Southerham Grey Pit

[TQ 427 090]

Highlights

Southerham Grey Pit in East Sussex (Figure 13.20) exposes a Chalk succession slightly older than that in the neighbouring Machine Bottom Pit. Fossil fish remains have been recovered in recent years by bulk sampling the sediments of a large channel structure that occur between the Grey Chalk and Chalk Marls. The site has excellent potential for new finds.

Introduction

The Southerham Grey Pit or Eastwoods Cement Company Pit exposes a total of 50 m of the Chalk Marl and Grey Chalk in the Lower Chalk succession (Lower–Middle Cenomanian). Now disused, it was worked relatively recently (White, 1926; Kennedy, 1969) and is not, therefore, the source of the large collections of chalk fish made in the 19th century. Nevertheless, the exposed Lower Chalk sequence in the Grey Pit can be correlated with the nearby overgrown section with in the fossiliferous Machine Bottom Pit (q.v.), and the pit is important as the stratigraphically highest productive site for Lower Chalk fishes.

The geology of the Grey Pit has been described in detail by Kennedy (1969, pp. 497–499), who also produced a bed-by-bed account of the palaeontology of the section. Subsequent workers (e.g. Wright and Kennedy, 1984; Lake *et al.,* 1987) have refined Kennedy's description, improving the quality of the biostratigraphical subdivision of the section and providing a correlation with the Lower Chalk sequence on the south coast. The fishes have not been formally described.

Description

The section has not been fully described, but detailed logs of the exposed faces in the Grey Pit were produced by Kennedy (1969) and Lake *et al.* (1987). Kennedy (1969) gave an excellent account of the fossils of the Lower Chalk succession exposed in the pit at that time, but made no mention of any fossil fishes in either the Chalk Marl or overlying Grey Chalk.

The Chalk Marl succession in the pit is highly fossiliferous, comprising an alternating sequence of marls and thick shelly limestone bands (Kennedy, 1969). The limestone bands in particular, produce a well-preserved uncrushed ammonite and inoceramid bivalve fauna, on which biostratigraphical subdivision is based. However, the zonal and subzonal boundaries are difficult to determine in the Chalk Marl of the Lewes area (Lake *et al.,* 1987). The boundary between the Chalk Marl and overlying Grey Chalk in this quarry is sharp (Figure 13.17) and occurs within the *acutus* Subzone (Lake *et al.,* 1987). The Grey Chalk at Southerham is much more calcareous than elsewhere, although the thin marl seams which do occur are laterally persistent and can be correlated to other pits in the area. At the top of the Grey Chalk section in the Grey Pit a 6 m band of limestone with large scour structures has been observed. This unit is present in the Machine Bottom Pit (q.v.) and corresponds to 'Jukes-Browne Bed 7' of the Dover–Folkestone Grey Chalk sequence (Lake *et al.,* 1987).

Fossil fishes have been recovered in recent years by bulk sampling the basal infill of a large channel structure between the Grey Chalk and Chalk Marls within the section (Lake *et al.,* 1987). The structure has a lateral extent of around 100 m across the northern face and has been described in detail by Lake *et al.* (1987). It cuts down from a level 1.5 m above the base of the Grey Chalk through 6 m of the underlying Chalk Marl. The basal infill comprises a thin (0.1–0.7 m) phosphatic rubble, which is also found in vertical burrows in the underlying chalk. The basal bed largely comprises a coarse calcarenite with a high content of echinoid debris. Pebble-sized clasts include reworked angular chalk, glauconitized and phosphatized pebbles and small phosphatic coprolites. Small fish teeth can be extracted from this unit by acid

preparation. The channel structure is inaccessible in the quarry face, but fallen blocks are commonly found in the talus slopes (D. Ward, pers. comm., 1994).

Fauna

The fauna recovered from acid preparation of the channel infill sediments has not been formally described (for example, the assemblage is referred to by Lake *et al.,* 1987, p.68, as 'much pelletal phosphate with small fish teeth'). The list of species is taken from the unpublished results of D. Ward (pers. comm., 1995).

Chondrichthyes: Elasmobranchii: Neoselachii: Squalomorphii

Notorhynchus aptiensis (Pictet, 1865)

Protosqualus sp.

Chondrichthyes: Elasmobranchii: Neoselachii:

Squatinomorphii

Squatina sp.

Chondrichthyes: Elasmobranchii: Neoselachii: Galeomorphii

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

Cretolamna sp.

Leptostyrax sp.

Paranomotodon sp.

Paraorthacodus sp.

Scyliorhinus sp.

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

Synechodus sp.

Synodontaspis (*Carcharias*) *striatula* (Dalinkevicius, 1935)

Chondrichthyes: Elasmobranchii: Neoselachii: Batomorphii

Squatirhina sp.

