

A TEN LOCULAR PETRIFIED FRUIT FROM THE DECCAN INTERTRAPPEAN SERIES OF INDIA*

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ABSTRACT

The petrified fruit described in this paper was collected in June 1969 from the Deccan Intertrappean beds of Mohgaonkalan. The fruit is more or less round and flatish, measuring 11×8 mm. in size. It is ten chambered with a very poorly preserved central axis. The fruit wall is wavy with ten prominent ridges marking ten loculi. The ten septae separating the ten loculi are narrow towards the central axis and broad and dome shaped towards the peripheral wall. The fruit shows a septicial dehiscence. Ten vascular bundles are in a ring in the central axis one against each septum. The vascular traces are seen in the septae and in the fruit wall. Each loculus is filled with a single seed occupying the whole chamber. The seed measuring 4 mm. long, 1.7 mm. broad at its broadest peripheral region and 7 mm. thick is placed in each chamber with its length at right angles to the central axis. Towards the central axis, it is narrowing down, showing micropyle in some transverse sections of the fruit.

This fruit is different from all the known fossil fruits from India. Comparisons with the living fruits have shown that it resembles most the fruits of Malvaceae. However, resemblances not being complete with any of its genera, the present fossil fruit is given a new name, *Daberocarpon gerhardii*, gen. et sp. nov.

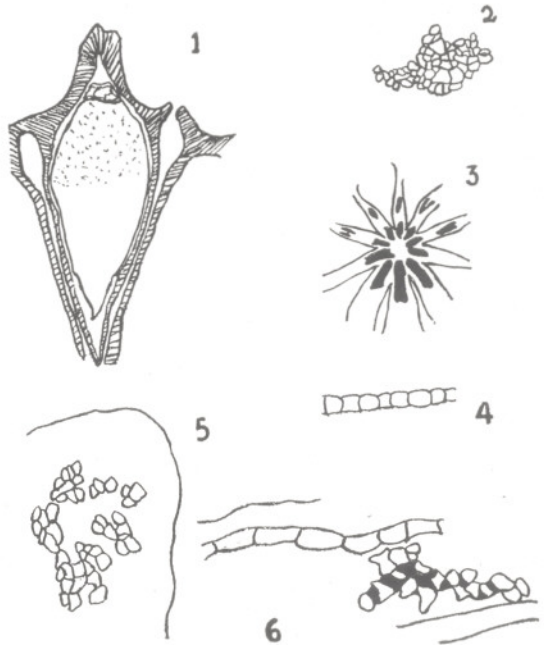
INTRODUCTION

VERY few fruits have so far been reported from the Deccan Intertrappean beds of India. Fossil *Nypha* which was first recorded in India by Hislop and Hunter (1855), and briefly described by Sahni and Rode (1937), was worked out in detail by Chitale (1960 a & b) and Chitale and Nambudiri (1969) and Nambudiri (1966). The other fossil fruits from the Intertrappean beds of Mohgaonkalan are *Enigmocarpon* (Sahni, 1943), *Tricoccites* (Sahni and Rode, 1937, Chitale, 1956), *Palmocarpon* (Rode 1933, and Prakash, 1954), *Viracarpon* (Sahni, 1944, Chitale, 1954, 1958; Chitale et al 1969), *Musa* (Jain, 1963), *Indocarpa* (Jain, 1964, Nambudiri, 1969), and *Harrisocarpon* (Chitale and Nambudiri, 1968). The three dicotyledonous fruits, *Enigmocarpon*, *Indocarpa* and *Harrisocarpon* are capsules.

The fruit under investigation was collected by Sheikh in June 1969, during a visit to the Deccan Intertrappean beds of Mohgaonkalan. The material was preserved in black chert which after breaking showed the fruit in oblique transverse section (Pl. 1, Fig. 1) in part and counter-part. Six to seven chambers of the fruit around a small central core were distinct to naked eye. The specimen was studied in detail by taking series of peel sections along all possible planes. The fruit surface showed ridges and furrows.

