Harefield

[TQ 049 898]

Introduction

Harefield is the only known site to yield charophytes from the Reading Formation, and these are important for the palaeoecological and biostratigraphical interpretation of these deposits. A small assemblage of fruits and seeds has been recovered from the Harefield Member, Oldhaven Formation (King, 1981).

'Harefield Cement Works Pit' or 'Great Pit' is a well-known geological site, in which Palaeocene–Eocene Reading Formation can be seen lying unconformably on Chalk. It has yielded an abundant fauna as described by Wooldridge and Wrigley (1930), Curry (1957), Cooper and James (1975) and Cooper (1976). In these reports, plant remains including leaves are mentioned as occurring in the Reading Formation here but no descriptions or identifications are given. The only published palaeobotanical work is on the charophytes (Riveline, 1984a,b).

The overlying Harefield Member has yielded some fossil fruits and seeds similar to those found in the overlying London Clay (Reid and Chandler, 1933; Chandler, 1961a).

Description

Stratigraphy

Daley (in Daley and Balson, 1999) reviews the geology of this site. In summary, there is a thin development of Upnor Formation lying unconformably on chalk, which in turn is overlain by about 10 m of Reading Formation (Figure 7.21). The top of the section is the basal Thames Group.

Palaeobotany

Curry (1957) and Cooper (1976) documented a level within the Reading Formation at Harefield, containing bithyniid gastropod operculae together with leaves, in a lenticular patch of grey sandy-silty clay. Sieved residues from this level yielded about 30 charophytes, including at least three taxa (Collinson, pers. obs.). The Natural History Museum, London, has in its collections (V 36337–9) about 15 specimens of three charophyte taxa, collected and presented in 1958 by D. Curry. Curry (pers. comm., 1981) indicated that these specimens and others (four taxa) still in his collection originated from 0.3 m above the base of the Reading Formation. According to Curry, they have been tentatively identified as species of *Peckichara,* cf. *Tectochara* and *Harrisichara* by Grambast. The *Peckicbara* (Figure 7.22) closely resembles *P. disermas* Grambast (Grambast, 1977; Collinson, pers. obs.; see also Riveline, 1984a,b).

Reid and Chandler (1933, p. 179) and Chandler (1961a, pp. 111–4) described (under 'London Clay Basement Beds') seven species of fruits and seeds from the Harefield Member (see Cooper, 1976 and King, 1981, p. 94): *Ehretia ehretioides* (Reid and Chandler) Chandler (borage family), *Jenkinsella apocynoides* Reid and Chandler (= *Nyssidium arcticum,* katsura family), *Iodes multireticulata* Reid and Chandler (icacina family), *Laurocarpum minimum* Reid and Chandler (laurel family), *Magnolia angusta* (?) Reid and Chandler (magnolia family), *Meliosma cantiensis* Reid and Chandler and *M. jenkinsii* Reid and Chandler (sabia family). This is the type locality for *E. ehretioides.*

Interpretation

The principle palaeobotanical interest at Harefield is that it is the only known locality to have yielded charophyte fossils from the Reading Formation (Curry, 1957; Riveline, 1984a,b; Collinson, pers. obs.). Charophytes (stoneworts) are a group of green algae with a fossil history extending back to the Silurian and are potential candidates for being ancestral to the vascular plants (Graham, 1985). However, the interest of these Palaeocene examples is that they are very

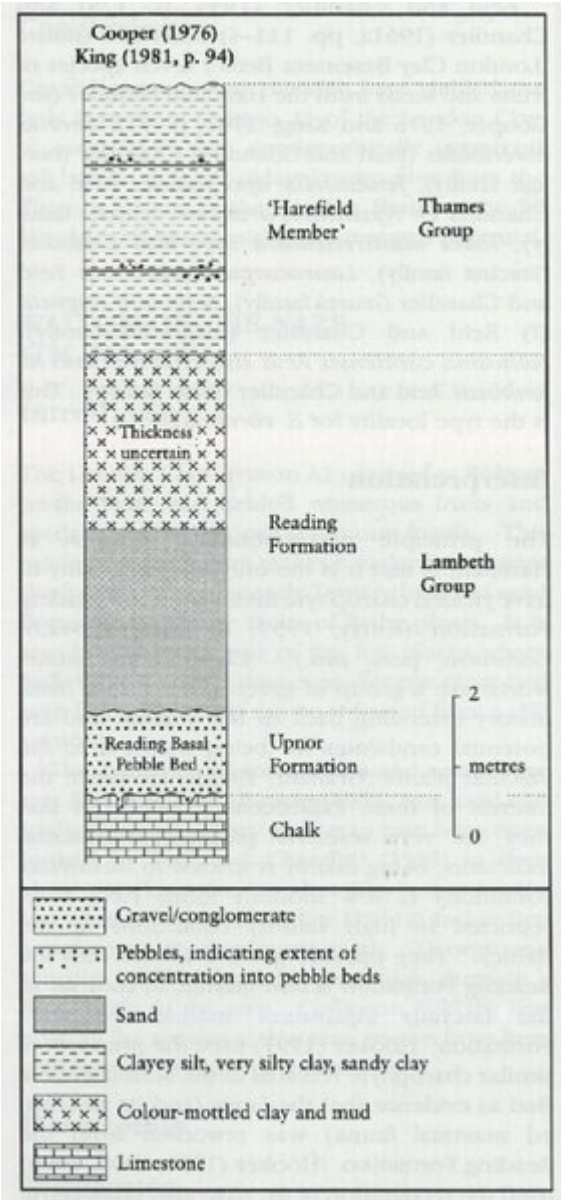
sensitive palaeoenvironmental indicators, being mainly restricted to freshwater conditions (a few modern forms have been reported in high salinity conditions in the Baltic). They provide good evidence that the Reading Formation is non-marine, in contrast to the laterally equivalent marine Woolwich Formation. Hooker (1991) used the presence of similar charophyte remains in the Suffolk Pebble Bed as evidence that the latter (and its associated mammal fauna) was reworked from the Reading Formation. Hooker (1991, 1996, 1998) used the recognition of the *disermas* charophyte zone at Harefield as pivotal in the interpretation of the stratigraphy of the Palaeocene–Eocene transitional interval and for correlation with continental Europe.