Turonibatis cappettai Landemaine, 1991

Interpretation

The channel lag deposit from which the fish fauna was recovered formed during a break in sedimentation in the Chalk Marl and Grey Chalk succession, and therefore the fish remains may have been concentrated or reworked from older deposits. However, the channel infill is an important source of Lower Chalk fishes, and their ages are roughly constrained to the *M. dixoni* and basal *A. rhotomagense* Zones.

The acid residues from the channel infill are made up of neoselachian taxa entirely, with no bony fish or archaic shark material (D. Ward, pers. comm., 1995). The fauna includes squalo-morph, squatinomorph, galeomorph and bato-morph

neoselachians and is almost identical to that from Tottemhoe (q.v.). The squalomorphs are represented by two small species, the squalid *Protosqualus* and the hexanchid *Notorhynchus aptiensis* (Pictet). *Protosqualus* teeth are common in many of the Chalk residues, including Totternhoe (q.v.) and the Lime Kiln Quarries at Southerham (q.v.). *Notorhynchus* is a Recent cow-shark that has seven branchial slits, and its fossil record is comprised solely of isolated teeth (Cappetta, 1987). The teeth are large and like those of the other Chalk hexanchids, *Hexanchus* and *Notidanodon.* The Grey Pit teeth are clearly referrable to the Lower Cretaceous (Aptian) species *N. aptiensis,* recovered from the 'Gargasian' sequence of southern France (Pictet, 1865), and this record extends the range of the species into the Upper Cretaceous (Cappetta, 1987). The species *N. serratissimus* (Agassiz, 1843) occurs in the Ypresian (Lower Eocene) of the Isle of Sheppey (q.v.), and thus the occurrence of *N. aptiensis* in the Grey Pit fauna fills a significant gap in the fossil record of this genus.

All the other elements of the Grey Pit microshark fauna are recorded from acid preparation of the Totternhoe Stone of Totternhoe (q.v.) by D. Ward (pers. comm., 1995), and details are not given here (see 'Interpretation' section of the Totternhoe report).

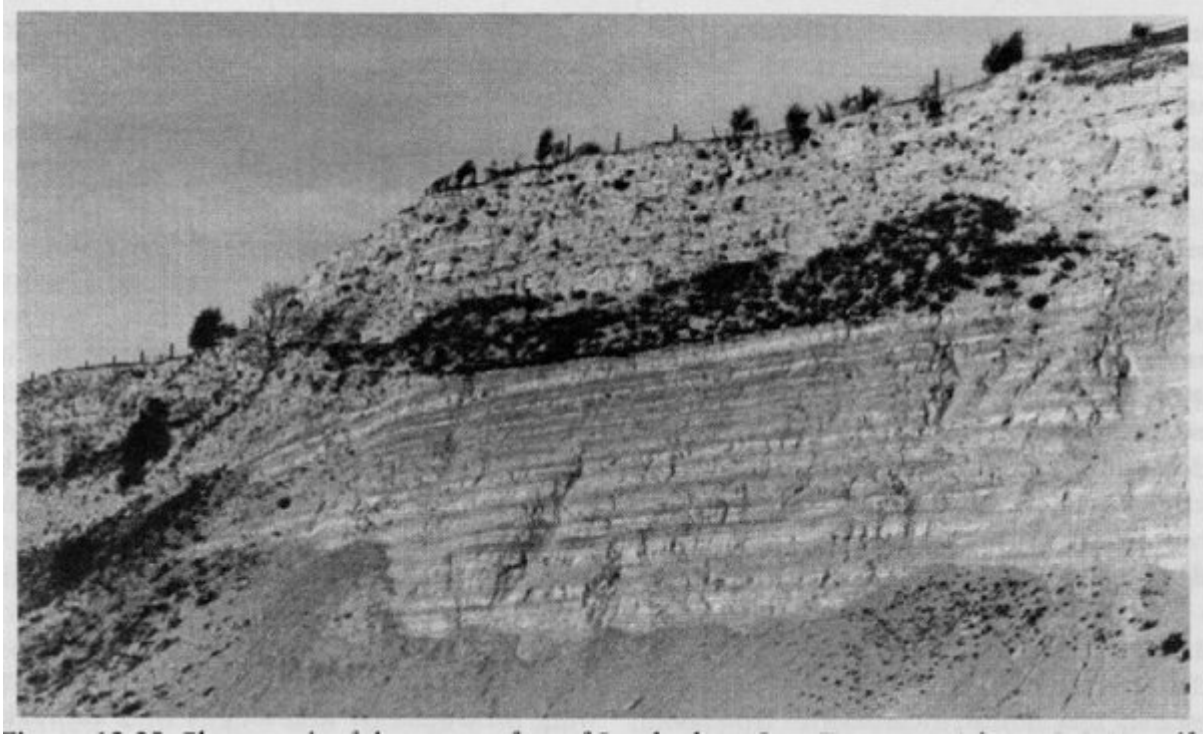
Comparison with other localities

The Cenomanian faunas of Southerham Grey Pit and the Totternhoe Stone are virtually identical, despite slightly different depositional environments. However, both assemblages are concentrated in lag deposits and are roughly equivalent in age (*M. dixoni* and *A. rhotomagense* Zones of the Lower Chalk). The acid residues from Southerham lack some of the larger elements of the Tottemhoe Stone, such as the hybodont shark *Ptychodus.*

