Harwich, Essex

[TM 263 316]–[TM 263 323]

Potential GCR site

Highlights

This locality is particularly important as the best exposure of the 'Harwich Stone Band', the most distinctive of the ash bands in the Harwich Formation (formerly the Harwich Member of the 'London Clay') which are now known to correlate with volcanic horizons in the North Sea Palaeogene succession.

Introduction

To the eastern side of the Harwich promontory, between grid references [TM 263 316] and [TM 263 323], a conspicuous hard bed, the 'Harwich Stone Band', is well exposed on the upper foreshore. This represents the best lithified and most easily identifiable example of in excess of 30 ash bands within the Harwich Formation (Ellison *et al.,* 1994), formerly the Harwich Member of the 'London Clay'. Both the Harwich Formation and the London Clay belong to the Thames Group of King (1981).

Harwich Cliff was first described by Dale in 1704 and in more detail in a later account in 1730, well before the construction in the 19th century of a protective breakwater and concrete 'promenade' which led to the cessation of active erosion (Elliott, 1971a).

The 'stone band' at Harwich was recognized as significant many years ago: the streets of Harwich had been originally paved with it and, indeed, the very existence of Harwich may reflect its resistant nature (Greensmith *et al.,* 1973, p. 10). Its presence had been noted by workers such as Whitaker (1918) and Davis and Elliott (1951a), although its geological significance was not fully recognized prior to Elliott's (1971a, b) discovery that it provided evidence for contemporaneous Eocene vulcanicity.

References to fossils from the 'Harwich Stone Band' and the adjacent muds within the Harwich Formation include Elliott (1971a) and Daniels (1971), whilst its magnetostratigraphical character was investigated by Townsend and Hailwood (1985, p. 972).

This site is a confirmed GCR site for its fossil plant content, a more detailed account will be published in the GCR Series volume *Mesozoic to Tertiary Palaeobotany of Great Britain* (Cleat and Thomas, in prep.).

Description

No natural cliff exposures have occurred at Harwich since the construction of the 'promenade'. Elliott (1971a), however, referred to the exposure on the foreshore of the lowest 7 m of the 'London Clay', with the 'basement-bed' not seen but known from dredged material. This succession, later assigned to the Harwich Member by King (1981), occurs within the Harwich Formation of Ellison *et al.* (1994).

The Harwich Stone Band

At the time of writing, foreshore exposures are poor, except for the 'Harwich Stone Band' which is well exposed on the upper foreshore. This comprises an apparently tabular, very well lithified band around 20 cm in thickness that rests sharply on underlying soft muds. A.C. Bishop (in Elliott, 1971a) referred to its having an ash content comprising angular, brown glass shards, some of which are streaky and resemble pumice, crystal fragments (often plagioclase) and lithic fragments full of opaque granules containing minute elongate feldspar crystals. Elliott (1971b) reported that the ash

content varies rapidly laterally.

Palaeontology

Elliott (1971b) referred to the common occurrence of fossils within the 'Harwich Stone Band', including sparse bivalves and gastropods, microcoprolites, siliceous diatoms and pyritized radiolaria. Fossils from this band were also recorded by Daniels (1971), including a seed *Jenkinsella apocynoides.* In places, there is evidence of bioturbation (Elliott, 1971a).

Whilst the muds both above and below the 'Harwich Stone Band' are currently poorly exposed, they are known to be fossiliferous. From the foreshore muds below this horizon, Elliott (1971a) reported numerous fish teeth, a small fruit flora (some ten genera according to K.I.M. Chesters in Elliott, 1971a) and a microbiota of diatoms (including *Coscinodiscus*), hystrichospheres, the foram *Astrorhiza* and Chalk-derived sponge spicules and foraminifera. Similar microfossils also occur in the muds above the Harwich Stone Band, together with woody material. Elliott's (1971a) account clearly implies that the fossil material noted was at least in part redistributed by present-day foreshore processing. Daniels (1971) referred to the presence of pyrite concentrates on the foreshore, which include pyritized wood or 'platimore', to use an old local term (Greensmith *et al.,* 1973).

Magnetostratigraphy

Magnetostratigraphical results determined from material from the Harwich Stone Band and the underlying mud by Townsend and Hailwood (1985) indicate deposition during a period of reverse polarity magnetization.

Interpretation and evaluation

The 'Harwich Stone Band', with its tough, well-lithified character, is lithologically quite unique in the context of the Thames Group. It was not, however, until the early 1970s (Elliott, 1971a, b) that its stratigraphical and palaeogeographical importance was fully appreciated; namely that it provides clear evidence that the range of ash-fall deposits of early Eocene age extended into the area of onshore Britain. The Harwich site clearly, therefore, has not just a scientific but an historical significance in the development of our understanding of Palaeogene times.

The Harwich Stone Band is the thickest of the ash layers known from the Harwich Formation and its lateral persistence in eastern Essex and South Suffolk makes it an important marker horizon. It occurs, for example, in 'Ferry Cliff' near Woodbridge, Suffolk (grid reference [TM 278 486]) (George and Vincent, 1977, p. 25) and at Wrabness, where younger ashes are also present. Further discussions of the ashes and the significance of the magnetostratigraphical data are considered in the account of the Wrabness site.

As well as being of stratigraphical importance, the Harwich site has been notified for its palaeobotanical significance. The site apparently yields the only fossil flora attributable with certainty to division A1 (the former Harwich Member) of King (1981). Hence, whilst floristic details will be considered elsewhere in the *Mesozoic to Tertiary Palaeobotany* GCR volume, the fossil plants may also provide data to enhance understanding of both palaeoenvironmental and palaeoclimatological aspects of early Thames Group times.

Conclusions

This site provides the best exposure of the Harwich Stone Band, the thickest and most distinctive of the ash bands that comprise a significant component of the Harwich Formation in this area and are correlatable with volcanic horizons in the North Sea succession. Furthermore, the site is historically important, since it was from here that evidence for Eocene volcanism was first discovered in the onshore sediments of the London Basin.

Harwich has a restricted fossil biota, but the macroflora (considerably older than that of Sheppey) has some potential for clarifying palaeoenvironmental and palaeoclimatological aspects of earliest Thames Group times in the British area.

References