

PALMOXYLON DILACUNOSUM SP. NOV. FROM THE DECCAN
INTERTRAPPEAN BEDS OF MANDLA DISTRICT,
MADHYA PRADESH

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ABSTRACT

Palmoxylon dilacunosum sp. nov., collected from the Deccan Intertrappean beds of Shahpura near village Silther in Mandla District, Madhya Pradesh is described. It is characterized by the outer and inner distinct lacunar parts in the central vascular zone.

Key-words — Xylotomy, *Palmoxylon*, Palmae, Deccan Intertrappean beds, Probably Eocene (India).

सारांश

मध्य प्रदेश में मंडला जनपद के दक्खिन अन्तर्द्वीपी संस्तरों से पाल्मॉक्सीलान डाइलाकुनोसम नव जाति - कृष्ण अम्ब्वानी

मंडला जनपद (मध्य प्रदेश) में मिलथर ग्राम के समीप शाहपुरा की दक्खिन अन्तर्द्वीपी संस्तरों से एकत्रित पाल्मॉक्सीलॉन डाइलाकुनोसम नव जाति का वर्णन किया गया है। इस ताड़-काष्ठायम में केन्द्रीय वाही मंडल सुस्पष्ट बाह्य एवं अन्तस्थ दो रिक्तकीय भागों से अभिलक्षणित है।

INTRODUCTION

SO far only a few fossil dicotyledonous woods (Ingle, 1972, 1973; Bande, 1973, 1974; Lakhanpal, Prakash & Bande, 1978; Bande & Khatri, 1980; Bande & Prakash, 1981, 1983), a petrified palm fruit resembling *Hyphaene* (Bande, Prakash & Ambwani, 1982) and a few fossil palm woods (Lakhanpal, Prakash & Ambwani, 1980) have been recovered from this region. Besides, the fossil palm woods resembling *Chrysalidocarpus* (Ambwani & Prakash, 1983) and *Licuala* (Ambwani, 1983) have been described from the Deccan Intertrappean exposures of Mandla District. However, this paper deals with a new species of a fossil palm wood from the Intertrappean beds near Silther Village in Mandla District, Madhya Pradesh.

SYSTEMATIC DESCRIPTION

Palmoxylon Schenk, 1882

Palmoxylon dilacunosum sp. nov.

The palm wood sector is about 9.5 cm long and 6.5 cm in radius. It shows the

presence of cortical, dermal, subdermal and central zones (Pl. 1, fig. 1).

Cortical zone — The cortical zone is very narrow, mainly composed of fibrous and irregularly oriented fibrovascular bundles. Fibrovascular bundles are composed of a large fibrous sheath and usually single small excluded metaxylem vessel. Fibrous bundles range from 40-80 μm in diameter. The fibrovascular bundles measure up to 400 \times 200 μm . Leaf-traces are frequently seen and are slightly larger than the fibrovascular bundles. The ground tissue is parenchymatous.

Dermal zone — It is about 2.5 cm thick and the fibrovascular bundles are regularly orientated (Pl. 1, fig. 3). They are usually oval to elongated in shape, 800 \times 400-1000 \times 400 μm in size and 160-170 per cm^2 . The f/v ratio is generally 4/1-6/1. The dorsal sclerenchymatous sheath is prominent, usually reniform, rarely cordate with thick-walled cells having narrow lumen. The median sinus is generally concave sometimes angular and the auricular lobes are present, while the auricular sinus is indistinct. Generally one rarely two excluded oval metaxylem

vessels are present (Pl. 1, fig. 3). Tabular and radiating parenchyma are absent. Stegmata are present around the fibrous part of fibrovascular bundles. The diminutive fibrovascular bundles are sometimes seen. They are usually irregularly oriented. Leaf-trace bundles are present. Horizontal bands of elongated parenchyma are frequently present in the ground mass which sometimes run obliquely between fibrovascular bundles (Pl. 1, fig. 3).

Subdermal zone — This zone extends further to about 3.5 cm towards the centre of the stem and the fibrovascular bundles are irregularly orientated (Pl. 1, fig. 4). They range in size from 1000×800 – 1000×1000 μm and are comparatively bigger in size than the bundles in the dermal zone. Their frequency varies from 120–130 per cm^2 and the f/v ratio from 2/1–3/1. The dorsal sclerenchymatous sheath is prominent and usually reniform. Its cells are thick-walled, the lumen of the cells of inner part of sheath is very narrow as compared to the cells of outer portion. Median sinus is generally concave and auricular lobes are rounded, while the auricular sinus is indistinct. Generally two sometimes three large, round, excluded metaxylem vessels are present (Pl. 1, fig. 4). Tabular parenchyma is mostly in a single layer around the fibrovascular bundles. Stegmata are present around the fibrous part of fibrovascular bundles. The diminutive fibrovascular bundles are occasional and show irregular orientation. Leaf-trace bundles are frequently present. The horizontal files of parenchymatous cells are absent. Phloem is usually represented by a lacuna.

