
Bees Nest

[SK 241 546]

Introduction

Bees Nest in Derbyshire (Figure 9.36) has yielded the only known Neogene macroflora from Britain. It includes the remains of leaves, seeds and wood, and represents vegetation dominated by conifers.

There are no major sedimentary sequences in Britain that post-date the lower Oligocene strata of the Hampshire Basin. There are some areas of Neogene marine deposits, such as the Coralline Crag in East Anglia, and the St Erth Beds in Cornwall (Curry *et al.*, 1978; but see Balson in Daley and Balson, 1999, p 239). However, the only reported terrestrial deposits are the so-called 'pocket deposits' in solution cavities within Carboniferous Limestone, mainly in northern England. Plant macrofossils were first reported from here by Chaloner (1961) and have been the subject of detailed description by Boulter (1969, 1970, 1971a,b, 1974) and Boulter and Chaloner (1970).

Description

Stratigraphy

Stratigraphical details of the Brassington Formation at Bees Nest are given by Boulter *et al.* (1971) and a general discussion on the sedimentology is provided by Walsh *et al.* (1972).

The sequence is c. 43 m thick and includes all three of the members recognized in the Brassington Formation (Figure 9.37). They are interpreted as deposits that were let down into subsidence hollows in a karstic landscape, and were thus protected from subsequent erosion. The plant remains occur in the grey clays of the Kenslow Member near the top of the sequence. Based on the palynology, these deposits have been dated as late Miocene to early Pliocene in age (Boulter, 1971c).

Palaeobotany

Conifer foliage and wood dominate this macroflora. The most extensively studied is the taxodiacean conifer *Cryptomeria anglica* Boulter, for which details of the shoot anatomy have been established (Boulter, 1969; Boulter and Chaloner, 1970). Also found in association are taxodiaceous wood (Figure 9.38) and a possible taxodiaceous seed. Logan and Thomas (1987) investigated the composition of lignin present in this wood. Boulter and Chaloner (1970) also briefly described shoots that they assign to the conifers *Sciadopitys tertiaria* Menzel and *Abies alba* Miller, and wood of *Picea* and *Pinus*. The only non-coniferous macrofossils found are of the moss *Muscites lanceolata* Boulter (1974).

Boulter (1971c) has also described the palynology of these deposits. This also revealed a forest-dominated flora, although there was a greater taxonomic diversity, including a range of broad-leafed angiosperms.

Interpretation

A number of other British sites have yielded Neogene palynofloras of this age, such as the nearby Kenslow Top pit (Boulter, 1971c), as well as in Cornwall, Pembrokeshire and Anglesey (Walsh *et al.*, 1987, 1996, 1999), but this is the only locality so far to have yielded plant macrofossils. It thus provides a unique insight into late Tertiary vegetation of Britain, as it moves from the relatively warm conditions of the Palaeogene times to the ice-house conditions of the Pleistocene.

Boulter (1969) argued that *Cryptomeria* was a major component of the Arcto-Tertiary Flora in Europe, having been reported from Germany and the Caucasus, as well as Derbyshire. Unlike many other extant taxodiaceous genera (see

Manchester, 1999, for a review), however, there are no reliable records of it from North America, suggesting that it originated in the Old World. Today, *Cryptomeria* is restricted to China, Japan and Korea, and it is probable that its distribution had declined significantly as a result of climatic cooling in late Neogene and Quaternary times.

Bees Nest is the only locality to yield macrofossils of *Cryptomeria anglica*. The foliage, including the epidermal structure, is very similar to that of the sole living species, *C. japonica* Don. The main difference was that the living species does not have such thickened walls in the cuticle at the outer edge of the stomatal subsidiary cells. Poorly preserved cones and a seed associated with this fossil foliage are also very similar to those of *C. japonica*.

Full systematic descriptions of the other conifers have not been published, although Boulter and Chaloner (1970) have figured and discussed some of the specimens.

