FOSSIL WOOD OF *PLATANUS* FROM THE BRITISH EOCENE

by DONALD W. BRETT

ABSTRACT. The fossil wood studied comes from the Landenian, Ypresian, and Pleistocene (Red Crag, presumed derived from Ypresian) of south-east England. Two specimens anatomically indistinguishable from the trunk wood of living species of *Platanus* are described as *Platanus* sp.: other specimens are described as *Plataninium decipiens* sp. nov.; these have certain features seen in wood of branch bases and roots of *Platanus*, but differ slightly from ordinary trunk wood of the living genus. Twelve additional specimens are assigned to the new species. An emended diagnosis of the organ-genus *Plataninium* Unger is given.

THE material described was collected at coastal localities in Suffolk, Essex, and Kent, and derives from three geological horizons, Landenian, Ypresian, and Pleistocene. The two principal specimens were given to me for investigation in 1954 by H. E. P. Spencer (*Platanus* sp.) and G. F. Elliott (*Plataninium*).

Fossil wood in the Landenian beds in south-east England is silicified, whilst similarly well-preserved wood in the London Clay is calcified. Pyritized and carbonized twigs and wood fragments are abundant in the London Clay, along with the well-known pyritized fruits and seeds. Soft humified wood and lignite are probably present in most of the British lower Tertiary horizons, but all this other material is usually poorly preserved. The fossil wood in the Red Crag (Pleistocene) has been generally regarded as derived from the Tertiary beds that underlie the Crags in Suffolk. This wood is calcified, like that of the London Clay, but it is orange-rust coloured and contains very little organic matter. Although polished, the Red Crag wood does not show signs of excessive abrasion: many pieces have bark attached, and there is a specimen in the Ipswich Museum with a thin vine coiled round it. These pieces of wood have presumably been re-deposited close to their original source and so it is most likely that they are from the local London Clay.

These records of *Platanus* extend the list of occurrences of non-tropical types of trees in the Eocene of south-east England.

DESCRIPTION OF THE FOSSILS

FAMILY Platanaceae

Platanus sp.

Plate 98, figs. 1–4; Plate 99, figs. 1, 2

V44298 (including slides) in Department of Palaeontology, British Museum (Nat. Hist.), London; cut from a larger piece in the Museum, Ipswich, Suffolk. From the London Clay at Harwich, Essex.

Stem about 10 cm across; medulla 1·5 cm wide, xylem cylinder with distinct growth rings. Vessels 150 per mm², tangential diameter 20–72 μm (average 50 μm), mostly crowded in multiples and irregular clusters, also solitary especially in late wood where vessels are less numerous; intervascular pitting opposite, perforations scalariform with 8–16 bars. Fibres 15–20 μm across, with bordered pits; several rows of flattened fibres at end of late wood. Rays about 3 per mm, 1–22 cells wide (average 7) in transverse section; in tangential section uniseriate or part-uniseriate rays very rare, most rays broad,

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fusiform, 2–3 mm high, occasionally to 6 mm high and dissected diagonally by fibres. Ray cells mostly procumbent, narrow, with broader or square cells at margins. Crystals common in procumbent cells. Wood parenchyma diffuse and in short wavy strings of cells. Secondary phloem with clusters of large stone cells, phloem ray cells packed with crystals.

V8036–8 (not illustrated). From the Red Crag at Woodbridge, Suffolk. Specimen consists of the inner 6 rings of wood with part of medulla. Vessels distorted by compression, about 120 per mm². Rays 2–4 per mm, up to 15 cells wide; many rays 3 mm high, dissected rays 7 mm and more.

FAMILY ?Platanaceae

Organ-genus *Plataninium* Unger emend. herein

Emended diagnosis

Fossil secondary wood, or stems or roots with some secondary wood. Rays of all widths commonly averaging 5–15 cells, uniseriate rays rare; about 3 per mm; height to above 1 mm, highest rays several mm sometimes diagonally dissected by fibres. Ray cells mostly procumbent, usually square or upright in marginal tiers; tangential walls often oblique in transverse view, especially at growth ring boundary; crystals common in procumbent cells. Diffuse or graded porous; vessels mostly solitary, or in small clusters and tangential multiples especially in early wood; 20–150 per mm²; tangential diameter rarely above 100 μm, narrower vessels in late wood when graded porous. Perforation plates mostly scalariform, 1–30 bars, or simple in larger vessels in early wood. Fibres with bordered pits. Parenchyma scanty where vessels are crowded, otherwise abundant in wavy tangential strings of cells often extending from ray to ray.

Plataninium decipiens sp. nov.

Plate 99, figs. 3–6

Diagnosis. Secondary xylem; growth rings mostly obscure. Vessels mostly solitary, about 30 per mm², tangential diameter 35–105 μm (average 80 μm), intervascular pitting opposite to scalariform, perforation plates scalariform with 13–25 bars (average 18); rays about 3 per mm, 2–18 cells wide (average 6) in transverse section; in tangential section rays mostly 1–6 mm high; ray cells mostly procumbent except at ray margins, richly pitted, commonly crystalliferous. Wood parenchyma diffuse and in strings of cells, abundant.

