WOOD OF PLATANUS KERRII

by

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SUMMARY

Mature wood of extant Platanus kerrii Gagnep., native to Laos and Vietnam, is described for the first time. Its general characteristics are similar to other Platanus species; it has narrow, mostly solitary vessels, perforation plates both simple and scalariform, opposite intervessel pitting, diffuse-in-aggregates axial parenchyma, mostly wide (> 10-seriate) rays that usually are homocellular. Rays are wider (up to 30 cells wide) than in other extant species and in this feature P. kerrii resembles Cretaceous and Paleogene platanoid woods more than other extant species do. Vessel element lengths are similar to other species, although the incidence of scalariform perforation plates is greater than in other extant Platanus species.

Key words: Platanaceae, Platanus, Platanus kerrii, wood anatomy.

INTRODUCTION

Members of the Platanaceae are among the oldest known dicotyledons. The family Platanaceae has a history going back some 100 million years; leaves and reproductive structures attributable to the family are known from the Albian, early Late Cretaceous of the northern hemisphere (Crane et al. 1993). Platanoid wood is common in the fossil record, and occurs at almost all northern hemisphere localities where Cretaceous and early Tertiary dicotyledonous woods have been found.

Today there is one genus, Platanus, with two subgenera, subgenus Platanus Leroy, with 7–8 species native to temperate to subtropical North America and Europe, and subgenus Castaneophyllum Leroy, with a single species, Platanus kerrii native to tropical Laos and Vietnam (Ernst 1963; Leroy 1982). It has been suggested that these two subgenera be recognized as two genera (Leroy 1982). North temperate to subtropical species of Platanus are easily recognized by their palmately lobed leaves and ‘buttonball’ fruits (short reproductive axes with one to five heads). In contrast, P. kerrii has elliptical to lanceolate leaves, and long reproductive axes with 12 or more sessile heads. Manchester (1986) and Crane et al. (1994) have summarized the differences between the two subgenera.

In the 1960s the characteristics of P. kerrii and its relationship to the other Platanus species became of particular interest because of the description of a compression fossil...
of *Platanus* appearing highly similar to the living *P. kerrii* (Buzek et al. 1967). Leaf and twig anatomy of *P. kerrii* were studied by Baas (1969). Mature wood was not then available for study. This paper presents a description of the mature wood of *P. kerrii* and compares it to other species, and to fossil platanoid wood.

**MATERIALS AND METHODS**

The sample was collected in 1975 in Langshon Vy Le Province, Vietnam, by Armen Takhtajan and Lev Budantsev, Coll. no. 8745. Cross, radial, and tangential sections approximately 20 μm thick were cut, stained with safranin, and mounted in Canada balsam. Vessel element lengths and fiber lengths were determined from macerations. Macerations were prepared using Franklin’s method (Jane 1970). Terminology and the method for determining quantitative features conform to recommendations from the IAWA Feature List (IAWA Committee 1989); each vessel was counted individually for vessel frequency, vessel element length was measured tip to tip.