The Thames Group here has yielded a relatively poor fruit and seed flora. It is nevertheless of interest in being the only known site to yield such plant fossils (Chandler, 1961a) from the Harefield Member, which is more or less contemporaneous with, but in a different facies from, the Oldhaven Beds at Herne Bay and the A1 division of the London Clay at Walton-on-the-Naze and Harwich.

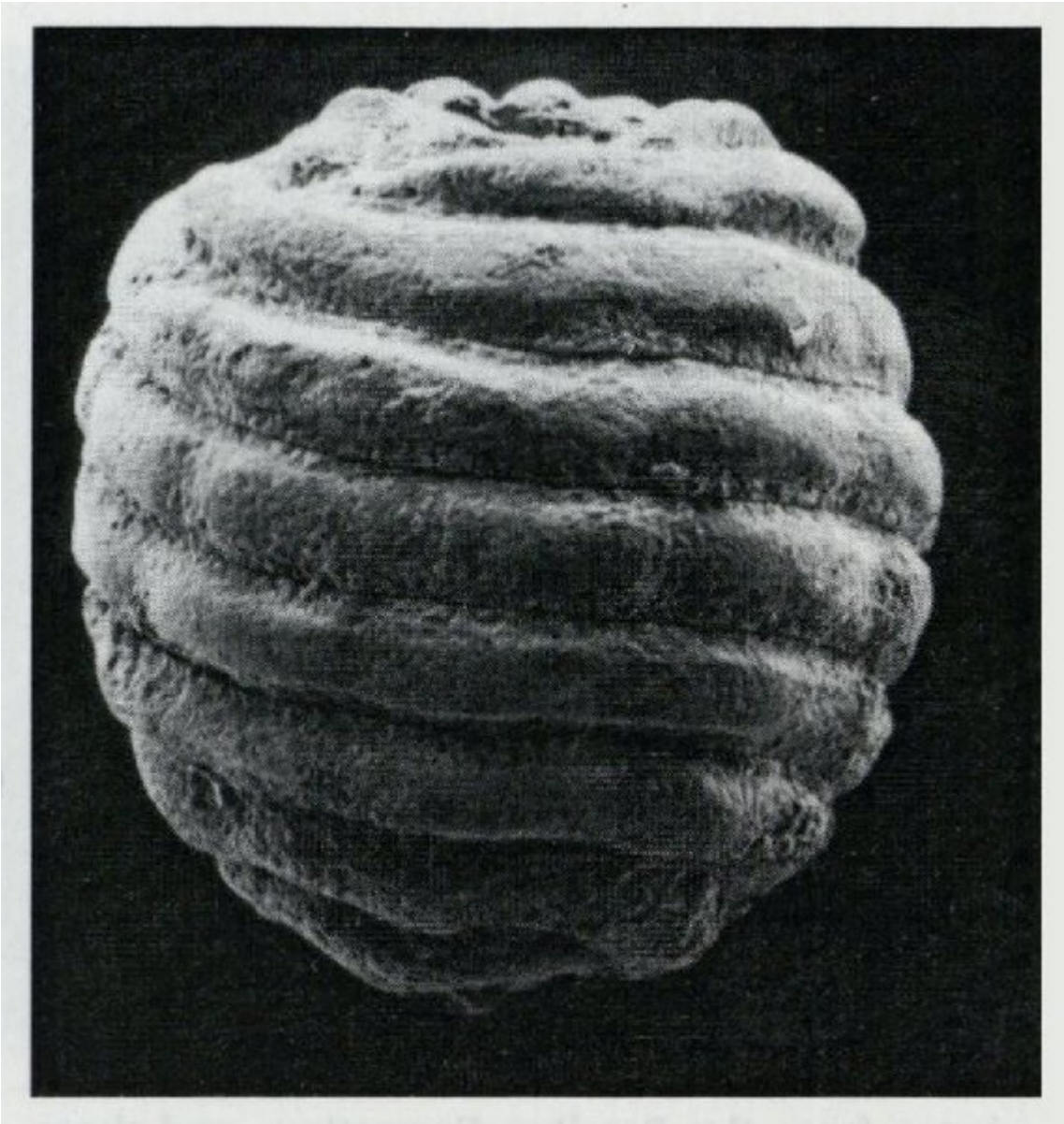
Conclusions

Harefield is the only British locality to yield remains of stoneworts (charophyte algae) from the Reading Formation, which is about 55 Ma old. They provide good evidence that the beds in which they occur formed under freshwater conditions. They are also critical for correlating these rocks with similar-aged deposits in continental Europe.

References



(Figure 7.21) Stratigraphical succession at Harefield. (After Daley and Balson, 1999, fig. 4.2.)



(Figure 7.22) Gyrogonite of charophyte ?Peckichara, × 80 from the Reading Beds, Harefield. (Photo: M.E. Collinson.)