

PALMOCARPON SPLENDIDUM SP. NOV. FROM THE DECCAN INTERTRAPPEAN BEDS OF MOHGAON KALAN, CHHINDWARA DISTRICT, M.P.

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ABSTRACT

A fossil fruit, *Palmocarpon splendidum* sp. nov. has been described from Mohgaon Kalan (22°1' N; 79°11' E) the well known locality of the Deccan Intertrappean series, in Chhindwara district of Madhya Pradesh. The palm fruit is well preserved to reveal its anatomical details and has been referred to the form genus *Palmocarpon* Lesquereux.

INTRODUCTION

THE material for the present investigation was collected by us from Mohgaon Kalan (22°1' N. 79°11' E), a well known locality in Chhindwara district, M.P. Species of *Palmocarpon* have been described from the Intertrappean beds by Sahni (1934), Sahni & Rode (1937), Mahabalé (1950) and Prakash (1954, 1960). Besides these, fruits of palms like *Nipa* have been described from the Intertrappean beds by Rode (1933) and Chitale (1960) while Lakhapal (1952) described *Nipa sahnii*; from Garo hills, Assam. Kaul (1951) described a species of *Cocos* from Kapurdi (Jodhpur). Anatomical details of *Palmocarpon mohgaonense*, *P. indicum* and *P. sulcatum* have been worked out by Prakash (1954, 1960). On comparing our specimen with all the known species of *Palmocarpon* we find that our specimen is distinct from those already reported. Transverse and longitudinal sections of the material were prepared for the study of the anatomical details. No stains have been used as the preservation is good.

DESCRIPTION

MONOCOTYLEDONEAE

Palmae

Palmocarpon splendidum

The palm fruit described here was found as a solitary specimen. It was partly

embedded in the rock and was partly exposed. The fruit is oval in shape (Text-fig. 1), 5.5 cm. long, 4.5 cm. broad in the middle; it is smooth on the exterior. A superficial longitudinal furrow running antero-posteriorly could be seen.

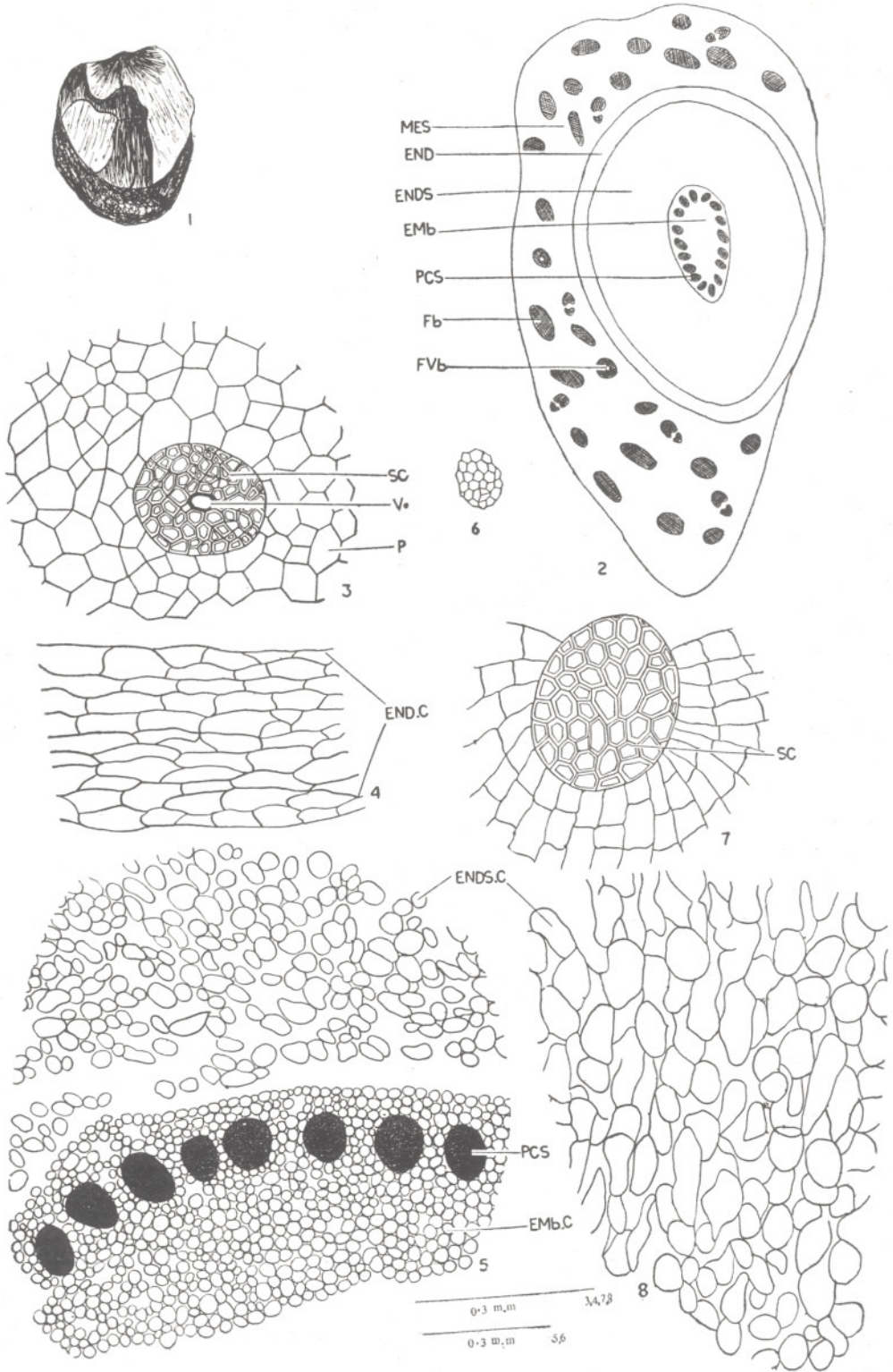
The pericarp of the fruit resembles that of a palm fruit. It is made up of semifibrous mesocarp and hard endocarp. Epicarp is not preserved, the mesocarp is only partially preserved but the endocarp is fairly well preserved.