The specimen of moss described by Boulter (1974) was compared with a number of extant families, including the Hypnodendraceae, Rhizogoniaceae and Mniaceae, but could not be accommodated within any of them. Boulter suggested that it might represent a moss family that became extinct during the Quaternary glaciations.

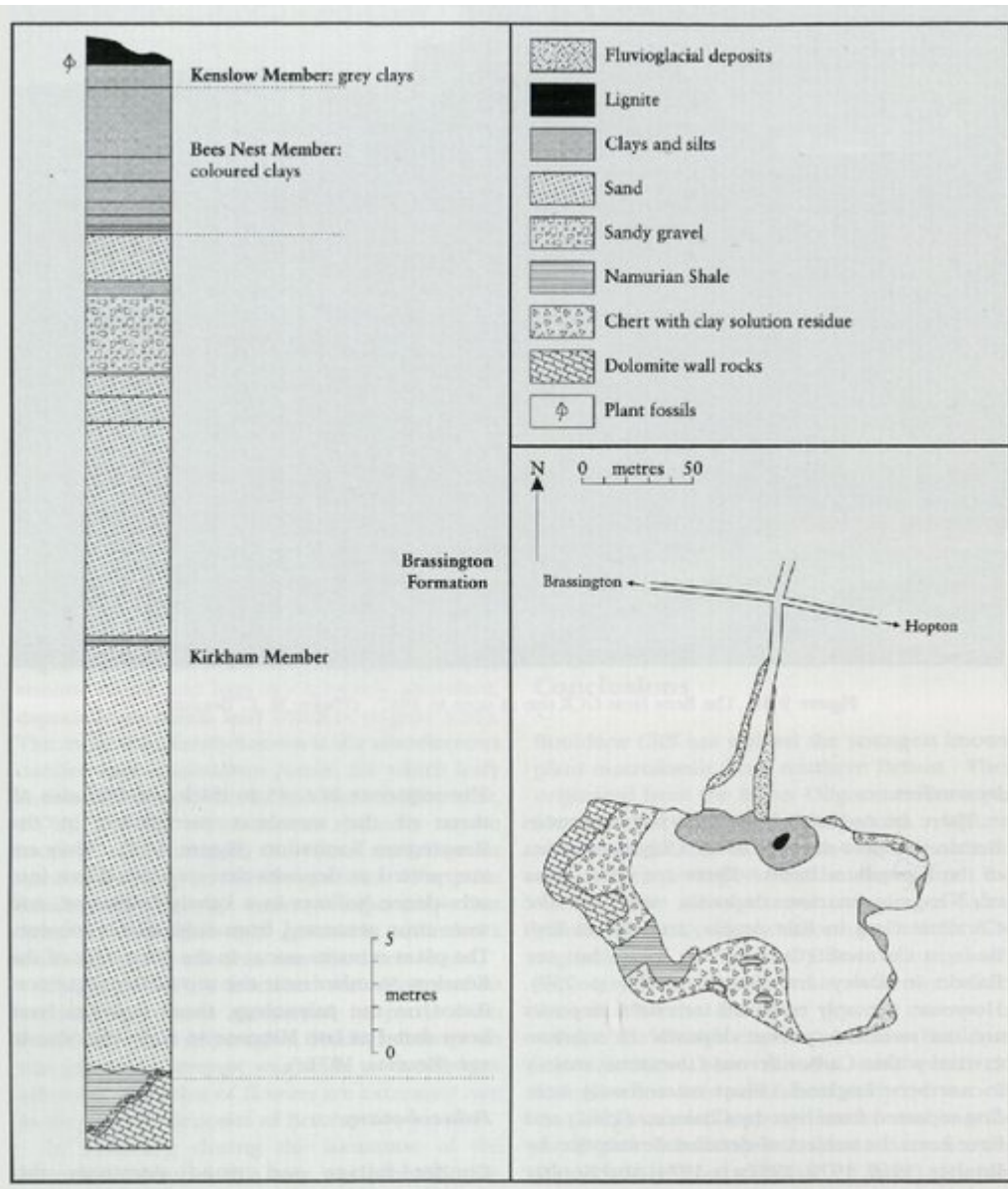
Conclusions

Bees Nest is the only site in Britain to yield plant macrofossils of Neogene age. It preserves remains of forests growing in inland Britain 5–6 Ma ago, which consisted mainly of taxodiaceous conifers. However, unlike the earlier (Palaeogene) floras, the dominant taxodiaceous conifer was *Cryptomeria*. This was a widespread tree in Neogene times in Europe, but today is restricted to parts of China, Japan and Korea.