Central zone — This zone can further be divided into two parts: the *outer* and an *inner* part. *Outer* part is highly lacunar and is about 0.5 cm in thickness, composed of very large air cavities. This portion is devoid of fibrous and fibrovascular bundles. The parenchymatous cells of this part are long, cylindrical and usually branched to form lacunae of very large size (Pl. 1, figs 2, 5, 6). The *inner* part is also lacunar but the lacunae are much smaller in size. It has profuse fibrous and fibrovascular bundles. The fibrovascular bundles are irregularly oriented (Pl. 1, figs 2, 7), 800×800 – 1000×1040 μm in size and round to oval in shape. The frequency ranges from 65–70 per cm^2 and the f/v ratio from 1/1–2/1.

The dorsal sclerenchymatous sheath is quite prominent and reniform. Its cells are thick-walled with considerably larger lumen. Generally two, sometimes three excluded metaxylem vessels and an ill-developed ventral fibrous sheath is also seen (Pl. 1, fig. 7). Tabular and radiating parenchyma are absent. Stegmata are present in the fibrous part of the fibrovascular bundles (Pl. 1, fig. 8). Phloem is represented by a small cavity. Diminutive fibrovascular bundles are absent. Leaf-trace bundles are present. Fibrous bundles profusely occur (Pl. 1, fig. 7).

Diminutive Fibrovascular Bundles — The diminutive fibrovascular bundles, similar in structure to normal fibrovascular bundles, are present in the dermal, subdermal and central zones and measure up to 300×400 μm in size. They are irregularly orientated (Pl. 1, figs 3, 4).

Leaf-trace Bundles — These are present throughout the stem and can easily be distinguished by their extended vascular part with many smaller xylem vessels. They are slightly larger than the normal fibrovascular bundles (Pl. 1, figs 3, 4, 7).

Fibrous Bundles — These bundles are rarely found in the dermal zone, their frequency increases in subdermal zone and profusely occur in the inner part of central zone (Pl. 1, fig. 7). Their size also gradually increases from dermal to central zone from 40 to 120 μm . Their absence in the outer part of the central zone is notable (Pl. 1, fig. 6).

Ground Tissue — The ground tissue in the dermal zone is parenchymatous, compact and scanty; parenchyma in the subdermal zone is slightly more while in the central zone it occupies a major portion of stem. Cells in the dermal zone are small, polygonal along with a large number of irregularly traversing horizontal files of cells (Pl. 1, fig. 3), absent from subdermal zone. The ground tissue consists only of polygonal parenchymatous cells (Pl. 1, fig. 4). The central zone is highly lacunar and the lacunarization starts abruptly (Pl. 1, figs 2, 6, 7). Based on the distribution pattern of lacunae, the central zone can be distinguished into two parts (i) the outer, about 5 mm wide, devoid of fibrous and fibrovascular bundles exclusively composed of large lacunae bordered by elongated parenchymatous cells forming mesh-like structure

(Pl. 1, fig. 6), and (ii) the inner portion with small lacunae accompanied by abundant fibrous and fibrovascular bundles (Pl. 1, fig. 7).

Vessel Elements — Metaxylem vessels of the fibrovascular bundles of dermal, subdermal and central zones are usually oval to round, sometimes laterally flattened (Pl. 1, figs 3, 4, 7), measuring $200 \times 120 \mu\text{m}$ to $350 \times 200 \mu\text{m}$ in cross section and 3 to 4 mm long. Their end plates are oblique with 2-4 perforation bars; side wall pitting is scalariform to reticulate. Annular and spirally thickened protoxylem vessels are sometimes seen associated with metaxylem vessels; measure $50-70 \mu\text{m}$ in cross section and are much longer than the metaxylem vessels (Pl. 1, fig. 8).

