

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

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ABSTRACT

A fossil palm wood, *Palmoxylon siltherensis* sp. nov., collected from the Deccan Intertrappean beds of Shahpura near the village Silther in Mandla District has been described. The fossil wood is characterized by the compact ground parenchyma and presence of one metaxylem vessel in the fibrovascular bundles.

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

सारांश

मध्य प्रदेश में मंडला जनपद के दक्खिन अन्तर्द्वीपी संस्तरों से पाल्मॉक्सिलॉन सिलथरेन्सिस नव जाति - कृष्ण अम्बवानी

मंडला जनपद में सिलथर नामक गाँव के समीप शाहपुरा के दक्खिन अन्तर्द्वीपी संस्तरों से एकत्रित एक ताड़-काष्ठाश्म, पाल्मॉक्सिलॉन सिलथरेन्सिस नव जाति, का वर्णन किया गया है। यह काष्ठाश्म संहत भरण मृदूतक एवं वाहिनी बंडलों में विद्यमान एक अनुदार वाहिनी से अभिलक्षणित है।

INTRODUCTION

A NEW species of a fossil palm wood has been described¹ here from the Deccan Intertrappean beds of Shahpura in Mandla District. The fossiliferous locality is situated near the village Silther in Shahpura (Ambwani & Prakash, 1983). So far only a few dicotyledonous fossil woods (Bande & Prakash, 1981), a fossil palm wood, *Palmoxylon ghuguensis* sp. nov. resembling the extant genus *Chrysalidocarpus* (Ambwani & Prakash, 1983), *P. shahpuraensis* (Ambwani, 1983) and a fossil palm fruit resembling the present day *Hyphaene* (Bande *et al.*, 1981) have been described from the Deccan Intertrappean beds of Shahpura.

SYSTEMATIC DESCRIPTION

FAMILY — PALMAE

Genus — *Palmoxylon* Schenk, 1882

Palmoxylon siltherensis sp. nov.

Pl. 1, figs 1-4

The wood is 7 cm in length and 12 cm in diameter and is well preserved to reveal

all the detailed anatomical features. It shows usually a single small metaxylem vessel per fibrovascular bundle and has compact ground tissue.

The common anatomical features observed in the dermal, subdermal as well as central zones of *Palmoxylon siltherensis* are: the presence of usually reniform type of dorsal sclerenchymatous sheath (Pl. 1, figs 1-4) consisting of thick-walled sclerenchymatous cells with a narrow lumen. The median sinus is concave and the auricular sinus is indistinct whereas the auricular lobes are round (Pl. 1, figs 1-4). Usually one small excluded metaxylem vessel is present in each fibrovascular bundle of these zones (Pl. 1, figs 1-4). One to two layers of tabular parenchyma may be seen around each fibrovascular bundle while the radiating parenchyma are absent (Pl. 1, figs 1-4). Sometimes one to two very narrow protoxylem vessels are seen associated with the metaxylem vessel. The protoxylem and the metaxylem elements have spiral to annular and scalariform to reticulate thickenings respectively. A very narrow ventral sclerenchymatous sheath may also be found in each fibrovascular bundle (Pl. 1, figs 1-4).

Diminutive fibrovascular bundles may sometimes be seen (Pl. 1, fig. 3).

Besides, the dissimilar anatomical features observed in the different zones of the stem are as follows:

Dermal Zone — The fibrovascular bundles are mediumly large, slightly sparse and their frequency varies from 130 to 140 per cm^2 . They are regularly oriented. The shape of these bundles varies from oval to slightly triangular. The size of the fibrovascular bundles varies from 960×480 to $800 \times 720 \mu\text{m}$. The f/v ratio varies from 18/1 to 23/1.

Subdermal Zone — The fibrovascular bundles are slightly larger in size, their frequency varies from 100 to 110 per cm^2 and they are more or less regularly oriented. The shape of the fibrovascular bundles varies from round to oval and the size of the fibrovascular bundles varies from 800×800 to $1020 \times 640 \mu\text{m}$ and the f/v ratio ranges from 24/1 to 30/1.

Central Zone — The fibrovascular bundles are generally larger as compared to those of the dermal and subdermal zones and sparsely placed; more or less irregularly oriented (Pl. 1, fig. 3) and round to oval in shape. The frequency of the fibrovascular bundles varies from 80 to 85 per cm^2 . The size of the fibrovascular bundles varies from 720×640 to $1300 \times 800 \mu\text{m}$. The f/v ratio is almost similar as in the subdermal zone.

