

HARRISOCARPON SAHNII GEN. ET SP. NOV. FROM THE DECCAN INTER-TRAPPEAN BEDS OF MOHGAON-KALAN, DISTRICT CHHINDWARA

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ABSTRACT

A new petrified dicotyledonous pentalocular capsular fruit is described in this paper from seven specimens collected from the Deccan Intertrappean beds of Mohgaon Kalan, India. The fruit is small, barrel-shaped, measuring 6×4 mm with a short stalk and two whorls of appendages at its base. The five loculi bear two seeds in each, one above the other in a vertical row. The seeds are attached to the central short placenta. Resemblances are shown to *Abutilon* like fruits of Malvaceae.

INTRODUCTION

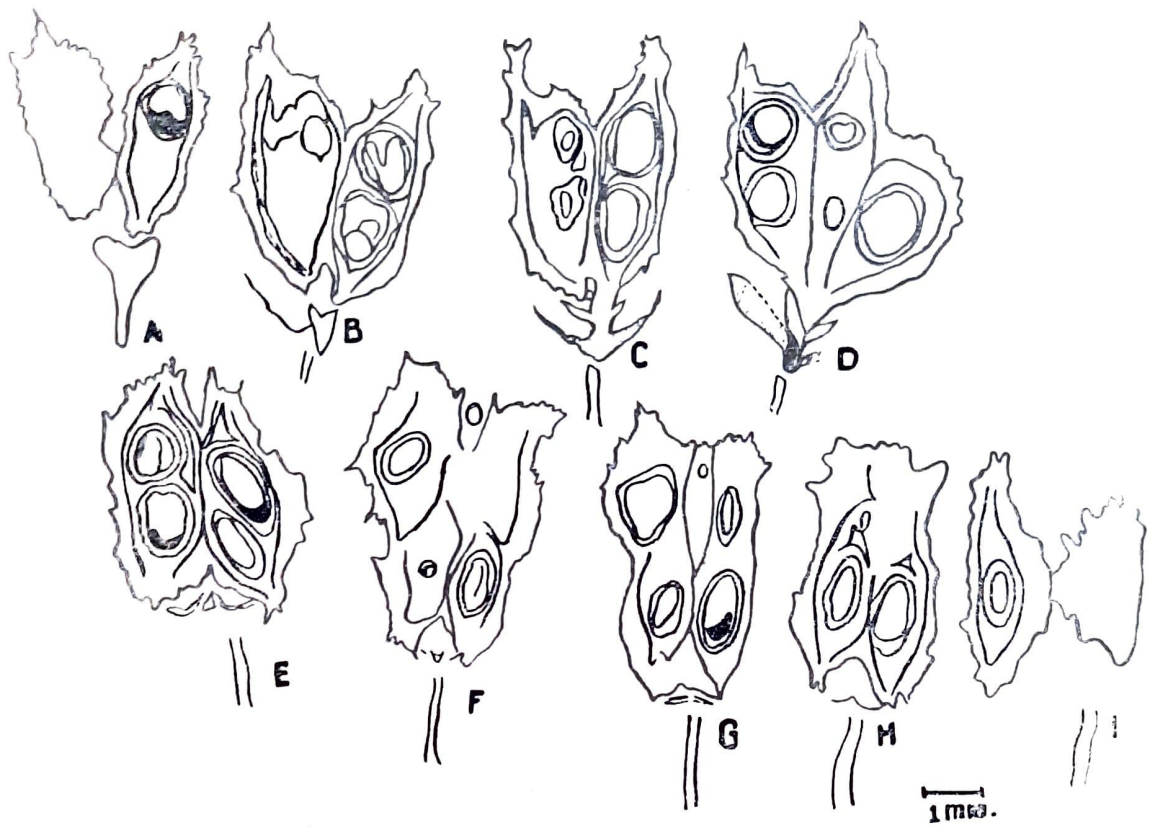
A new petrified dicotyledonous fruit is described in detail in this paper. Earlier, only a short account of the same was given by us (CHITALEY & NAMBU DIRI, 1968). As a matter of fact, petrified fruits are of rare occurrence. So far, only two dicotyledonous fruits are known from the Deccan Intertrappean beds of India. They are *Enigmocarpon parijae* (SAHNI, 1943) and *Indocarpa intertrappea* (JAIN, 1964). Both are capsules. The present fruit forms an important addition to the knowledge of the fruits preserved in these beds.