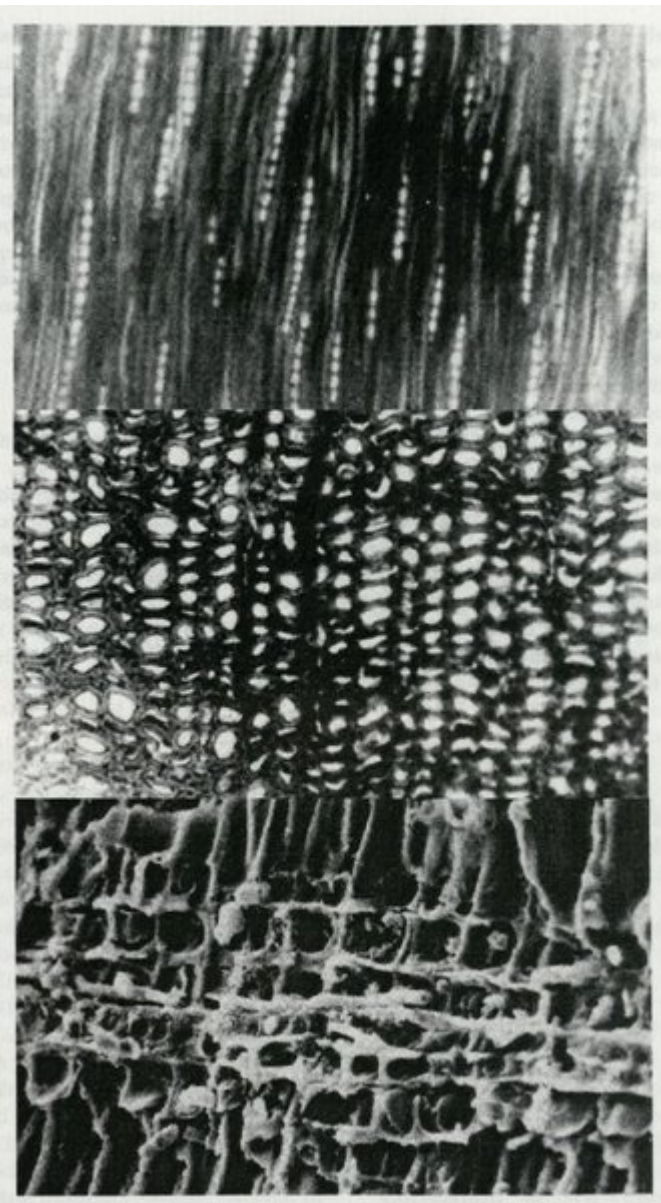
References



(Figure 9.36) The Bees Nest GCR site as seen in 1967. (Photo: M. C. Boulter.)



(Figure 9.37) Left shows the Neogene deposits exposed at Bees Nest, including the plant-bearing Kenslow Member. Right shows the geographical distribution of the principal deposits within the quarry (After Boulter et al., 1971.)



(Figure 9.38) Taxodiaceous wood. Sections cut in transverse (top $\times 130$), radial longitudinal (bottom $\times 200$) and tangential longitudinal (middle $\times 75$) alignment show radially aligned tracheids and uniseriate medullary rays with both parenchyma cells and ray tracheids. The upper two photographs were taken using light microscopy, the bottom photograph under Scanning Electron Microscopy