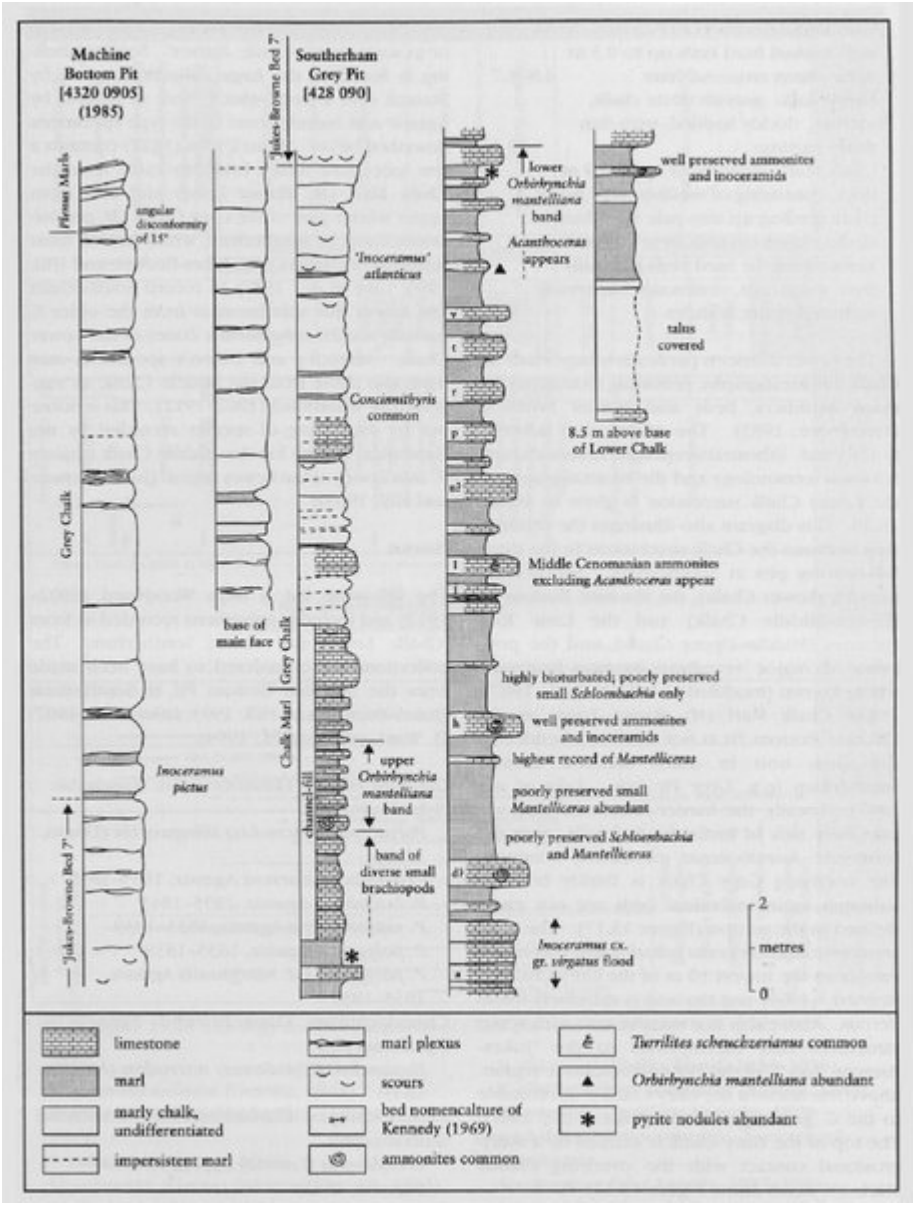
Conclusion

The conservation value of Southerham Grey Pit results from its Cenomanian microshark fauna that contains a diverse assemblage of neoselachian elements, including rare teeth of the seven-gilled cow-shark *Notorhynchus.* This living form is otherwise only known from Lower Cretaceous and Lower Eocene sequences, and the occurrence of this genus in the Upper Cretaceous of Southerham fills an important gap in the fossil record of this group.

References



(Figure 13.20) Photograph of the eastern face of Southerham Grey Pit section (photo: S. J. Metcalf).



(Figure 13.17) Chalk sections in the Machine Bottom Pit and Southerham Grey Pit (after Lake et al., 1987).