Diminutive Fibrovascular Bundles — These bundles are present throughout the stem section. They measure from 240×320 to $480 \times 480 \mu\text{m}$ and reveal similar structure to that of the larger fibrovascular bundles. They are irregularly dispersed (Pl. 1, fig. 3).

Leaf-trace Bundles — These are present throughout the stem wood but more common in the central zone. They are easily distinguished by their protruded tongue-like vascular part with a number of smaller vessels (Pl. 1, figs 1, 2).

Ground Tissue — The ground tissue is characteristic and compact throughout the stem. It is scanty in the dermal zone and is composed of slightly thick-walled parenchymatous cells generally rectangular to horizontally as well as vertically elongated in shape, sometimes oval cells may also be observed between the fibrovascular bundles. They are mostly arranged in tiers (Pl. 1, fig. 1).

In the subdermal zone the ground tissue cells are also somewhat thick-walled; round to oval as well as elongated in shape, sometimes rectangular to squarish cells may also be observed. The frequency of the elongated cells in this zone is greater than other types of cells. These elongated cells are seen vertically and obliquely placed between the fibrovascular bundles. The elongated cells are observed below the xylem portion of leaf-trace bundles which may be confused with the radiating parenchyma (Pl. 1, fig. 1).

The ground tissue in the central zone is also compact and composed of generally rectangular squarish as well as circular to oval cells. A few elongated cells may also be seen. The frequency of elongated cells is greater in the ground tissue (Pl. 1, fig. 3).

SPECIFIC DIAGNOSIS

The specific anatomical features observed in the dermal, subdermal as well as central zones of the fossil wood are: presence of reniform type of dorsal sclerenchymatous sheath, median sinus concave, auricular sinus indistinct, auricular lobes round, usually one small excluded metaxylem vessel present in each bundle, one to two layers of tabular parenchyma present, radiating parenchyma absent; sometimes one to two very narrow protoxylem vessels present; protoxylem and metaxylem elements show annular to spiral and scalariform to reticulate thickenings respectively; a narrow ventral sclerenchymatous sheath present, diminutive fibrovascular bundles sometimes seen.

Besides, the dissimilar anatomical features in each zone are as follows:

Dermal Zone — Fibrovascular bundles mediumly large, slightly sparse; frequency ranges 130-140 per cm^2 , regularly oriented; shape oval to slightly triangular; size varies from 960×480 to $800 \times 720 \mu\text{m}$, f/v ratio 18/1-23/1.

Subdermal Zone — Fibrovascular bundles slightly larger in size, frequency 100-110 per cm^2 ; more or less regularly oriented; size 800×800 - $1020 \times 640 \mu\text{m}$; f/v ratio 24/1-30/1.

Central Zone — Fibrovascular bundles generally larger than dermal and subdermal zones, sparsely placed (Pl. 1, fig. 3) irregularly oriented; frequency 80-85 per cm^2 , shape

round to oval, size 720×640 - 1300×800 μm ; f/v ratio almost similar to subdermal zone.

Ground tissue compact throughout, cells generally rectangular, elongated as well as circular sometimes oval and squarish. Cells in dermal zone generally arranged in tiers between two adjacent fibrovascular bundles; cells in subdermal and central zones round, oval as well as elongated; frequency of elongated cells greater in central zone.

Holotype — B.S.I.P. Museum no. 36034.

Locality — Silther, Mandla District, Madhya Pradesh.

Horizon — Deccan Intertrappean Series.

Age — ?Palaeocene-Eocene.

Palmoxylon species with compact ground tissue comparable with the present fossil species are: *Palmoxylon sahnii* Rode (1933), *P. sclerodermum* Sahnii (1931, 1964), Shukla (1946), *P. surangei* Lakhanpal (1955), *P. rewahense* Sahnii (1964), *P. liebighianum* Sahnii (1964), *P. coronatum* Sahnii (1964), *P. compactum* Sahnii (1964), *P. maheshwarii* Rao & Menon (1963), *P. raoi* Menon (1968), *P. puratanum* Ramanujam (1958), *P. mohgaonensis* Trivedi & Surange (1970), *P. splendidum* Trivedi & Chandra (1971), and *P. mandlaensis* Lakhanpal *et al.* (1979) but the present fossil species is closely comparable only with *Palmoxylon sclerodermum*.