MATERIAL AND METHODS

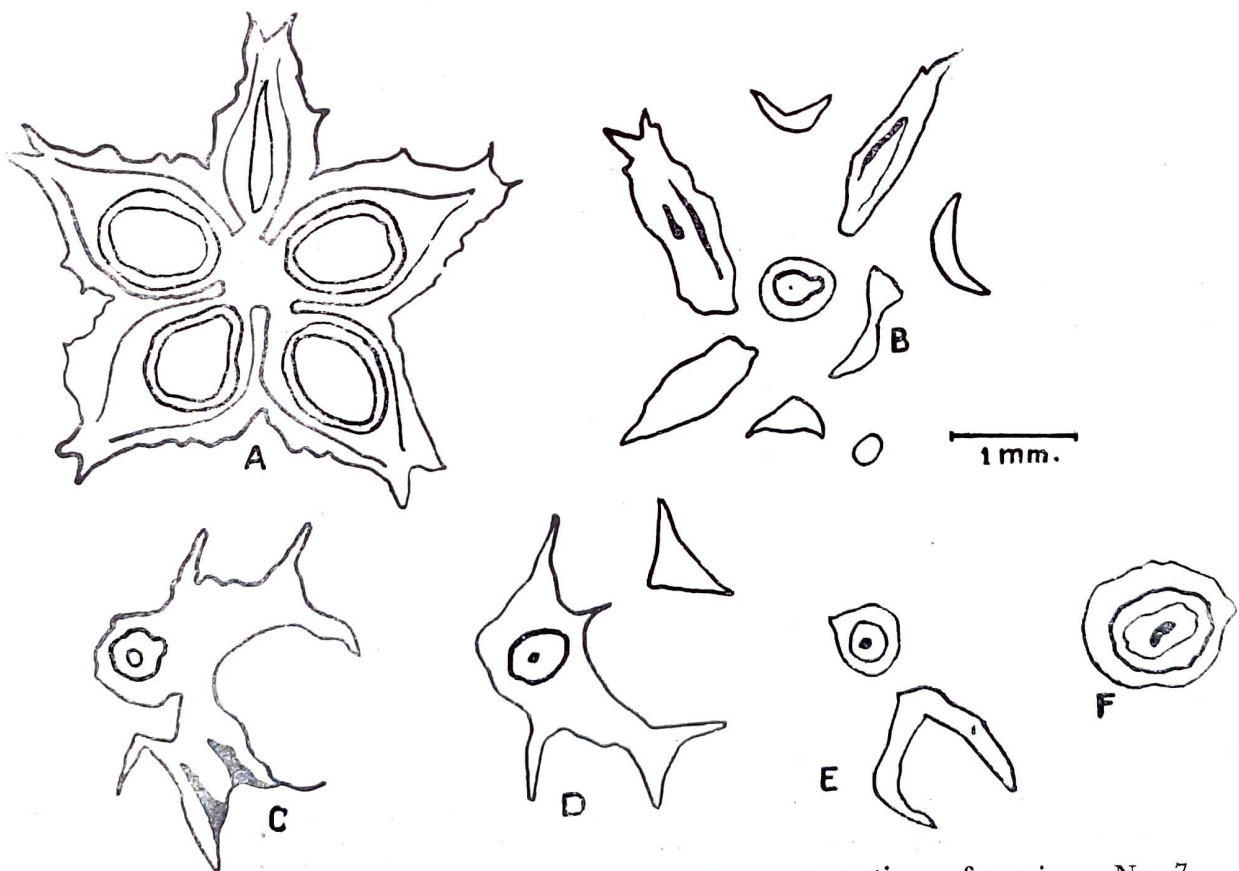
Seven specimens of the fruit were collected by the junior author in December 1965 from a fossiliferous bed near Mohgaon Kalan, Chhindwara district, M. P., India. They were exposed in transverse and longitudinal planes, with counter-parts available in some. Serial sections along all possible planes were taken for the study.

