Boxford Chalk Pit

[SU 431 719]

Highlights

Boxford Chalk Pit in Berkshire (Figure 13.23) is extremely important as being one of the best Upper Chalk sites still actively producing fossil fishes. Bulk sampling of the unusual phosphatic horizons at the quarry in recent years has revealed a rich microshark fauna, which includes some extremely rare taxa not previously described from the British Chalk sequence. The site is still accessible and future excavations will undoubtedly produce more remains.

Introduction

Boxford Chalk Pit is one of the few remaining pits in the Upper Chalk (Upper Turon-ian–Santonian) succession of southern Britain still producing vertebrates. At this site there are many thin phosphatic horizons overlying phos-phatized hardgrounds in the upper half of the *M. coranguinum* Zone (Santonian Chalk), which yield abundant coprolites and many tiny fish teeth. The material recovered by bulk sampling includes an important microselachian component with many taxa yet to be described.

The small quarry is disused and rather overgrown (Figure 13.23), with dangerous talus slopes below the main faces. However, the faces are clean and further finds could be made with minor re-excavation. The geology of the site has been described by White (1907).

Description

The section was originally described by H.J. Osborne White for the Geological Survey Memoir (1907) and is reproduced here with modifications:

	Thickness (m)
4. Soft to very hard yellowish-white chalk, having a lumpy appearence on weathered surfaces, and containing a few flints in the lower part. Harder portions occur in ill-defined bands, and in elongate bodies at various angles to the bedding planes. Softer parts distinctly phosphatic, the wash-residues being rich in brown polished coprolites, phosphatic clasts of foraminifera, and organic debris. Brown phosphatic, and light or dull green glauconitic concretions, of angular form (up to ¼ inch [6 mm] in diameter) are very abundant in places. Many oyster shells	*c.* 3.0
3. Firm, irregularly-jointed white chalk, with one distinct band of nodular, and a few seams of tabular flint, near the middle. Lower part of the bed yields asteroid ossicles, fragments of *Inoceramus,* and broken *Cidaris* plates. A thin seam of grey rubbly marl at the base	*c.* 4.3
2. Yellow, rocky chalk, minutely banded with iron stains, and green concretions. Top of this hard band even and clearly defined, in places a very thin brown glaze. From it descend borings filled either with the marl or with soft chalk containing phosphatized materials like those in bed (4):	0.3–0.8

1. Soft, white, blocky chalk, passing up into the above rock. One prominent band of big flint nodules (studded with asteroid ossicles, plates of *Cidaris,* etc.) about 5 feet [1.5 m] down. Smaller scattered, finger-shaped and globular flints 2.1

The sequence of hard and phosphatized chalk is uncommon in the White Chalk in the Boxford area, and many more phosphatic beds occur lower down in the *M. coranguinum* Zone in this region (White, 1907). Most of the vertebrate material was derived from the uppermost phosphatic unit (Bed 4 in the log; White, 1907, p. 25), which is similarly rich in invertebrates, many of which are phosphatized.

Fauna

The microvertebrate remains yielded by acid preparation have not been formally described; the list below has been compiled from the unpublished results of D. Ward (pers. comm., 1995).

Chondrichthyes: Elasmobranchii: Neoselachii: Squatinomorphii

Squatina sp.

Chondrichthyes: Elasmobranchii: Neoselachii: Galeomorphii

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

Cretolamna sp.

'*Hemiscyllium*'sp.

Pararhincodon crochardi Herman, 1977

Paratriakis sp.

Scyliorhinus sp.

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

Synechodus sp.

Chondrichthyes: Elasmobranchii: Neoselachii: Batomorphii

Ganopristis sp.

Rhinobatos sp.

Squatirhina sp.

Interpretation

The phosphatized condensed sequence at Boxford is relatively rich in fossil sharks. These include the usual complement of galeomorph sharks, for example *Cretolamna, Scyliorhinus, Squalicorax* and *Synechodus,* which are common in all British Chalk horizons, although many other common galeomorph taxa recorded from other Chalk sites, such as *Paranomotodon, Cretoxyrhina* and *Plicatolamna,* are missing. No squalomorph shark is present at Boxford, although teeth of the ubiquitous *Squatina* were recovered from acid residues (D. Ward, pers. comm., 1995). Ptychodont sharks were also not found at Boxford, although several species of *Ptychodus* have been recorded at other Upper Chalk horizons (Woodward, 1902–1911). The neoselachian fauna includes some unusual elements quite different from those from the Lower and Middle Chalk localities.