Palmoxylon sclerodermum in its general anatomy shows scanty parenchyma in the ground tissue and usually one rarely two metaxylem vessels in each fibrovascular bundle. It also resembles the present fossil wood in shape and size of the fibrovascular bundles as well as in having 1-2 layers of tabular parenchyma around the fibrous part of the fibrovascular bundle; both have rounded auricular lobes. The diminutive fibrovascular bundles are present in both the species.

But it differs from *P. sclerodermum* which has generally cordate type of dorsal sclerenchymatous sheath. The f/v ratio in the present species is 18/1-23/1 in dermal and 24/1-30/1 in the subdermal and central zones whereas in the dermal, subdermal and central zones of *P. sclerodermum* it is 9/1-18/1, 20/1 and 23/1 respectively. The frequency of the fibrovascular bundles in both the species also differs and is greater in the present species, being 130-140 in the dermal, 100-110 in subdermal and 80-85

per cm^2 in the central zone respectively while it is 105 in the dermal, 75 in subdermal and 55-70 per cm^2 in the central zone of *P. sclerodermum*. The median sinus in the present species is concave whereas it is cordate in *P. sclerodermum*. Generally one rarely two small vessels are seen in each fibrovascular bundle of all the zones in the present species while one to two or more vessels in each fibrovascular bundle are present in *P. sclerodermum*.

The ground tissue in the present species is compact throughout the stem while it is slightly lacunar in the dermal zone of *P. sclerodermum*. The parenchymatous cells of the ground tissue in the present species vary from round, oval, rectangular, squarish and sometimes elongated whereas they are usually isodiametric in *P. sclerodermum*. The fibrous bundles are absent throughout the stem in the present species while they are present in *P. sclerodermum*.

Further, the present fossil species can also be compared with *Palmoxylon speciosum* Stenzel (1904) to some extent. The size and shape of fibrovascular bundles closely resemble in both. The size ranges from 1000 to 1400 μm in *P. speciosum* whereas the dorsal sclerenchymatous sheath is reniform in both. The f/v ratio is more or less similar, bundles show presence of ventral sclerenchymatous patch below the xylem of the fibrovascular bundle. Presence of 1-2 layers of tabular parenchyma may also be seen in the fibrovascular bundles with concave median sinus in both the species.

However, the present fossil species differs from *P. speciosum* in having greater frequency of the fibrovascular bundles, being only 21 per cm^2 in *P. speciosum*. The fibrous bundles are absent in the present fossil species whereas they are present in *P. speciosum*. The diminutive fibrovascular bundles are observed in the present species while they are absent in *P. speciosum*. There is usually one small metaxylem vessel in the fibrovascular bundle of the present species while generally two metaxylem vessels are present in *P. speciosum*. The dorsal sclerenchymatous sheath of the fibrovascular bundles in the present species is usually reniform while it is lunaria as well as sagittata in *P. speciosum*. The ground tissue is compact in the present species, whereas it is lacunar in *P. speciosum*.

Thus the present species differs from all the above mentioned species of *Palmoxylon* and therefore a new species *Palmoxylon*

siltherensis has been created. The specific name has been assigned after the locality from which the specimen was collected.

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EXPLANATION OF PLATE

1. Cross section of *Palmoxylon siltherensis* sp. nov. passing through dermal zone. Note the nature of the fibrovascular, leaf-trace bundles and the ground tissue cells. Note the presence of diminutive bundle. $\times 30$. Slide no. 6703.
2. Cross section of the same showing subdermal zone. Note the presence of tabular parenchyma around the fibrous part of fibrovascular bundle. $\times 30$. Slide no. 6703.
3. Cross section of the Central zone of stem enlarged, showing irregularly oriented fibrovascular bundles and leaf-trace bundle. Note the presence of diminutive bundle. $\times 30$. Slide no. 6703.
4. Cross section showing a single enlarged fibrovascular bundle with different types of ground tissue cells. $\times 60$. Slide no. 6703.
5. L.S. showing stegmata. $\times 60$. Slide no. 6703A.