DESCRIPTION

Serial sections of the specimen show a ten chambered fruit (Pl. 1, Fig. 4) with a



TEXT-FIGS. 1-6 — A loculus to show fruit wall ridges, dehiscence and a single seed. $\times 20$. 2. Cells of endosperm. $\times 80$. 3. Central core with ten vascular bundles entering ten septae. $\times 20$. 4. Epidermal cells of fruit wall. $\times 200$. 5. Parenchymatous cells of septae. $\times 200$. 6. Part of fruit wall magnified. $\times 200$.

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very small central core, measuring 300 μ in size. The tissue of the central core is not showing good preservation and hence its anatomical details are not clear. Size and shape of the fruit in T.S. and L.S. (Pl. 1, Figs. 4 & 5) being same, it looks more or less spherical, flat or pressed, measuring 7.5 to 8 mm. long and 11 mm. wide. The fruit wall is wavy in T.S. with ten prominent ridges and ten furrows (Pl. 1, Figs. 1 & 4; Text-fig. 1). It is 145 μ to 290 μ thick and is made up of compactly arranged, thin walled, parenchymatous and thick-walled, sclerenchymatous cells (Pl. 1, Fig. 3; Text-fig. 6) with thin walled outer and inner limiting layers. The ten septae separating the ten chambers show more or less same tissue as in the fruit wall except that there is some soft tissue in between the two radial limiting layers (Text-fig. 4). This soft tissue (Text Fig. 5) of thin walled parenchymatous cells is broken down at places creating empty spaces (Pl. 1, Figs. 4 and 5; Text-fig. 1). The loculi are wide at the periphery and narrowing towards the centre, where a small axial tissue is indistinctly seen (Text-fig. 3). Septae are also wide and are dome shaped at the periphery as seen in the T.S. of the fruit (Pl. 1, Figs. 1 & 4; Text-fig. 1). These narrow down towards the centre. Vascular supply is clearly marked in the central core and in the septae. The ten vascular bundles are in a ring in the central core against the ten septae, (Pl. 1, Fig. 2; Text-fig. 3) supplying vascular traces to them and to the fruit wall. Each chamber of the fruit is 5.3 mm. long and 2 mm. broad at the periphery. It contains a single seed, 4 mm. long and 1.75 mm. broad and 7 mm. thick, occupying almost the whole chamber (Pl. 1, Fig. 4; Text-fig. 1). It is broad at the periphery and pointed at its micropylar end (Pl. 1, Fig. 7) towards the central core. The seed coat is 50 to 80 μ thick. Inside is endosperm (Pl. 1, Fig. 6), cells of which are preserved at places. They are parenchymatous and compactly arranged (Pl. 1, Fig. 1; Text-fig. 2). Embryo is not clear.

DISCUSSION

In the serial study of the fruit, it is observed that the fruit wall is not continuous but ruptured at places (Pl. 1, Figs. 1 & 4; Text-fig. 1). These ruptures are

seen in the fruit wall against the septae. Further study of the serial sections show that these ruptures later disappear and the fruit wall becomes continuous. This means that the fruit shows dehiscence only at the apical portion, whereas it is complete otherwise. Thus, the fruit is a ten locular capsule showing splits at its top against the septae suggesting septicial dehiscence. The whole form and appearance of the fruit looks like a schizocarp of one seeded mericarps. Such fruits are frequent in Malvaceae.

Hence, comparisons are made with the various fruits of this family. Morphological resemblances are seen with the schizocarps of *Malva parsiflora*, *Malva sylvestris*, *Sida rhombifolia* and *Sida cordifolia* which are ten carpellary schizocarps with one seeded mericarps (Cook, 1958).