Mesocarp

Mesocarp is present all round the fruit except on one side where it has disappeared. (Plate 1, Photo. 1; Text-fig. 2).

Ground tissue — The ground tissue is not very well preserved but at some places oval or polygonal cells which vary greatly in size, are present. The polygonal cells are generally found in association with fibro-vascular bundles (Text-fig. 3), while oblong cells in association with fibrous bundles show radiating arrangement (Text-fig. 7). Crystal sacs and crystalline deposits are absent.

Bundles — Fibrous and fibrovascular bundles are irregularly distributed in the ground tissue of the mesocarp of the fruit (Text-fig. 2, Plate 1, Photo. 5). Fibrous bundles are numerous; these can be seen in almost all planes. They vary in shape, size and form. Some of them are round, oval or elliptical. Some are small about 1 mm. while others are large about 3 mm. across. They are made up of purely sclerenchymatous cells (Text-fig. 7). Only a few fibro-vascular bundles occur mixed with fibrous bundles. In shape and size the two resemble each other and both have irregular course. The fibro-vascular bundles have well developed dorsal and ventral sclerenchyma and most of them have only single vessel in the centre (Plate 1, Photo. 3; Text-fig. 3). Stigmata are absent.



TEXT-FIGS. 1-8

Endocarp

A distinct compact zone between the mesocarp and the seed can be clearly made out. (Plate 1, Photo. 6) although the cells of this zone are not uniformly well preserved. At some places, however, the preservation is better. This zone has parenchymatous cells which run transversely (Text-fig. 4). Fibrous and fibro-vascular bundles are completely absent from this zone.

Seed

Only a single seed is present, remains of any abortive seed(s) can not be made out. The seed measures 3.5 cm. in length and 2.3 cm. in breadth as seen in transverse section. Inside the seed is present an embryo (Text-fig. 2) which is centrally situated. Endosperm is composed of two kinds of cells viz., those surrounding the embryo—the inner endospermal cells—these are small and oval (Plate 1, Photo. 4; Text-fig. 5) and the outer endospermal cells which are larger and oblong (Text-fig. 8). The embryo in a transverse section of the fruit when cut through the middle is about 5 mm. in diameter. In another section slightly above the middle, the embryo is 3 mm. in diameter. The embryo is composed of thin walled cells with intercellular spaces and it has a ring of small, procambial strands near the periphery (Plate 1, Photo. 2). Procambial strands are composed of parenchymatous cells (Text-fig. 6) and the diameter of each strand is 0.2 mm.

Diagnosis—Fruit a drupe, oval, about 5.5 cm. long, 4.5 cm. broad. Epicarp absent; mesocarp parenchymatous with irregularly distributed fibrous and fibrovascular bundles. Endocarp single layered. Seed single with a central embryo. Endosperm has two kinds of cells.

Locality—Mohgaon Kalan, Chhindwara district, M.P.

Horizon and Age—Deccan Intertrappean series and Tertiary (early Eocene).

Collection—At present all the slides and specimen are with B.S. Trivedi, Botany Department, Lucknow University, Lucknow, India.