In common with the galeomorph assemblage from 'Strahan's Hardground' at Southerham Lime Kiln Quarries (q.v.), the Boxford fauna includes tiny teeth from the extant orectolobiform '*Hemiscyllium*' sp. (D. Ward, pers. comm., 1995) and a second orectolobiform, *Pararhincodon crochardi* Herman (Figure 13.24)A. This latter genus is an extinct Cretaceous and Palaeocene relative of the Recent orectolobiform Parascyllidae, represented today by two genera of small elongated sharks in the Pacific (Cappetta, 1987). The genus is known from isolated teeth of the type species, *P. crochardi,* from Turonian rocks of Belgium (Herman, 1977) and a single incomplete skeleton of a second species, *P. lehmani* Cappetta, 1980, from the Cenomanian of Lebanon (Cappetta, 1980). The teeth of *P. crochardi* are very small (about 1 mm high) and are strongly asymmetrical.

The second unusual galeomorph at Boxford is the triakid carcharhiniform *Paratriakis* (Figure 13.24)B,C. This genus has previously been recorded from complete skeletons in the Upper Santonian Chalk of Lebanon (Davies, 1887), as well as from isolated teeth from the Campanian and Turonian of northern France and Belgium (Herman, 1977). Teeth of *Paratriakis* are similar to those of the extant smooth dogfish *Triakis,* with a large, straight, central cusp flanked by either one or two pairs of lateral cusplets or a smooth cutting edge (Cappetta, 1987). *Paratriakis* is the oldest undisputed member of the Triakidae, and its presence in the Boxford fauna is the first recorded occurrence of it in the British Chalk.

Three batomorph genera are found in the phosphatic beds at Boxford. The enigmatic Cretaceous ray *Squatirhina* is present, but has also been recovered from the Totternhoe Stone of Totternhoe (q.v.) and its occurrence in the Boxford fauna is unremarkable. *Rhinobatos* is a similar rhinobatid genus, the isolated teeth of which are common in most shallow-water deposits from the Lower Cretaceous onwards (Cappetta, 1987). This genus is characterized by small teeth (up to 2 mm wide) which have a rather massive and high, globose crown, with a pronounced transverse ridge on the oral side (Cappetta, 1987). *Rhinobatos* includes several extant species which frequent warm or tropical seas, but almost nothing has been written on the dental morphology of these forms, making elucidation of the fossil species and their relationship to the extant forms extremely difficult (Cappetta, 1987). Living rhinobatids are benthic animals feeding on molluscs and crustaceans. Although they mainly frequent the warm waters of the continental shelf; they do not always indicate shallow depths, as several species descend to more than 200 m.

A second suborder of batomorphs represented in the Boxford fauna comprises the scle-rorhynchoid rays, which are characterized by a long, flattened rostrum and a rather whip-like tail. The sclerorhynchoids were well represented in the Chalk seas, and include one extinct family, the Sclerorhynchidae, confined to the Upper Cretaceous (Cappetta, 1987). Teeth of *Ganopristis,* a Maastrichtian sclerorhynchid ray ((Figure 13.24)D) have been recovered from the Boxford phosphate bed acid residues (D. Ward, pers. comm., 1995). These are large, laterally compressed rostral teeth (up to 25 mm in length). The oral teeth are much wider (up to 35 mm in width) than long and have a central cusp marked by short vertical folds upon the labial and, sometimes, lingual faces (Cappetta, 1987). This occurrence may be the earliest for the genus.