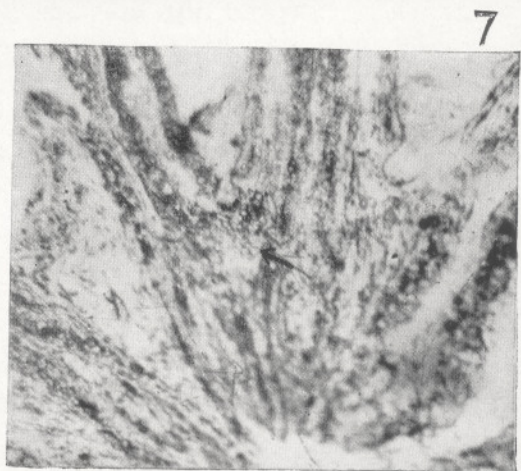
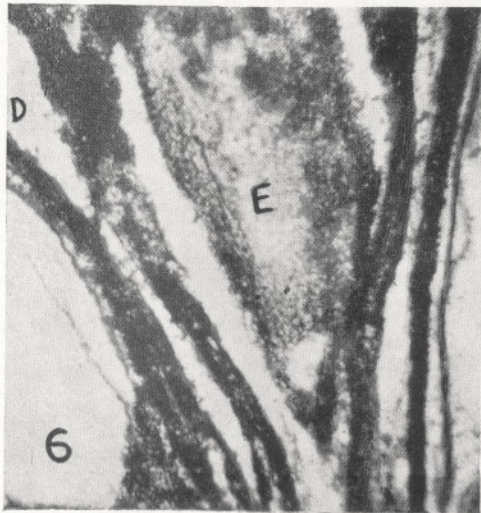
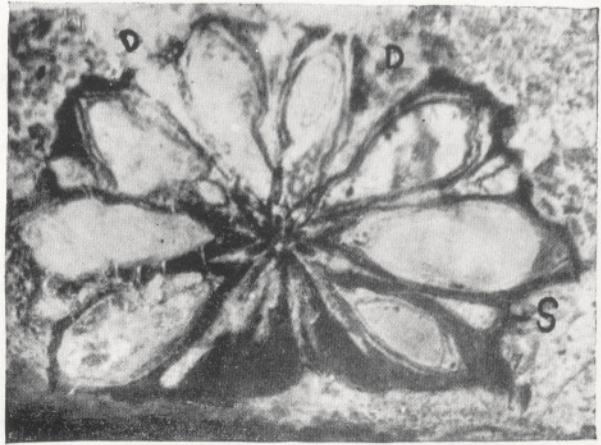
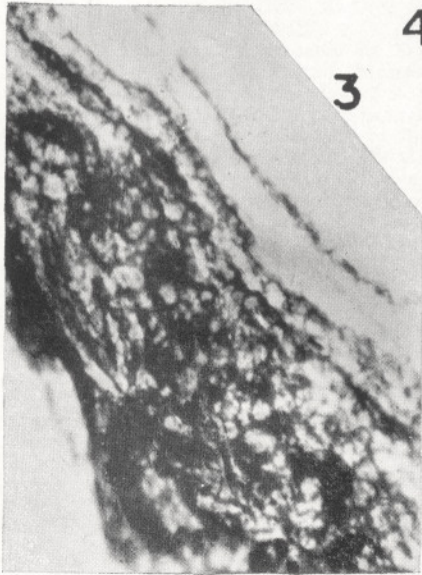
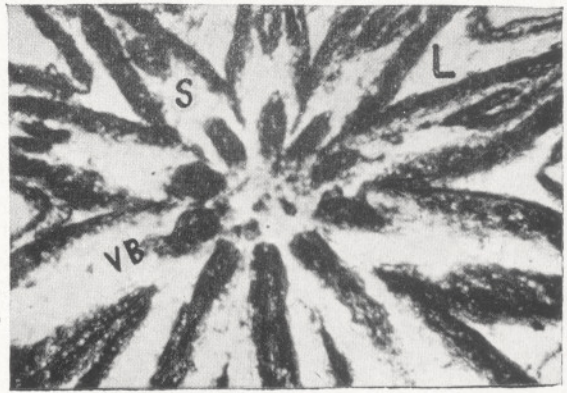
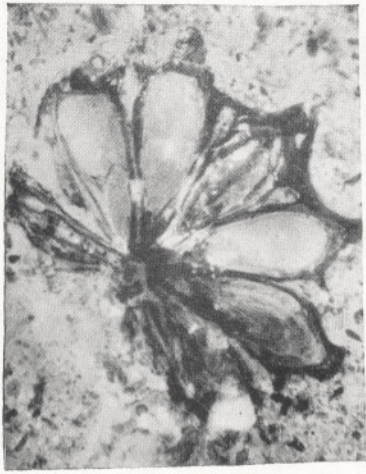
Freshly cut fruits of *Malvastrum*, *Sida* and *Abutilon* are also studied for comparisons. *Abutilon indicum* differs from the fossil specimen in having 15 carpels and 3 small seeds in each loculus. Structure of the septae is also different. *Sida acuta* differs from the present fruit in having 5 carpels which are loosely arranged. It also differs in fruit size. However, the only similarity is in having a single seed in each loculus. *Malvastrum* has 13 loculi with a single seed in each, completely filling the loculus.

