Hanover Point

[SZ 385 837]–[SZ 371 848]

Introduction

Hanover Point is the best site in Britain for the study of Early Cretaceous conifers, especially of the extinct family Cheirolepidiaceae. The fossils, which occur in several different beds in the sequence, include shoots with well-preserved cuticles, and petrified cones, shoots and trunks. The trunks include the famous Hanover Point 'Pine Raft' ((Figure 6.10), and see (Figure 6.13)). Also found here are petrified bennettite and cycad cones.

Wealden (Early Cretaceous) fossil floras occur at various points along the coast between Brook Chine and Shippards Chine. They are represented mainly by fragmentary plant debris, in which cuticles showing epidermal structures are preserved. However, there are also rather larger petrifactions to be found, showing fine details of the plant anatomy. The fossils have been described by Oldham (1976), Watson (1977), Harris (1981), Alvin (1974, 1983) and Alvin *et al.* (1978, 1981, 1994).

Description

Stratigraphy

The fossiliferous beds at this locality are in the Wessex Formation (formerly known as the 'Wealden Marls') and are all Barremian in age. They are exposed at the foot of the cliff and in the foreshore (Figure 6.10), (Figure 6.11), (Figure 6.12). Three major plant beds have been identified:

1. Upper Plant Bed: 0.4 m thick, exposed in the cliff about half-way between Shippards (sometimes called 'Compton') Chine and Hanover Point.
2. Lower Plant Bed: 0.3 m thick, exposed in the cliff and on the shore at low tide about 20 m to the west.
3. The 'Pine Raft': at Hanover Point itself.

Immediately above the upper bed is a thin brown, organic-rich layer without well-preserved plants, which has been suggested to be a podsol. Alvin *et al.* (1981) envisaged the whole deposit as representing a stream channel in which the flow rate was variable and which progressively silted up. The two beds were interpreted as deposits of forest-floor debris that may have been derived from bank erosion upstream. The Hanover Point 'Pine Raft' site is about 50 m lower down the section than the other two sites and is exposed only at low tide.

Palaeobotany

The plant remains consist almost entirely of gymnosperms, including cycads, bennettites, ginkgos and conifers. At certain points in the section, rather larger permineralizations can also be found, showing fine details of the plant anatomy. Particularly significant are the well-preserved specimens of the cheirolepidiacean conifer *Pseudofrenelopsis parceramosa* (Fontaine), showing details of the wood anatomy, and leaf and cone structure. Well-preserved bennettite and cycad cones have also been reported.

The 'Pine Raft' (illustrated in (Figure 6.13)) is composed of massive logs of *P. parceramosa* that are up to about 40 cm across and are a few metres long. They are mineralized in carbonate. Their anatomy has been described by Alvin *et al.* (1981). Logan and Thomas (1987) used material from these logs in their study of fossil lignin.

Alvin (1974) described fusainized fragments of the fern *Weichselia reticulata* (Stokes and Webb) Ward, which, although fragmentary, showed remarkably fine anatomical preservation. Other examples of fusainized fern fragments were mentioned by Harris (1981), including *Phlebopteris dunkeri* Schenk.

Oldham (1976) described cuticular fragments of a variety of gymnosperms from the plant debris beds including cycads, bennettites, ginkgos, representatives of the Cheirolepidaceae and Taxaceae, and other conifers, but he did not identify them to genera and species. In their study of English Wealden Bennettitales, Watson and Sincock (1992) subsequently identified some of Oldham's cuticles from this locality as follows:

Pseudocycas saportae (Seward) Holden (Oldham's 13 BENN, occasional)

P. roemeri (Schenk) Holden (Oldham's 14 BENN, occasional)

P. lesleyae Watson and Sincock (Oldham's 14 BENN *pro parte,* occasional)

Zamites carruthersii Seward (Oldham's 18 BENN, frequent)

Z. wendyellisae Watson and Sincock (Oldham's 16 BENN, frequent)

Ptilophyllum marksilveri Watson and Sincock (Oldham's 17 BENN, frequent)

Pterophyllum lyellianum Dunker (Oldham's 19 BENN, occasional or frequent)

Cycadolepis shuteana Watson and Sincock (Oldham's 23 BENN, frequent)

Watson (1977) has also identified Oldham's conifer (30 CHEIR, rare or occasional) as *Pseudofrenelopsis parceramosa* (Fontaine) Watson.