DISCUSSION

A few species of *Palmocarpon* based chiefly on morphological grounds are known from India. The only anatomical work on *Palmocarpon* is by Prakash (1954, 1960). Paucity of anatomical work on fossil as well as living palm fruits makes the task of comparison difficult. A detailed comparison of our specimen with the known fossil palm fruits clearly indicates that it differ in general shape, size, surface marks of the fruit and also in the number of seeds present. It also differs from *Palmocarpon mohgaoncense*, *P. indicum* and *P. sulcatum* in many important characters as indicated in table 1.

On comparing the present specimen with the fruit of *Borassus flabellifer* it becomes clear that the two resemble each other with regard to the distribution of fibrous and fibrovascular bundles, absence of zonation in endocarp and cellular structure of embryo and mesocarp. They differ from each other in the number of seeds, in the cells of the endosperm, position of the embryo and the distribution of vascular bundles in the embryo.

Rendle (1963) divides the family Palmae taxonomically into 7 tribes. The character of the fruit in various tribes as described by him is given below :

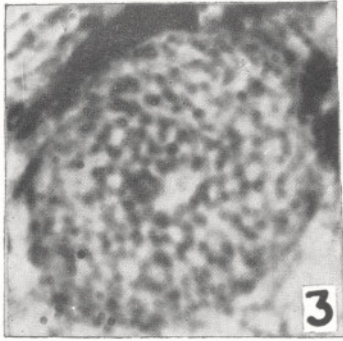
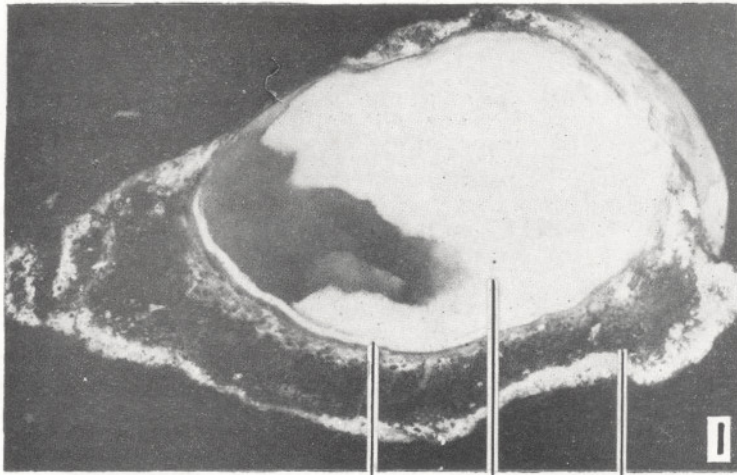
1. Phoeniceae—Fruit is berry.
2. Lepidocaryeae—The fruit has shining imbricate scales on the fruit wall and the endosperm is not completely developed.
3. Areceae—The endosperm is ruminant and fruit is generally a berry.
4. Coccoaeae—The fruit has fluid like endosperm

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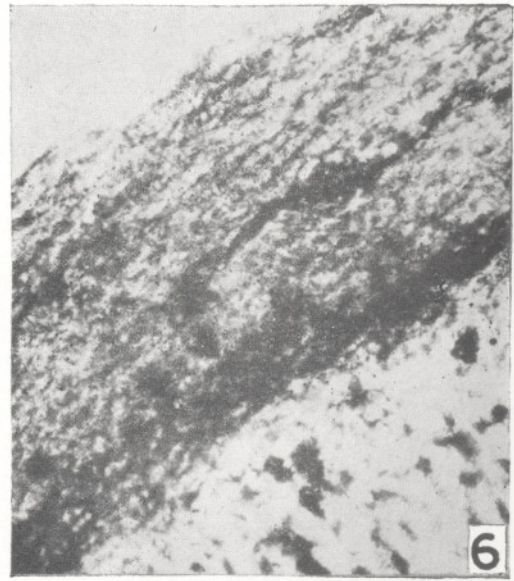
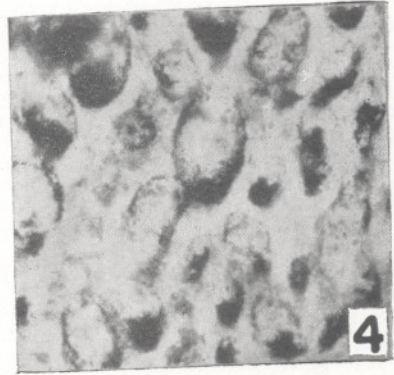
TEXT-FIG. 1—Fruit (XI). 2. Cross section of the fruit showing mesocarp, endocarp, endosperm and embryo $\times Ca$ 5. 3. A fibro-vascular bundle enlarged to show the tissue with ground parenchyma of the mesocarp. 4. Cells of endocarp. 5. Cross section of fruit showing detailed cellular structures of embryo and endosperm cells. 6. A procambial strand enlarged. 7. A fibrous bundle enlarged showing radiating parenchyma. 8. Endosperm cells of outer periphery. END—Endocarp, ENDS—Endosperm, END.C—Endocarp cells, ENDS.C—Endosperm cells, EMB—Embryo, EMB.C—Embryo cells, Fb—Fibrous Bundle, Fvb—Fibro-vascular bundles, MES—Mesocarp, P—Parenchyma, PCs—Procambial strands, SC—Sclerenchyma, V—Vessel.

