pp. 38, 50). The vertebrate fossils are associated with abundant phosphatic material derived from the Gault, and were collected from former phosphate workings located along a SW–NE line from Whaddon [TL 34 47] to Swaffham Fen [TL 56 67]. There are now few extant localities of the Cambridge Greensand: it may be seen at Barrington [TL 39 49] and Arlesey ([TL 185 350]; Benton and Spencer, 1995).

Fish remains in the Lower and Upper Greensand are usually fragmentary and sparse. Reworked Jurassic and Wealden fish material is also found in the Lower Greensand of southern Britain, and include taxa such as *Hybodus basanus, H. obtusus, H. subcarinatus, Hylaeobatis ornata* and *Synechodus tenuis* (Casey, *in* Edmonds and Dinham, 1965). Non-derived Mid-Cretaceous material includes forms such as *Heterodontus sulcatus, Cretolamna appendiculata, Cretoxyrhina mantelli, Scapanorhynchus subulatus, S. raphiodon, Scapanorhynchus* sp., *Ischyodus thurmanni, Edaphodon, Sphaerodus neocomiensis, Gyrodus atherfieldensis* and *Apateodus* sp. (Casey, *in* Edmonds and Dinham, 1965).

The Gault Clay has yielded abundant and well-preserved remains, particularly from the cliff sections of Folkestone (q.v.). The Gault Clay can be split into two divisions: the Lower and Upper Gault; fish remains have been found in both divisions, but they are much more numerous in the Upper Gault Clay (Jukes-Browne and Hill, 1900). The Gault Clay has a good fish fauna, isolated teeth and vertebral discs of elas-mobranchs being the most common find. Most of these belong to *Cretolamna appendiculata,* although other abundant taxa are several species of *Hybodus, Synechodus* and *Acrodus laevis, Cretoxyrhina mantelli, Leptostyrax macrorhiza, Heterodontus canaliculatus, Squalicorax pristodontus, Notidanodon lanceolatus* and *Scapanorhynchus subulatus* (Jukes-Browne and Hill, 1900; Smart *et al.,* 1966), and also *Squatina* sp. Chimaeroid dental plates (*Ischyodus thurmanni, Edaphodon sedgwicki* and *E. laminosus*)are also common, as are teeth, scales and bones of the bony fish, e.g. *Xiphactinus gaultinus, Coelodus ellipticus, Enchodus lewesiensis, Pachyrhizodus salmoneus, Anomoeodus cretaceus, Apateodus glyphodus, Syllaemus anglicus* and *Protosphyraena ferox* (Jukes-Browne and Hill, 1900; Smart *et al.,* 1966). Most of these forms range up into the Late Cretaceous Chalk succession of Great Britain.

Aptian and Albian deposits from western Europe have also yielded similar fish faunas. A Gault fauna, similar to that at Folkestone, but lacking hexanchids, is known in northern France and in the Aptian of southern France.

Fish sites

Aptian–Albian strata have yielded abundant fossil fish remains from dozens of localities from Dorset to Yorkshire. The majority of these finds are only isolated debris, and many sites now have only low potential for future finds. The fossil fish sites are listed below by county from the south-west to the north-east:

DORSET: Worbarrow Cove (Upper Greensand; [SY 871 797]; *Cretolamna appendiculata;* Jukes-Browne and Hill, 1900); Punfield Cove, Swanage (Penfield Marine Band, Lower Greensand and in the 'Pebble Bed', Atherfield Clay Formation; [SZ 032 798]; *Lepidotes,* pycnodonts, '*Lamna*',other fish debris; Arkell, 1947c); Corfe siding ('Basal Pebble Bed', Atherfield Clay Formation; [SY 970 807]; *Lepidotes,* pycnodonts, '*Lamna*', other fish debris; Arkell, 1947c); Okeford–Fitzpaine brickyard (Lower Greensand and 'Ironstone' Bed, Lower Gault Clay; [ST 801 101]; many fish teeth, scales and bones, including *Cretolamna appendiculata, Synechodus;* Jukes-Browne and Hill, 1900; White, 1923); Cerne Abbas–Minterne quarries (Upper Greensand phosphate bed; various localities around [SU 662 035]; *Ptychodus decurrens, Cretolamna appendiculata;* Jukes-Browne and Hill, 1900).