DESCRIPTION

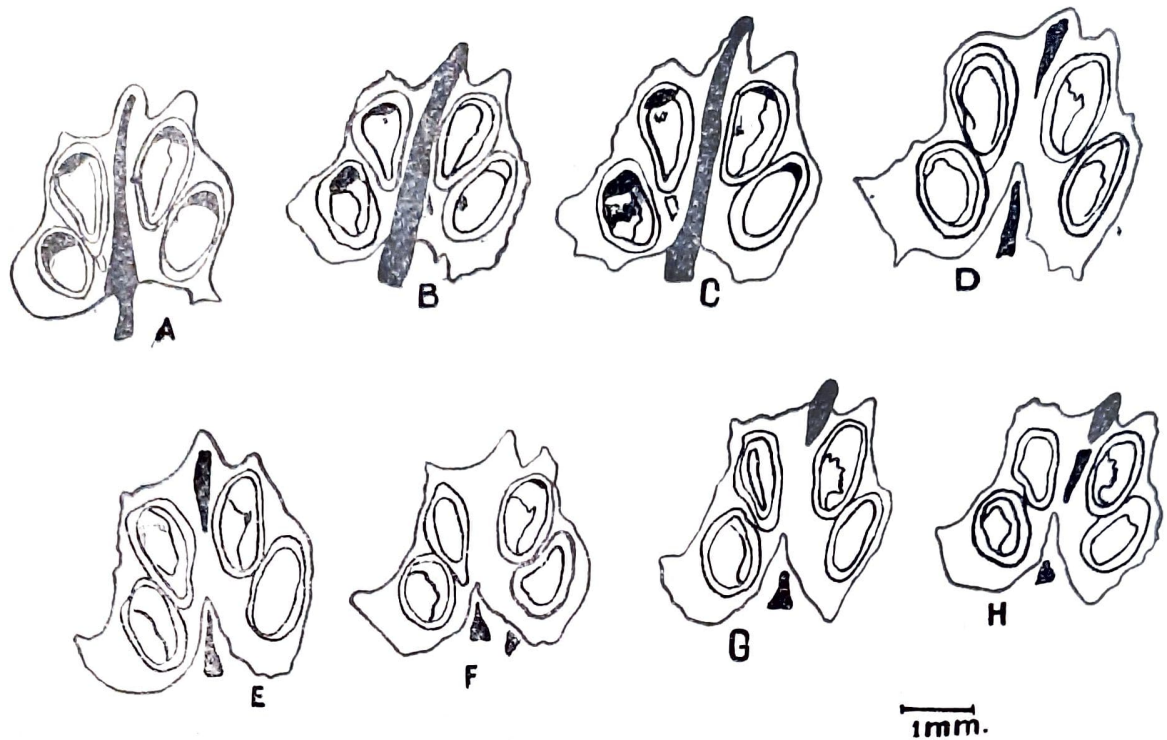
All the seven specimens are alike. Three better preserved ones were cut serially along transverse (Text-fig. 2, A-F) and longitudinal planes (Text-figs. 1 and 3) respectively. Description of the fruit is based mainly on the study of these. The other four specimens also helped in the description. The fruit is pentalocular and penta-ribbed, barrel-shaped, measuring 4.3 mm. to 6 mm. long and 4 mm. to 6 mm. broad at the broadest part (Pl. 1, Figs. 1, 2 and 5). It is slightly narrowed at the base. Each loculus contains two large seeds, one above the other, in a vertical row. They are dicotyledonous, endospermic and anatropous with radicle and plumule present. There is a central axis 1 mm. long connecting the five septae of the five loculi (Pl. 1, Fig. 5). The base of the fruit shows a very short stalk 2 mm. in length, bearing the whorls of appendages, each of five members alternating with each other. (Text-fig. 1 A-D).



Text-fig. 1—*Harrisocarpon sahnii*. A—I, Serial Longitudinal sections of specimen No. 6.



Text-fig. 2—*Harrisocarpon sahnii*. A—F, Serial transverse sections of specimen No. 7.



Text-fig. 3—*Harrisocarpon sahnii*. A—H. Serial longitudinal sections of specimen No. 4.