Schizocarpic fruit are also found in Umbelliferae. However, there the fruits are cremocarps consisting of two indehiscent carpels, which condition is not seen in the present fruit. Also the oil glands present in the wall of umbelliferous fruits are wanting in our fruit.

As is the case with the other fruits from the Deccan Intertrappean beds of Mohgaonkalan, the present fruit too is difficult to identify. At the most it can be placed for the present under the family Malvaceae, because of the similarity in general characters. However, further comparisons being incomplete a new extinct genus *Dabercarbon* is created for this petrified fruit. The generic name is after Prof. Rudolf Daber of the Humboldt University, East Berlin. Specific name *D. gehardii* is after Prof. G. O. W. Kremp of the Geo-Sciences Laboratory of the Arizona University.

Diagnosis of the Genus *Dabercarbon*, gen. nov. Chitale & Sheikh

Fruit a schizocarp, ten or more locular, loculus with a single seed,



**Diagnosis of the Species *D. gerhardii*,
sp. nov. Chitale & Sheikh**

Fruit spherical and flat, 7.5 to 8 mm. long and 11 mm. wide, ribbed with ten ridges and furrows. Fruit wall 145 to 200 μ thick, parenchymatous with few sclerenchymatous cells; outer and inner epidermis seen. Septae ten, separating the ten loculi with a single seed in each loculus. Each septum splitting at top of fruit. Vascular bundles ten in a ring in the central core, each against the septum. Loculus 2 mm.

broad and 5.3 mm. long. Seed 4 mm. long and 1.75 mm. broad at the broadest part and 7 mm. thick, completely filling the loculus; seed coat 50 to 80 μ thick; endosperm parenchymatous; embryo not seen.

Holotype — 5 Dn/Sh Dept. of Botany, Institute of Science, Nagpur.

Locality — Mohgaonkalan.

Horizon — Deccan Intertrappean Series of India.

Age — ? Upper-most Cretaceous.

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EXPLANATION OF PLATE 1

Daberocarpon gerhardii — A ten locular fruit

1. Fruit as exposed on a piece of rock. $\times 6$.
2. T.S. Central core to show ten vascular bundles and ten loculi — S... Septum; L... Loculus; VB — Vascular bundle. $\times 30$.
3. Pericarp showing parenchyma and sclerenchyma. $\times 100$.
4. T.S. Fruit showing loculus — L, Dehiscence — D and central core — C. $\times 8$.
5. Part of Fruit in L.S.—. $\times 6$.
6. T.S. Seed showing Endosperm — E, Dehiscence — D. $\times 30$.
7. T.S. Fruit showing micropylar end near central core. $\times 20$.