WILTSHIRE: Vale of Warminster ('Warminster Beds', 'Lower Sands', 'Chen Beds' and 'Rye Hill Sands'), Upper Greensand; various localities including Maiden Bradley Quarry, [[ST 80 39]], Rye Hill Farm Quarry, [ST 847 404], Shute Farm Quarry [ST 844 411], Stourton, [ST 77 33], Penselwood, [ST 76 31]; *Ptychodus decurrens, Scapanorhynchus subulatus, Squalicorax falcatus, Cretolamna appendiculata, Leptostyrax macrorhiza, Cretoxyrhina mantelli, Edaphodon crassus, Anomoeodus angustus, Coelodus cretacous, Coelodus* sp., *Enchodus lewesiensis, Plethodus expansus, Protosphyraena ferox,* Jukes-Browne and Hill, 1900); Seend, Devizes (Ferruginous Sands ('Devizes Beds'), Upper Greensand; [ST 610 980]; *Cretolamna appendiculata,* '*Oxyrhina*'sp., *Protosphyraena ferox, Lepidotes maximus* (= Sphaerodus *neocomiensis*)*;* Keeping, 1883; Jukes-Browne and Hill, 1900; Casey, *in* Edmonds and Dinham, 1965).

HAMPSHIRE: Alton railway cutting, Petersfield (Gault Clay; [SU 71 32]; '*Lamna*' sp.; Jukes-Browne and Hill, 1900, p. 111); Binsted, Froyle, East Worldham, Selbourne ('Malmstone', Upper Greensand; various localities of uncertain position; *Enchodus, Protosphyraena ferox, Cretolamna appendiculata;* Jukes-Browne and Hill, 1900, p. 121).

BERKSHIRE: Farringdon (Lower Greensand; [SU 28 95]; *Asteracanthus, Hybodus, Strophodus, Ischyodus, Gyrodus, Pycnodus, Lepidotes maximus* (= Sphaerodus *neocomiensis* and *S.* sp.; Keeping, 1883).

ISLE OF WIGHT: Bonchurch (Lower Gault Clay; [SZ 360 860]; fish remains; Jukes-Browne and Hill, 1900); Compton Bay (Lower Gault Clay; [SZ 36 85]; fish remains; Jukes-Browne and Hill, 1900); Luccombe and Shanklin quarries (Upper Greensand, sands and ragstones; various localities around [SZ 580 801]; '*Lamna*', *Gyrodus, etc.;* Jukes-Browne and Hill, 1900).

SURREY: Godalming (Hythe Beds and Sandgate Beds (basal pebble beds), Lower Greensand; [SU 96 43]; *Lepidotes, Hybodus, Gyrodus, Acrodus* and other reworked fish remains; Topley, 1875; Keeping, 1883; Casey, *in* Edmonds and Dinham, 1965).

SUSSEX: Eastbourne (Upper Gault Clay; [TQ 58 02]; *Squalicorax pristodontus, Scapanorhynchus subulatus;* Jukes-Browne and Hill, 1900, p. 121); Hopton Wood cement works, Small Dole (Gault Clay; [TQ 211 126]; D. Ward, pers. comm., 1995).

KENT: Iguanodon Quarry, Maidstone ([TQ 746 558]; *Hybodus complanatus, Heterodontus sulcatus, Synechodus tenuis* (holotype specimen), *Ischyodus thurmanni;* Bensted, 1860; Casey, *in* Edmonds and Dinham, 1965, p. 539); Hythe (Hythe Beds, Lower Greensand; [TR 163 352]; *Heterodontus sulcatus, Ischyodus agassizi;* Topley, 1875); Folkstone (Lower and Upper Gault Clay; [TR 22 35]; 30 species; see site report); Dover Colliery shafts (Atherfield Clay Formation; derived Wealden fishes, including *Lepidotes* spp., *Hybodus* spp.; Casey, *in* Edmonds and Dinham, 1965).