Holotype. V45684 in Department of Palaeontology, British Museum (Nat. Hist.), London.

Horizon. London Clay (Ypresian); Isle of Sheppey, Kent.

Additional specimens. V45685: from the beach at Herne Bay, Kent, this small piece of silicified wood with some bark is presumed to have come from the Thanet or Woolwich Beds (Landenian) in the cliffs at this locality.

Vessels mostly solitary, except for overlapping ends, occasionally in groups of 2–4 forming a short tangential row; 42 per mm² excluding the wider rays; tangential diameter 54–120 μm (average 88 μm). Scalariform perforation plates with 17–32 bars (average 25). Rays 1–3 per mm in transverse section, 4–25 cells wide; in tangential section the wider rays reaching height of 5 mm, acutely tapered at margins except where two rays are vertically in line. Bulk of ray cells procumbent, marginal cells more or less square.

The following specimens in the British Museum (Natural History) agree fairly closely in structure with the type of the new species and are also assigned to it: London Clay: Sheppey, Kent, 32662, V8354–5; Herne Bay, Kent, V21733; Harwich, Essex, V10253–4. Red Crag: Woodbridge, Suffolk, 52696, V7815, V8009, V8011, V8018, V8031, V8054–5.

DISCUSSION

The woods described above do not differ in any major anatomical detail from the wood of living species of *Platanus*. Whilst there can be little doubt about the identity of

the specimen described above as '*Platanus* sp.' I do not wish to ignore the differences which exist between this specimen and the others I have described in this paper. Thus I have placed these other specimens in a new form-species, *Plataninium decipiens*. In doing so I have recognized the possibility that these fossils belonged to a natural genus other than *Platanus*. Nevertheless, the structure of these fossils seems to fall within the known range of variation of wood from the extant genus. It is unfortunate that mature wood (as distinct from small branches on herbarium sheets) is not available of some species of *Platanus* likely to be of great interest to the palaeobotanist—namely those from Mexico, Guatemala, and Laos. Available timber specimens and published descriptions of the major species (*P. occidentalis*, *P. orientalis*, *P. racemosa*, *P. wrightii*, *P. lindeniana*, *P. mexicana*) show that the wood varies little from one species to another, and a 2-year-old branch of *P. kerrii* gives no indication that its trunk would be distinguishable from any of the other species. The development of late-wood is very variable between one growth increment and another in timber specimens, suggesting that this is a feature readily influenced by the environmental or climatic conditions during the growing period, but the early-wood almost always commences with rather larger, crowded pores. This is not so, however, in the root. I have examined a root of about 6 cm diameter from a large *Platanus*×*acerifolia*. Compared to normal trunk wood, the root has fewer and more rounded pores with no obvious diminution in size through the growth increment; growth ring boundaries are obscure; and the broad rays are closer together. The bases of branches may also be different, with less crowded pores and a lot of parenchyma. This can be seen in Plate 98, fig. 3, which shows the wood in a small branch base ('knot') of the fossil *Platanus*; in this case the parenchyma and many other cell cavities are filled with dark material, and the distribution of the wood parenchyma can be easily seen. At least these give some indication of possible variation in wood of *Platanus*. In some respects these variants show similarities to *Plataninium decipiens* sp. nov. and to another species recently described as *Plataninium californicum* (Page 1968). One specimen of *P. californicum* is a small branch so there is no question of regarding this type of wood as solely root material, although this is clearly a possibility in the case of the holotype of *P. decipiens*.

EXPLANATION OF PLATE 98

Figs. 1–4. *Platanus* sp. 1, Transverse section showing full width of a growth ring, early wood at bottom. ×40. 2, Transverse section at growth ring boundary showing the crowded early wood vessels at top and characteristic widening of the broad ray at the boundary. Many oblique tangential walls of the ray cells are also visible. ×220. 3, Transverse section of wood in branch base embedded in the wood of the specimen described. The abundant wood parenchyma is revealed clearly by its dark contents. ×70. 4, Tangential section showing ends of broad rays. ×70.

EXPLANATION OF PLATE 99

Figs. 1, 2. *Platanus* sp. 1, Radial section showing the procumbent cells which constitute the bulk of the ray tissue. 2, Radial section showing heterogeneous ray cells such as occur along the ray margins, and elsewhere in the ray at the growth ring boundary and in narrower rays. ×100.

Figs. 3–6. *Plataninium decipiens*. 3, Transverse section; parenchyma revealed by dark contents. ×70. 4, Transverse section at growth ring boundary showing the widening of the ray and oblique tangential walls. ×140. 5, Tangential section showing the broad rays. ×70. 6, Radial section showing the heterogeneous composition of a narrow ray or ray margin; numerous crystal pseudomorphs are visible as small light patches in the cells. ×70.