DIAGNOSIS

Fossil palm wood a triangular sector; cortical, dermal, subdermal and central zones present; 9.5 cm long, 6.5 cm radius; cortical fibrovascular bundles irregularly placed measuring $400 \times 200 \mu\text{m}$ in size. Dermal zone bundles regularly oriented, $800 \times 480 \mu\text{m}$ to $1000 \times 400 \mu\text{m}$ in size, 160-170 per cm; f/v ratio 4/1-6/1, dorsal sclerenchymatous sheath reniform, cell lumen very narrow; median sinus concave to angular; auricular sinus indistinct, lobes rounded; generally one rarely two metaxylem vessels in each fibrovascular bundle, tabular, radiating parenchyma absent; stegmata and diminutive fibrovascular bundles present; phloem represented by lacuna; fibrous bundles and parenchymatous bands present.

Subdermal fibrovascular bundles irregular in orientation, round to oval, 120-130 per cm^2 , size $1000 \times 800-1000 \times 1000 \mu\text{m}$, f/v ratio 2/3-3/1; dorsal sclerenchymatous sheath reniform; median sinus concave, auricular sinus indistinct, lobes rounded; stegmata, diminutive bundles, tabular parenchyma and fibrous bundles present; radiating parenchyma and parenchymatous bands absent.

Central fibrovascular bundles irregular in orientation; frequency 65-70 per cm^2 , shape round to oval, $800 \times 800-1400-1000 \mu\text{m}$ in size, f/v ratio 1/1-2/1; metaxylem vessels 2-3, excluded; dorsal sclerenchymatous sheath reniform; median sinus con-

cave, auricular sinus indistinct, auricular lobes rounded; tabular and radiating parenchyma absent; stegmata present; fibrous bundles profuse; horizontal parenchymatous bands absent; phloem represented by lacuna; leaf-trace bundles present. Metaxylem vessels $200 \times 120-350 \times 200 \mu\text{m}$ in diameter, 3-4 mm long; perforation plates oblique with 2-4 bars, scalariform to reticulate thickened; protoxylem vessels $50-70 \mu\text{m}$ in diameter, annular and spirally thickened perforation plates usually with two bars. Central ground tissue distinguished into outer part devoid of fibrous and fibrovascular bundles; inner part with small lacunae, fibrous and fibrovascular bundles profuse.

Holotype — B.S.I.P. Museum no. 35541.

Locality — Silther, near Shahpura, Mandla District, Madhya Pradesh.

Horizon — Deccan Intertrappean beds.

Age — Probably Early Eocene.

DISCUSSION

The present palm wood possesses distinct lacunar ground tissue in the central zone which is further distinguishable into two parts, i.e. an outer highly lacunar part without any fibrous or fibrovascular bundles and an inner part with profuse fibrous and fibrovascular bundles (Pl. 1, figs 2, 6, 7). A large number of Indian fossil palm woods possessing lacunar ground tissue have been described. These are: *Palmoxylon hislopi* Rode (1933), *P. dakshinense* Prakash (1960), *P. chhindwarese* Prakash (1960), *P. eocenum* Prakash (1962), *P. deccanense* Sahni (1964), *P. wadii* Sahni (1931, 1964), *P. kamalam* Rode (Rode, 1933; Shukla, 1939; Sahni, 1964; Mahabale & Kulkarni, 1973), *P. jammuense* Sahni (1931, 1964), *P. blanfordi* Schenk (Schenk, 1882; Sahni, 1931, 1964), *P. parthasarathyi* Rao & Menon (1964), *P. feistmanteli* Rao & Achutan (1969), *P. kerienne* Trivedi & Verma, (1971a), *P. superbium* Trivedi & Verma (1971b), *P. parapaniensis* Lakhnopal *et al.* (1979) and *P. livistonoides* Prakash & Ambwani (1980). None of them possess the distinct pattern of distribution of lacunae in the central zone as seen in the present fossil and hence the fossil has been assigned to a new species, *Palmoxylon dilacunosum* sp. nov.

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EXPLANATION OF PLATES

Palmoxylon dilacunosum sp. nov.

1. Transverse section of stem in low power to show dermal, subdermal and central zones. \times natural size. (D=dermal, SD=subdermal, C=central zones); B.S.I.P. specimen no. 35541.
2. Transverse section of stem through central zone to show its outer and inner parts. \times 4; slide no. 8015.
3. Transverse section of stem to show dermal zone. Note the presence of horizontal files of parenchymatous cells. \times 25; slide no. 8014.
4. Transverse section of the stem to show subdermal zone. Note the presence of diminutive fibrovascular and leaf-trace bundles. \times 25; slide no. 8014.
5. Longitudinal view of the specimen showing outer and inner lacunar parts of the central zone of the specimen. \times 3. B.S.I.P. specimen no. 35541 (O=outer, I=inner).
6. Transverse section of stem to show outer lacunar part of the central zone. Note the absence of

fibrovascular and fibrous bundles in this part.
× 25; slide no. 8015.