BUCKINGHAMSHIRE: Marshall Farm quarries, Bishopstone (Lower Gault Clay; [SP 80 10]; *Leptostyrax macrorhiza, Cretolamna appendiculata, Ischyodus* sp., *Protosphyraena ferox;* Jukes-Browne and Hill, 1900, p. 278); Puttenham Pit ('Malmstone', Upper Greensand; [SO 92 47]; *Cretolamna appendiculata, Protosphyraena ferox;* Jukes-Browne and Hill, 1900, p. 282); Long Crendon Pit ('Shenley Limestone', Gault–Lower Greensand junction beds; [SP 69 09]; fish remains indet.; Lamplugh, 1922, p. 41); Brickhill (Lower Greensand; [SP 91 31], ?exact locality; *Asteracanthus, Sphenonchus, Edaphodon* (derived Jurassic species), *Macromesodon* '*couloni*'and *Lepidotes maximus* (= *Sphaerodus neocomiensis; Sphaerodus gigas*)*;* Keeping, 1883).

BEDFORDSHIRE: Arnold's Pit, Billington Crossing (Gault-Lower Greensand (Woburn Sands) junction beds; [SP 933 240]; *Notorhynchus aptiensis;* Smart, 1995); Leighton Buzzard pits ('Shenley Limestone', Gault-Lower Greensand

(Woburn Sands) junction beds; various sand pits around [SP 93 28], including Chamberlain Barn Pit [SP 929 265], Shenley Hill, Mundays Hill [SP 936 279]; *Notorhynchus aptiensis; Cretolamna appendiculata, Scapanorhynchus subulatus, S. raphiodon, Apateodus* Lamplugh, 1922; Casey, *in* Edmonds and Dinham, 1965; D.Ward, pers. comm., 1995; Smart, 1995); Potton (Lower Greensand; [TL 22 49]; *Asteracanthus, Strophodus, Hybodus, Sphenonchus,* chimaeroid material, *Gyrodus* and *Pycnodus* (derived Jurassic species), *Lepidotes maximus* (= *Sphaerodus neocomiensis*)and *Ischyodus townsendi;* Keeping, 1883).

CAMBRIDGESHIRE: Upware, Commissioner's Pit (Lower Greensand; [TL 539 708]; mixed fauna of derived Jurassic and Cretaceous forms *Acrodus, Asteracanthus, Hybodus,* '*Sphenonchus*',*Strophodus, Cretoxyrhina, Ischyodus townsendi,* other chimaeroid material, *Macromesodon couloni, Gyrodus, Lepidotes maximus* (= Sphaerodus *neocomiensis, S. gigas*)*;* Keeping, 1883); Barnwell brickpit (Upper Gault Clay; exact site now uncertain; *Ptychodus* fin spine, *Cimo/ichthys striatus;* Jukes-Browne and Hill, 1900).

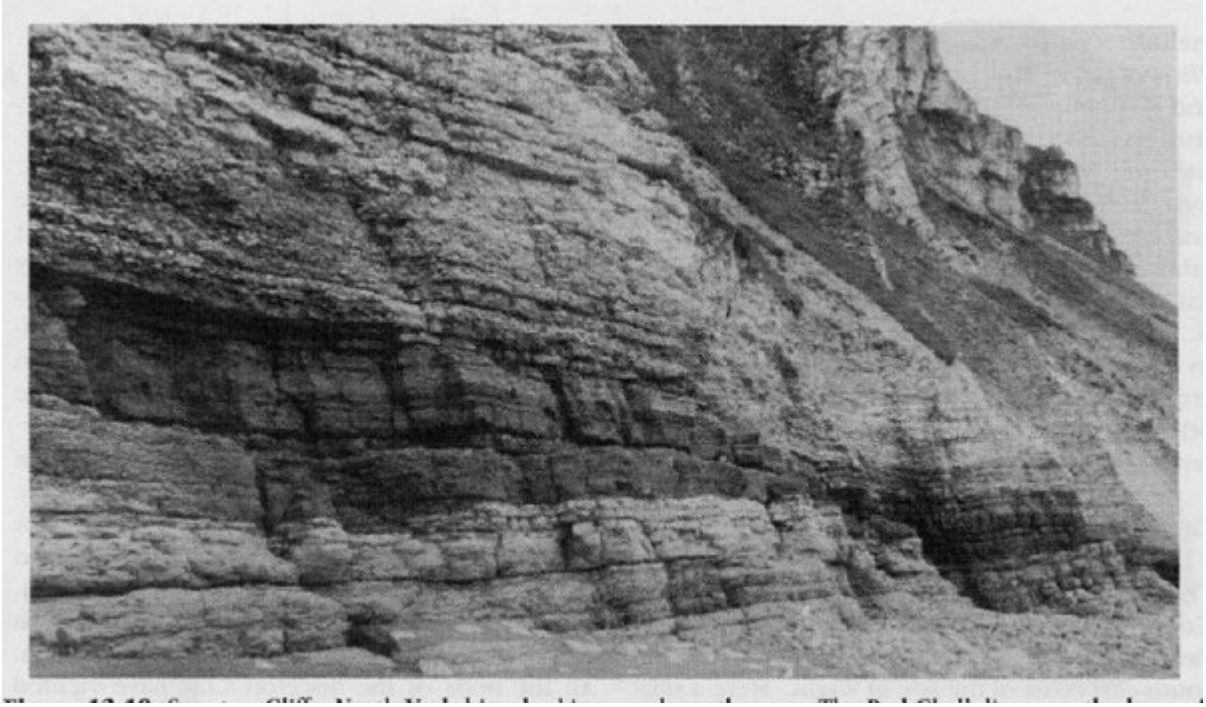
NORFOLK: West Dereham brickpits (Gault Clay; [TL 65 00]; *Odontaspis gracilis* (= *?Carcharias amonensis*), pycnodonts, *Cimolichthys striatus,* indeterminate beryciform actinopterygian ('*Beryx*')*;* Jukes-Browne and Hill, 1900); Hunstanton (Hunstanton Formation Cited Chalk') undifferentiated fish and shark material; Woodward, 1894).