Interpretation

The most important plant fossils are those of the cheirolepidiaceous conifer *Pseudofrenelopsis parceramosa* (Fontaine) described by Watson (1977). It is one of the best sites in the world (and by far the best in Britain) for studying Cretaceous Cheirolepidiacea, which was the dominant family of conifers during much of the Mesozoic Era. Much of what we know about the later members of this important family (the frenelopsids) has arisen directly or indirectly from studies on specimens from Hanover Point (summarized by Watson, 1982, 1988; Alvin, 1983).

One of the most important advances in our understanding of these plants was made in the mid-1970s when an almost pure assemblage of conifers was obtained by bulk maceration of dried blocks of matrix (Alvin *et al.,* 1978). The blocks were soaked in water for several hours, sieved and the plant debris macerated with Schulze's solution. Abundant shoots and wood fragments were recovered, together with fragments of its male cone, which was given the name *Classostrobus comptonensis.* The cone fragments bore peltate sporophylls, each with two or more pollen sacs containing pollen of the *Classopollis* type. The pollen did not completely agree with any species of *Classopollis,* but Alvin *et al.* (1978) thought it to be close to, although smaller than that of *Classolepis rishra* (Barnard). This pollen was also found in association with dispersed cuticles (Oldham, 1976) that were identified by Watson (1977) as *P. parceramosa.* Taylor and Alvin (1984) studied the ultrastructural wall development of *Classopollis* using pollen from these cones.

The cheirolepidiaceous conifers are the most important element of the plant fossils found at the Hanover Point site, although they are associated with rare examples of cycads and bennettites. In his palaeoecological interpretation of the English Wealden, Batten (1975) gave four alternative reconstructions for the flora and three alternatives for the Classopollis-producers. These were sandy bars and barrier islands along the 'coast', mangrove-like communities, and floodplain or upland slopes. Alvin *et al.* (1978) suggested that the Cheirolepidiaceae might have been sufficiently diverse to occupy and dominate a variety of different habitats.