**DESCRIPTION**

*Description of mature wood of Platanus kerrii* — Figures 1–13

Growth rings indistinct (Fig. 1), marked by radially shortened ray cells and more frequently occurring crystals in ray parenchyma (Fig. 3). Diffuse-porous. Vessels mostly solitary, but also in oblique and tangential pairs. Solitary vessels tending to be angular in outline (Fig. 2, 3). Mean tangential diameter 94 μm (sd = 19), range 51–127 μm; 30–56 vessels per sq. mm (in areas between wide rays). Perforation plates simple (47%) and scalariform (53%); scalariform perforations with 2–22 (~30) bars, mean 12 (sd = 2), occasionally forked bars; individual vessel elements with both simple, both scalariform, or simple and scalariform perforations (Fig. 6–8). Intervessel pits opposite, occasionally scalariform (Fig. 5), non-vestured, 5–13 μm. Vessel-ray parenchyma pits with narrow borders, elongated in some of the marginal ray cells (Fig. 4), more commonly similar to intervessel pits, the latter characteristic of contacts between procumbent body ray cells and vessels. Vessel-axial parenchyma pits more frequently with reduced borders. Helical thickenings absent. Mean vessel element length 648 μm (sd = 112), range 443–880 μm. Fibre-tracheids with distinctly bordered pits (Fig. 12) in radial and tangential walls, non-septate. Mean fibre length 1758 μm (sd = 250). Fibre walls thin, mostly of medium thickness (Fig. 2, 3). Axial parenchyma aprotarcheal diffuse to diffuse-in-aggregates (Fig. 2, 3), in strands of 4–8 cells. Uniseriate rays rare and composed exclusively of upright/square cells (Fig. 13). Multiseriate rays accounting for approximately 30% of the cross-sectional area. Multiseriate ray width and height variable. Rays 3–34 cells, 51–467 μm wide, mean ray width 12 cells (sd = 7 cells) or 198 μm (sd = 105). Ray height 449–2873 μm, mean of 1372 μm (sd = 551). Large rays frequently appearing dissected, and commonly in vertical series with other large rays (Fig. 13). Multiseriate rays composed of procumbent ray parenchyma, with some rays having 1–3 rows of square/upright cells (Fig. 9). Storied struc-
Fig. 1–8. *Platanus kerrii*. – 1: Cross section showing diffuse-porous wood and frequent solitary vessels. – 2: Solitary vessels slightly angular in outline, diffuse-in-aggregates parenchyma. – 3: Growth ring boundary, noded rays, and radially flattened fibers. – 4: Vessel-ray parenchyma pits. – 5: Vessel-vessel pits, opposite, to transitional. – 6: Vessel element with simple perforation plate and scalariform perforation plate. – 7: Vessel element with two simple perforation plates. – 8: Scalariform perforation plate with more than 20 bars. — Scale bars = 500 μm in Fig. 1; 100 μm in Fig. 2, 6–8; 50 μm in Fig. 3, 5; 25 μm in Fig. 4.
Fig. 9–13. *Platanus kerrii*. – 9: Radial section showing marginal rows of square and upright cells. – 10: Prismatic crystals in procumbent ray parenchyma, some cells with solitary crystals, others with two or more crystals. – 11: Ray cell with two large crystals. – 12: Fiber pitting on radial walls. – 13: Tangential section showing high and wide rays. — Scale bars = 250 μm in Fig. 13; 100 μm in Fig. 9; 50 μm in Fig. 10; 25 μm in Fig. 11; 12 μm in Fig. 12.

ture, sheath cells, and tile cells absent; no perforated ray cells observed. Prismatic crystals only in ray cells (Fig. 10, 11), in both marginal cells and cells in the ray interior, usually solitary with one crystal per procumbent ray cell, but sometimes two of the same size, or less commonly large and small crystals in the same cell (Fig. 10).
DISCUSSION

The characteristics of *P. kerrii* are similar to other species of *Platanus*; the wood is diffuse-porous, vessels are mostly solitary, mean vessel diameter is less than 100 μm, both simple and scalariform perforation plates occur, intervessel pitting is opposite, axial parenchyma is apotracheal diffuse and diffuse-in-aggregates, fibers have distinctly bordered pits in their radial walls, uniseriate rays are rare, multiseriate rays are typically wider than 10-seriate, and mostly homocellular. Crystals occur only in ray parenchyma cells.

Twig wood of *P. kerrii* had longer vessel elements and a higher proportion of scalariform perforation plates than other *Platanus* species (Page 1968; Baas 1969; Süss & Müller-Stoll 1975; Wheeler 1991). Mature wood of *P. kerrii* does not have significantly longer vessel elements (648 μm, sd = 112, range 443–880 μm) than samples of other extant species (e.g. 750 μm, sd = 134, range 448–986 μm in *P. wrightii*, Aw 25109, Wheeler 1991). The proportion of scalariform perforation plates (53%) is higher than in most samples of extant species (e.g., usually 20% in the earlywood of most species, Wheeler 1991). It is important, however, to remember that this generalization for mature wood is based on but one sample of *P. kerrii* and only a few samples of the Mexican species, *P. chiapensis* (which also had a high proportion of scalariform perforations in the twig wood; Page 1968; Baas, 1969).

*Platanus* wood usually has homocellular rays, composed only of procumbent ray cells. Some of the rays of *P. kerrii* had a few marginal rows of square to upright cells (Fig. 9). However, many of the rays were still being dissected, and what their shape and cellular composition would be in more mature wood is unknown. The rays of *P. kerrii* are the widest in the genus, up to 30 cells. Usually, rays are 12–15 cells wide in the other species. The differences between *P. kerrii* and other species of *Platanus* are primarily in ray structure; it is equivocal whether these differences support its recognition as a separate genus. The indistinct growth rings of this species are surely correlated with its tropical distribution, and should not be considered systematically useful.

Geologically ancient platanoid woods have exclusively scalariform perforation plates and very wide rays (the widest rays often being more than 25 cells wide) (Wheeler et al., in preparation; Wheeler 1991). In ray width, *P. kerrii* is more similar to the fossil woods assigned to the Platanaceae than are other extant species. *Platanus kerrii*, as do other extant species, has a mixture of simple and scalariform perforation plates. Thus, there is still a distinction between Cretaceous and Paleogene platanoid woods (all scalariform) and extant *Platanus* (mixture of simple and scalariform) in perforation plate type.

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REFERENCES