TABLE 1

	<i>Palmocarpon mohgaense</i>	<i>Palmocarpon indicum</i>	<i>Palmocarpon sulcatum</i>	<i>Palmocarpon splendidum</i>
1. <i>Shape</i> :	Obovoid in shape, slightly trigonous.	Ovate in shape.	Quadrangular throughout its length	Oval in shape.
2. <i>Size</i> :	6.4 cm. long, 4.8 cm. broad.	7.2 cm. long, 3.2 cm. broad.	5.75 cm. long, 4.2 cm. broad.	5.5 cm. long, 4.5 cm. broad.
3. <i>Surface mark</i> :	No surface mark present	4-6 longitudinal ridges present.	Surface mark not mentioned.	A slight groove present, it runs superficially from anterior end to posterior end.
4. <i>Epicarp</i> :	Epicarp not preserved.	Thin walled parenchymatous cells.	Membraneous.	Not preserved.
5. <i>Mesocarp</i> :	Fibrous band present below the epicarp. Different kinds of vascular bundles in different zones. Ground tissue is composed of two types of loose, thin walled parenchymatous cells of various dimensions.	Fibrous band present below the epicarp. Below the fibrous band, fibrous and fibro-vascular bundles are arranged in 4-6 series. Ground tissue is composed of loose thin walled cells.	Fibrous band present below the epicarp. Below the fibrous band, fibrous and fibro-vascular bundles are present. Ground tissue has thin walled cells.	Fibrous zone absent. Fibrous and fibro-vascular bundles are irregularly distributed. Ground tissue composed of polygonal and oblong thin walled cells.
6. <i>Endocarp</i> :	Three layers present, Middle layer is transversed by widely spaced fibro-vascular bundles.	Endocarp is hard and formed of fairly thick walled cells with fairly small lumen.	Endocarp composed of thick walled cells.	Endocarp composed of transversely running parenchymatous cells. Fibrous and fibro-vascular bundles completely absent from this zone.
7. <i>Seed</i> :	Three seeds present. Two aborted and one well developed.	Single seed present and an aborted carpel is also present on the basal end, on one side of the fruit.	Single seed present. Seed is distinctly grooved with the endocarp ridge dipping into it. Two aborted carpels are present.	Single seed present
8. <i>Endosperm</i> :	Composed of thin walled cells.	Endosperm is tough and formed of thick walled cells.	Endosperm is hard and formed of thick walled cells.	Endosperm consists of two type of cells; outer peripheral cells are oblong and arranged in radiating manner towards the centre. The cells in the centre round the embryo, are oval.
9. <i>Embryo</i> :	Apical in position.	Embryo not described.	Embryo not described.	Embryo central in position.



END ENDS MES



5. Phytelphanteae — The fruit has a very large furrow on the fruit wall.

6. Borasseae — The fruit is a drupe.

7. Sabaleae — The fruit is a drupe or a berry, in some genera of this tribe the procambial strands are arranged at the periphery of the embryo.

In some genera of Sabaleae the procambial strands are arranged at the periphery of the

embryo as also in the present specimen. The fruit is a drupe in Sabaleae. The fossil fruit shares these characters with the fruit of the tribe Sabaleae.

The present specimen is clearly distinct from all the *Palmocarpon* known so far. We, therefore, propose to give it a new name viz. *Palmocarpon splendidum* sp. nov.

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EXPLANATION OF PLATE

PLATE 1

1. T.S. of fruit showing well developed mesocarp, endocarp and endosperm \times Ca 3. ENDS — Endosperm, END — Endocarp, MES — Mesocarp.
2. Embryo with procambial strands \times 11.

3. A fibrovascular bundle showing single vessel \times 44.
4. Cells of endosperm \times 22.
5. Distribution of fibrous and fibrovascular bundles in the mesocarp region of the fruit \times 22.
6. Well developed endocarp layer \times 35.