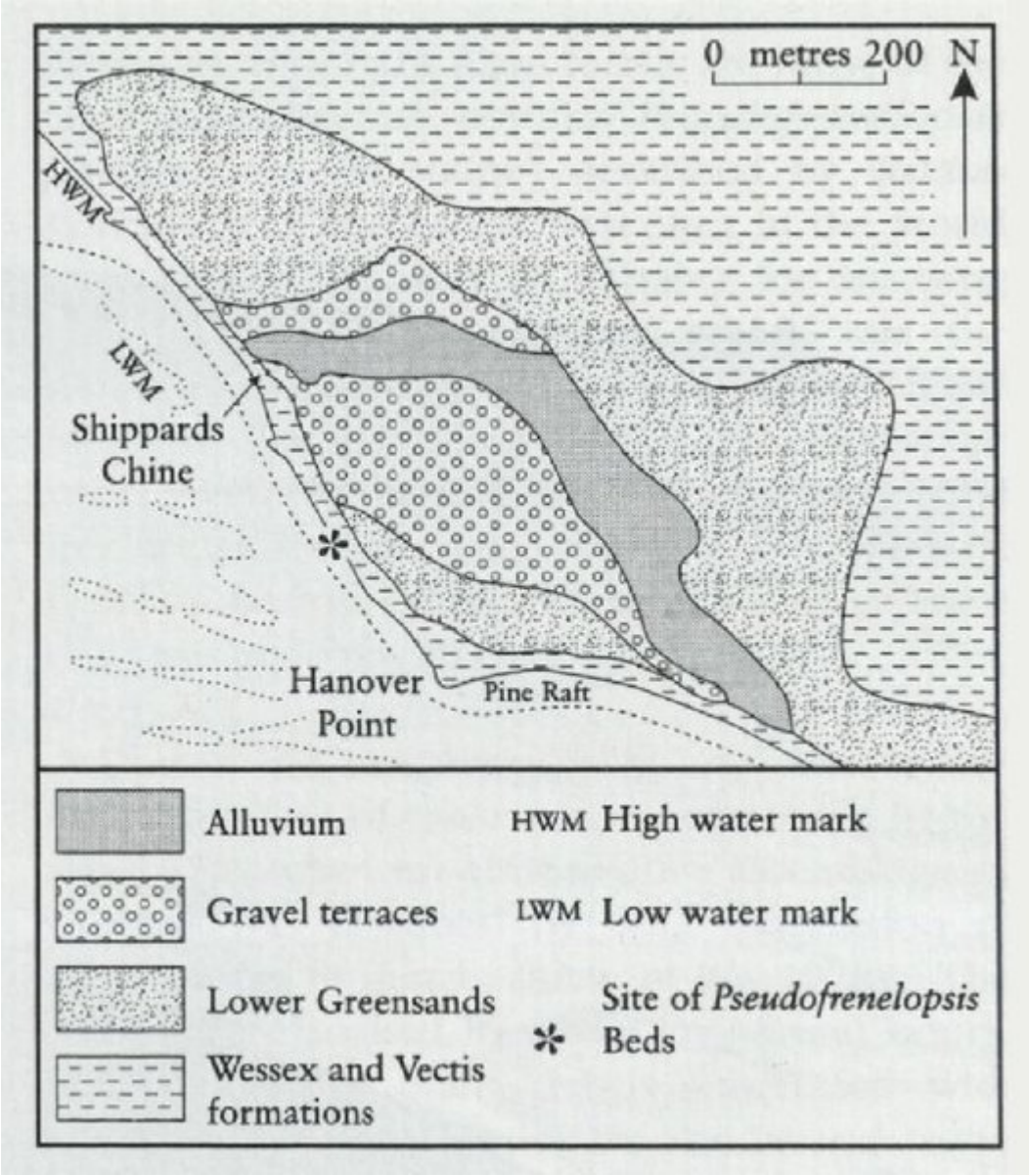
Alvin *et al.* (1994) described another new species of conifer male cone from the same bed as *Masculostrobus vectensis.* The pollen was attributable to *Araucariacites* Cookson ex Couper by Batten. The parent tree is unknown, but Alvin *et al.* suggested the structure of the cone is closest to that found in the Taxodiaceae and Araucariaceae.

The studies by Alvin (1974) and Harris (1981) on fusain from here were among the first to use this type of preservation to study the anatomy of plant remains.