NORTH LINCOLNSHIRE: South Ferriby brickpit (Hunstanton Formation ('Red Chalk'); [SE 98 20]; *Hexanchus* sp., *Notorhynchus aptiensis, Synechodus* spp., *Paraorthacodus* sp., *?Sphenodus* sp., *Heterodontus* sp., *Protosqualus sigei,* indeterminate squalids, *?Protolamna* sp., *?Cretolamna* sp., *Cretoxyrhina* sp., *Archaeolamna* sp., *?Anomotodon* sp., *Scapanorhynchus* sp., indeterminate lamnids, *Scyliorhinus* sp., *Pteroscillium* sp., *Cederstroemia* sp., indeterminate orectolobidiformes, *Squatirhina* sp., indeterminate bony fish material, may include *Protosphyraena sp.;* C. Underwood, pers. comm., 1996).

YORKSHIRE: Speeton Cliffs (Reighton Gap to Speeton Gap) (Speeton Clay Formation and the Huntstanton Formation ('Red Chalk'); [TA 143 764]–[TA 152 756]; *Hexanchus* sp., *Notorhynchus aptiensis, Notidanodon lanceolatus, Synechodus dubriensis, S.* sp., *Paraorthacodus recurvus, ?Spenodus* sp., *Squatina* spp., *Heterodontus* sp., *Protosqualus sigei, Squalus* sp., indeterminate squalids, *?Protolamna* sp., *Palaeobrachaelurus, Cretolamna woodwardi, Cretoxyrhina mantelli ?Arhaeolamna* sp., *Anomotodon principalis, Scapanorhyncus praeraphidon,* indeterminate odontaspid, *Scyliorhinus destombesi, Scy.* sp., *Pteroscylium* sp., indeterminate scyliorhind, *Orectoloboides parvulus, Cederstroemia* sp., *Chiloscilium* sp., *Pararhincodon* sp., indeterminate orectolobiformes, *Squatirhina thiesi, Squ.* sp., otoliths; Phillips, 1829; Pictet, 1865; Neale, 1974; Rawson and Wright, 1992; C. Underwood, pers. comm., 1996.)

Only East Wear Bay, Folkestone, Kent, is selected as a 'Middle' Cretaceous (Aptian–Albian) GCR site.

References



(Figure 13.10) Speeton Cliffs, North Yorkshire, looking north-north-west. The Red Chalk lies near the base of the Lower Chalk and crops out in the foreshore below the beach in the foreground. Cliffs of Middle Chalk in the middle distance show small landslips. Fossil fish remains have been found in both of these formations. (Photo: BGS no. A5467, Crown Copyright reserved.)