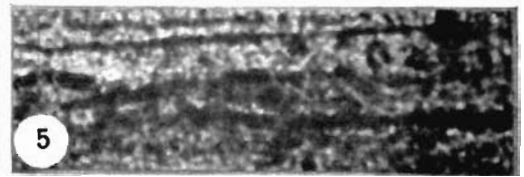
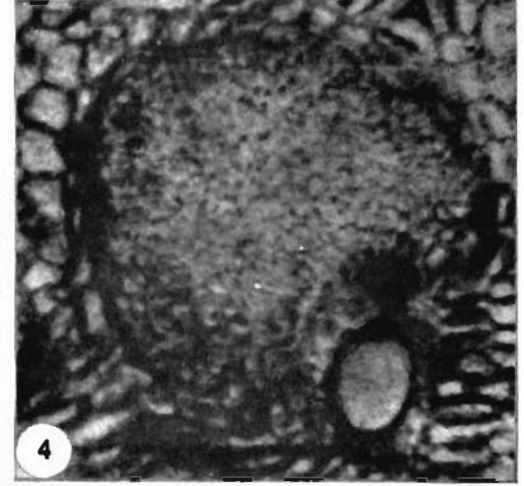
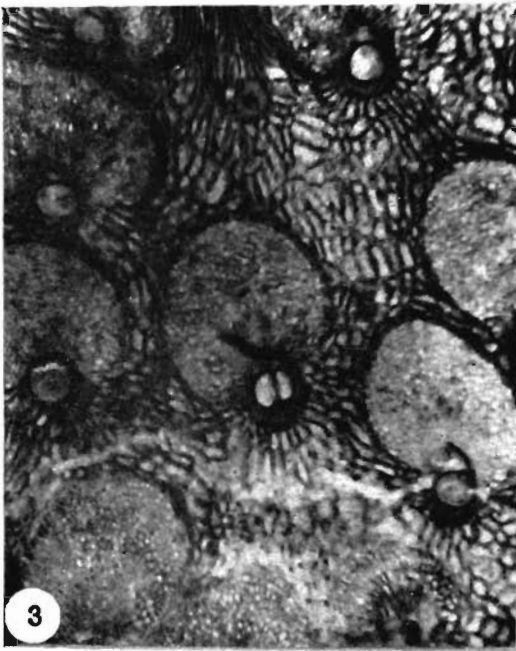
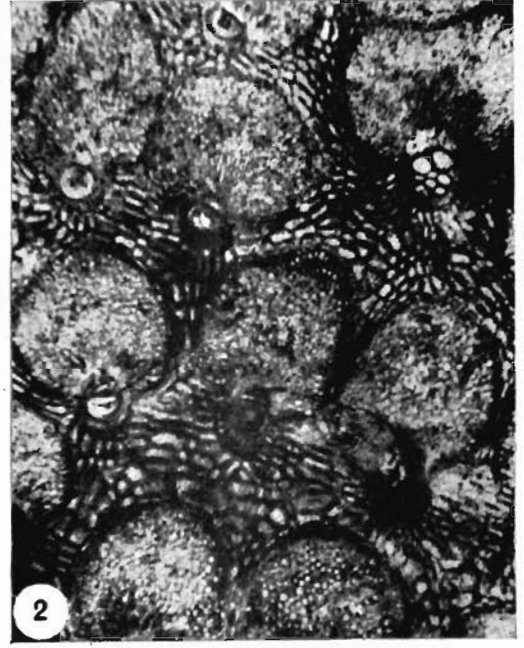
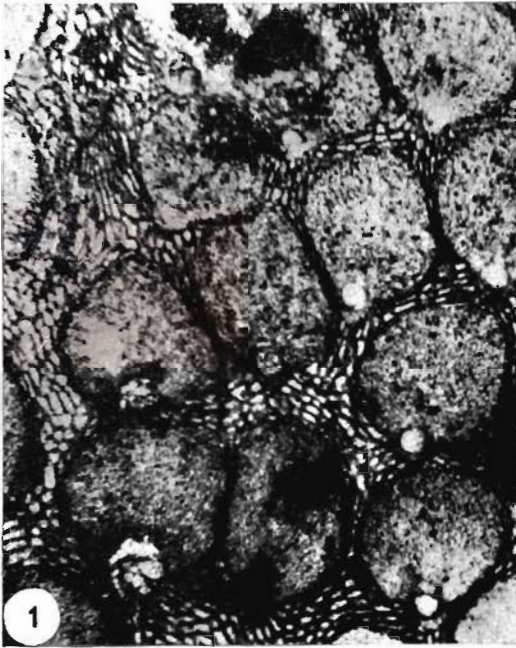


PLATE 1