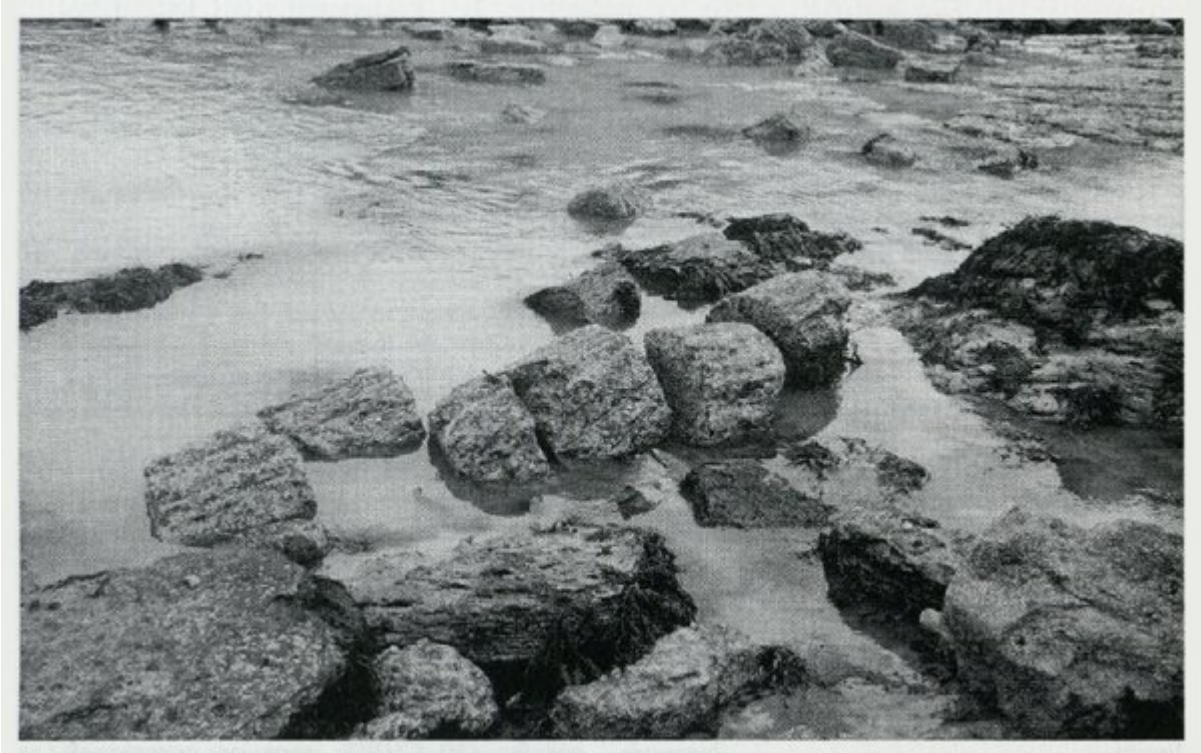
Conclusion

Hanover Point is an exceptional site for studying the morphology of trees of the Cheirolepidiaceae, the most important family of conifers growing in Britain about 130 Ma ago. Well-preserved remains of cycads, bennettites, ginkgos, and other conifer groups are also present. There is much research potential in the floras found in this section, which are of considerable palaeobotanical significance.

References

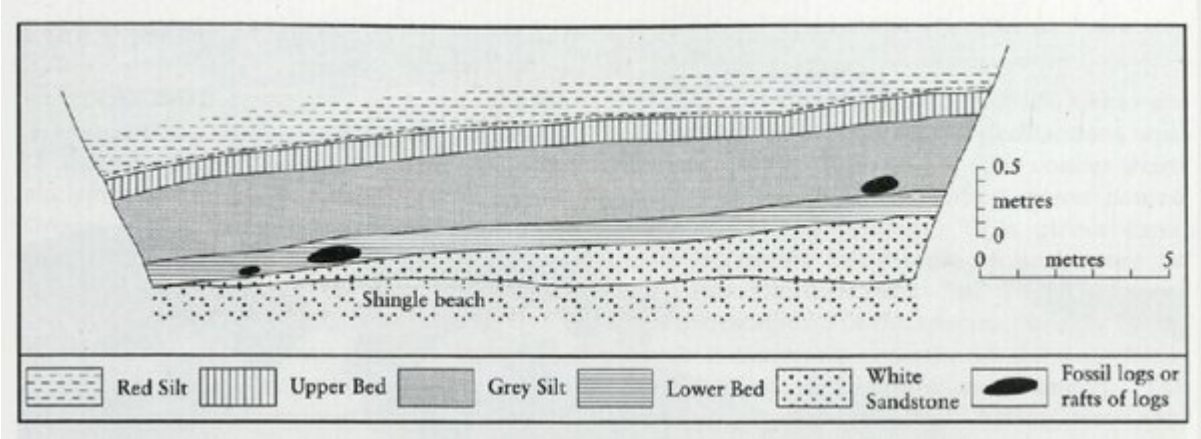


(Figure 6.10) Geology of the coast near Hanover Point, showing the location of the main plant beds. (After Alvin et al., 1981.)



(Figure 6.13) The Pine Raft at Hanover Point, Isle of Wight. These massive petrified logs, exposed at low tide, are mineralized in carbonate and lie in sandstone. They have tracheid pitting similar in character to the better-preserved cheirolepidiaceous woods of Pseudofrenelopsis parceramosa (Fontaine) Watson found at Shippards Chine but the arrangement of these is more araucarioid. They are better classified in the form-genus Dadoxylon. (Photo: B.A. Thomas.)

(Figure 6.11) Hanover Point from Roughland Cliff. The beds of the Wessex Formation are exposed in the cliffs of Brook Bay running south-eastwards from Hanover Point (left). The darker upper layer in the cliff consists of unconformable Quaternary deposits. (Photo: D.J. Batten.)



(Figure 6.12) Diagrammatical representation of the two Pseudofrenelopsis Beds at Hanover Point. (After Alvin et al., 1981.)