Several fossils agreeing very closely with wood of the common *Platanus* spp. have been described from the Tertiary of Europe and North America (Edwards 1931, Mathieson 1932, Slijper 1932, Hofmann 1952, Selmeier 1957, Prakash and Barghoorn 1961). Most of them are so similar to one another, so far as one can judge from the descriptions, that it is hard to justify the conventional use of a different specific name for each. The older descriptions (v. Edwards 1931) omitted details that a wood anatomist would wish to know about today, but the material was usually well preserved and the authors quite convinced about the identity of their material with the living genus. A consequence of this is that the fossil genus *Plataninium* (along with many others) was never given a proper diagnosis, and came to be accepted as simply the name for fossil *Platanus* wood. (Whether or not the newer names ending in *-xylon* are accepted and used still depends on one's regard for the priority of Unger's generic names. This is probably a trivial matter compared with the fact that so few of these 'genera', whatever suffix they bear, are provided with an adequate diagnosis.) Mathieson incorrectly used the name *Platanites* for wood from Greenland; there is no evidence for connection with the leaves so named, although it seems more than likely that they were from the same natural species of tree.

A diagnosis could be constructed on this basis (i.e. fossil wood of *Platanus* L.) using such information as we at present have about the wood of extant species, but there is little advantage in that, and the description of any part of the living species is simply an extension of the diagnosis of the natural genus. If there exists a group of modern genera, related or otherwise, which cannot be separated on the grounds of wood anatomy alone, it should be possible to construct a diagnosis for a form-genus to include the whole range of wood structure in the natural genera. Kräusel (1949) has discussed this fully in relation to the wood of conifers. I attempted to do this for the fossil wood genus *Quercinium* (syn. *Quercoxylon*) which is best used only for certain types of wood found in the Fagaceae, but not for all (Brett 1960).

An emended diagnosis for *Plataninium* has been given by Page (1968). It is in general terms, not in the usual style of a diagnosis, and includes the statement that *Plataninium* is 'a form-genus for fossil woods resembling certain members of the Fagaceae (*Fagus*), Platanaceae (*Platanus*), Eupteleaceae (*Euptelea*), and Icacinaceae (*Citronella*, *Ottoschultzia*), whose familial relationships cannot be determined with certainty'.

ADDENDUM

Since the above was written some new fossil *Platanus* and *Platanus*-like woods have been described from Oligocene deposits in Northern Bohemia (Prakash, Březinová, and Bůžek 1971). The new *Platanus* wood has been named *Platanoxylon bohemicum* sp. nov. and it is virtually indistinguishable from that which I have described above and from the wood of living species. They have also described a *Platanus*-like wood, *Plataninium europeanum* sp. nov., which appears to be very similar to the specimens I have described in the present paper as *P. decipiens* sp. nov. and there is therefore a stronger possibility that these belong to a distinct natural genus apart from *Platanus*. Also of interest is the occurrence with *Platanus* in the Northern Bohemian Oligocene of *Cercidiphyllum* (*Cercidiphylloxylon kadanense* sp. nov.) since fossil wood of this genus also occurs in the London Clay (Brett 1956).

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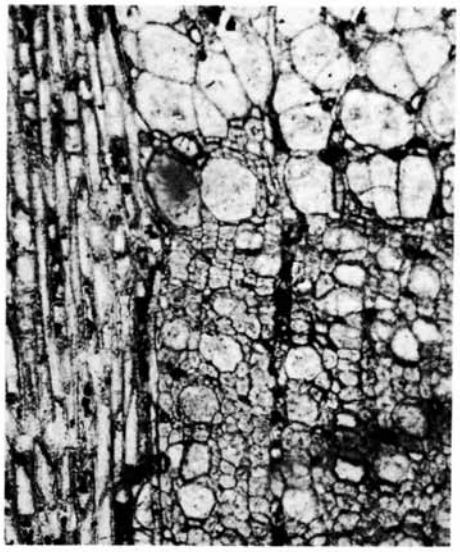

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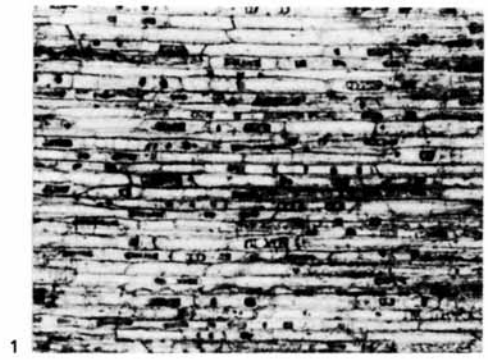
BRETT, Eocene *Platanus* wood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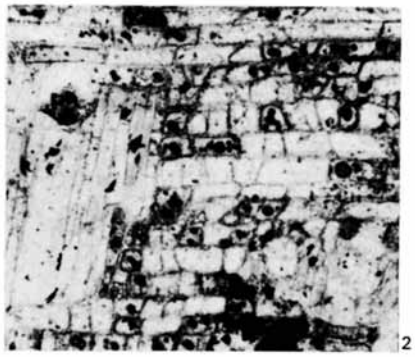
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BRETT, Eocene *Plantanus* wood