7. Transverse section of stem to show inner part of the central zone. Note the presence of fibrous, fibrovascular bundles and smaller size of lacunae. × 25; slide no. 8015.
8. Longitudinal section of fibrovascular bundle to show stigmata and the nature of the xylem elements. × 60; slide no. 8016.

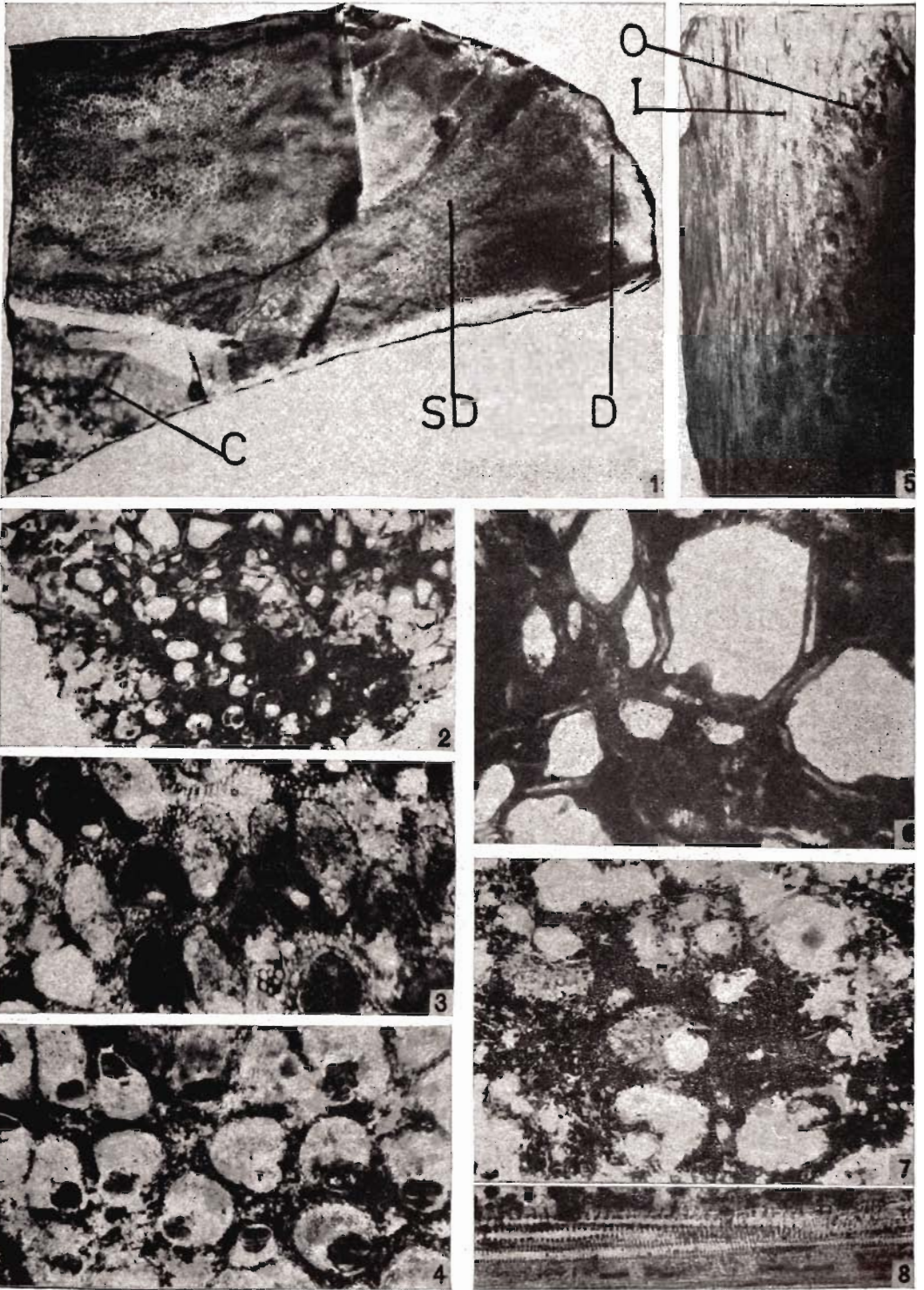


PLATE I