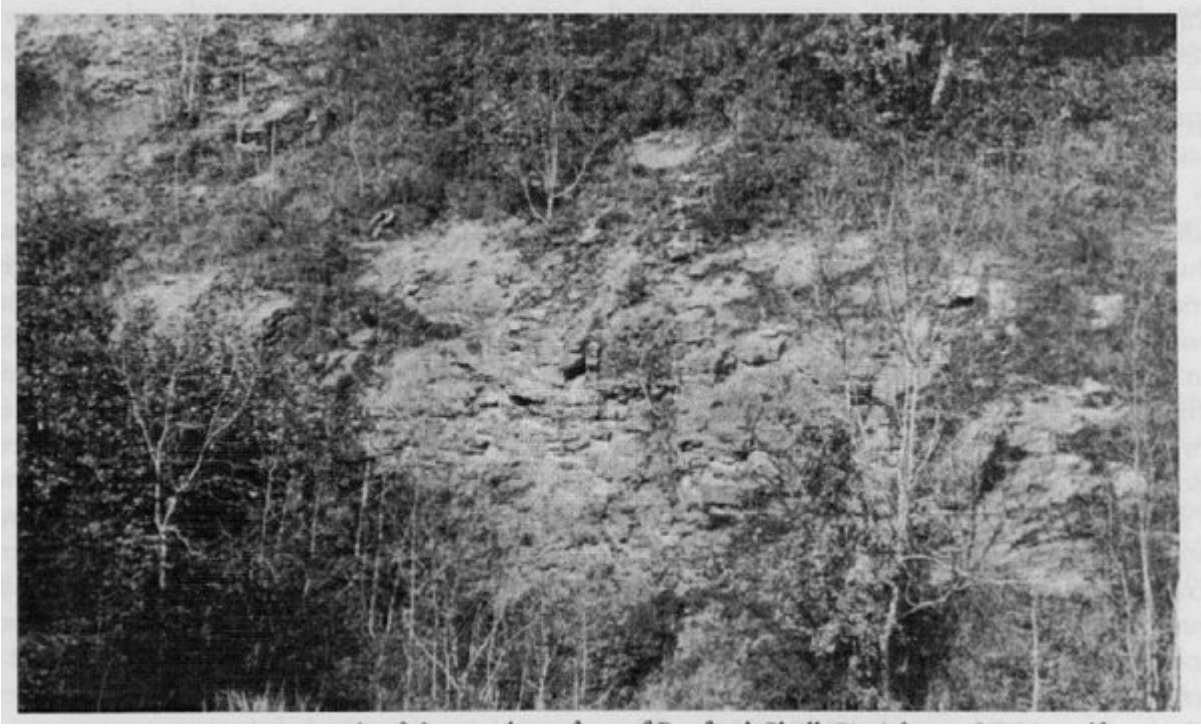
Comparison with other localities

Fossil fish remains are not uncommon in the Upper Chalk succession of southern Britain, with over 30 localities recorded by Jukes-Browne and Hill (1904). However, they are not so nearly abundant or well preserved as fishes from the Lower Chalk, and many of the sites have been overlooked as sources of Chalk fishes. Sites that have yielded fish remains from the *M. coranguinum* Zone are Porton railway cutting, Wiltshire [SU 19 36], Witherington railway cutting, Wiltshire, Winchester pits, Hampshire, Beachy Head–Brighton cliff section, Sussex [TV 58 95]–[TQ 35 03], Gravesend, Kent [TQ 64 74], Strood pits, Kent [TQ 72 69], Charlton pits, Kent, Lewisham pits, Kent [TQ 37 74), and Haling and South Croydon pits, Surrey. Much of the material consists of isolated lamniform and ptychodont shark teeth, but some of these sites also yielded abundant 'enchodont' teeth, along with other bony fish remains, such as scales, jaws, rostra and a few partial skeletons of the smaller species. The large bones of the coelacanth *Macropoma* are uncommon in the Santonian Chalk, but have been found at Brighton, Sussex and in coastal sections between Dover and Margate, Kent. They have not been recorded from Boxford.

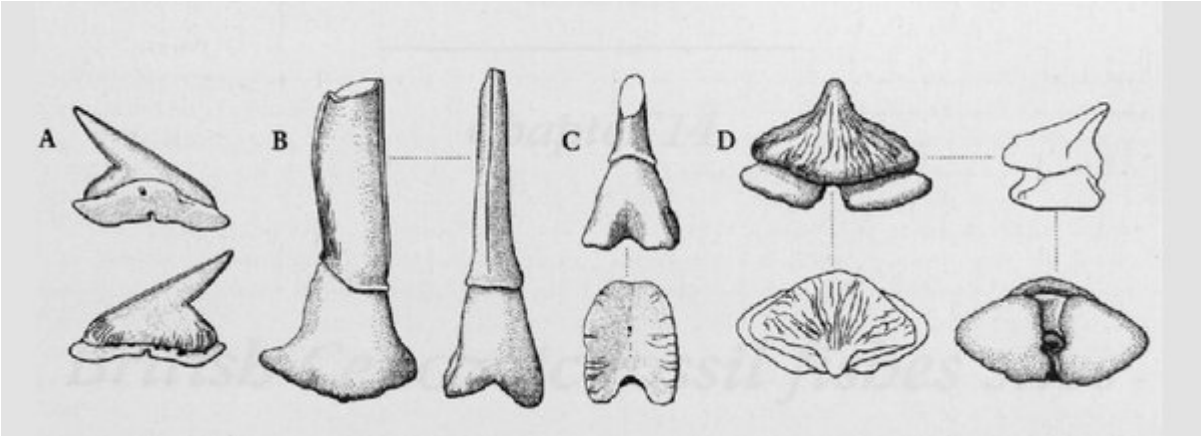
Conclusion

Although much of the Santonian microshark fauna recovered from Boxford is similar to that from earlier Chalk localities, the site has also revealed an important neoselachian component, including several shark and ray taxa not previously recorded from the British Upper Chalk, hence the site's conservation value.

References



(Figure 13.23) Photograph of the southern face of Boxford Chalk Pit (photo: S.J. Metcalf).



(Figure 13.24) Fossil elasmobranchs from the Chalk at Boxford Chalk Pit. (A) Pararhinocodon angustidens, X 16; (B), (C) Paratriakis sp., rostral teeth, x 2.5; (D) Ganopristis sp. (after Cappetta, 1987), oral tooth, x 10.