STRUCTURAL DETAILS

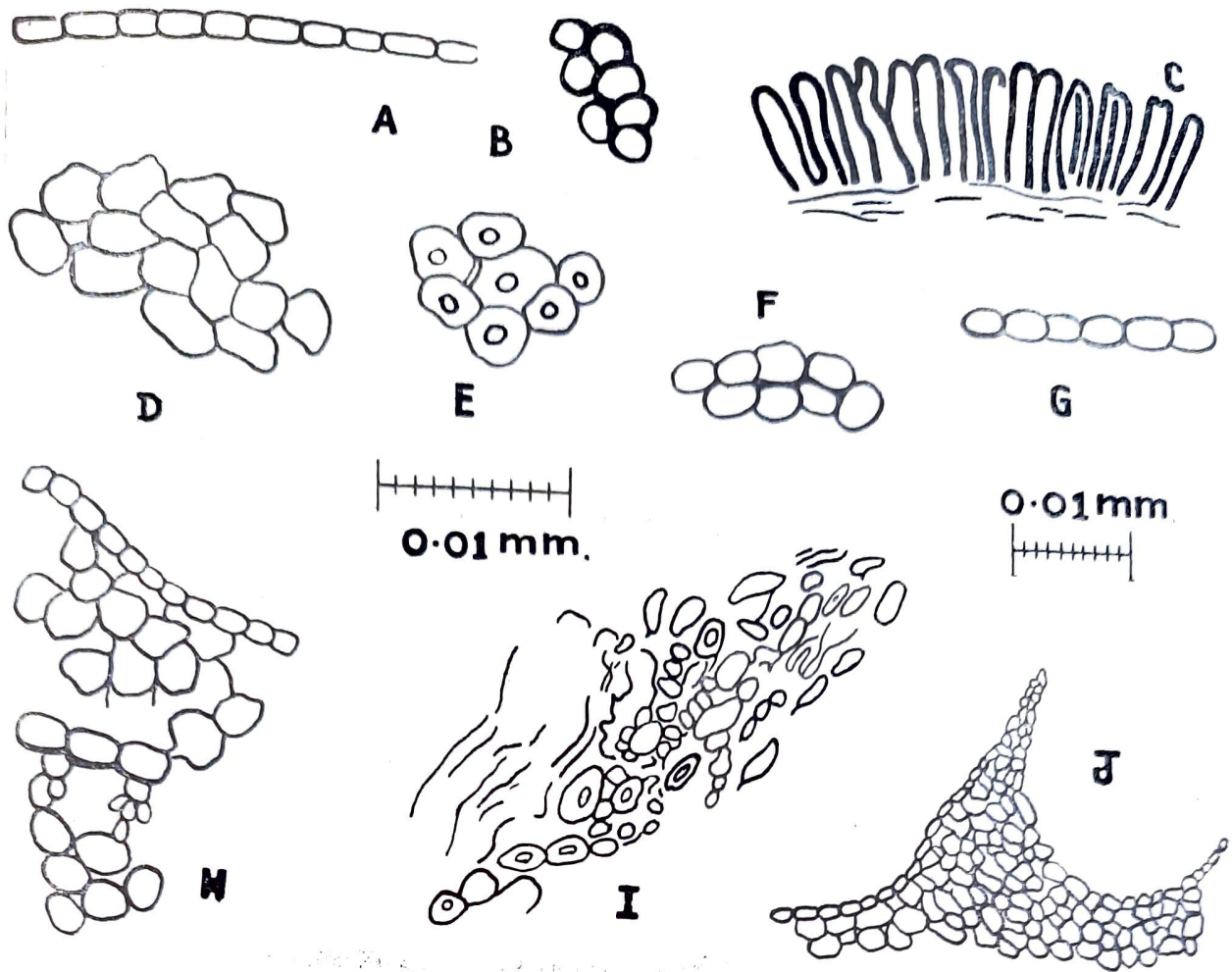
Appendages—In the transverse sections of the fruit, around the stalk, two whorls of five appendages each, are very clear, the members of which are alternating with each other. Members of the inner whorl are shorter than those of the outer one and are slightly fused with each other at the base of the fruit. Each appendage of the inner whorl in l.s. is $250\ \mu$ long showing a single layer of rectangular cells. In t. s. each is broad in the centre about $116\ \mu$., tapering at both sides. The outer appendages which are united at the base, are $364\ \mu$ long in l.s. and $11\text{--}21\ \mu$ thick in t.s. showing many layers of polygonal cells. Appendages of this whorl are more or less horizontally spread.

Fruit Stalk—(Text-figs. 1 & 4, H). Longitudinal section of the fruit shows a short stalk. It is in continuation with the axis and shows an epidermis of a single layer of rectangular cells, each $10\ \mu$ in diameter, without any cuticle. It is followed by a badly preserved cortex made up of 4-5 layers of thin walled roundish cells with small inter-cellular spaces. These cells vary in diameter from 9 to $26\ \mu$ each. Endodermis is single layered, composed of cells with outer and tangential walls thickened. Each cell of endodermis is $12\ \mu$ in diameter. A few vessel-like elements—very small and round—are seen around a small central pith. Parenchymatous cells, $26\ \mu$ each in t.s. with intercellular spaces are present in the pith.

Fruit axis—The centre of the fruit has a short axis-like structure only at the base. It shows a few parenchymatous cells, fibres and vessels (Pl. 1, Fig. 6).

T. S. through the middle region of the fruit—It shows five ridges and five furrows. The single layered epidermis (Text-fig. 4, A & B) of rectangular cells shows multi-cellular, scaly hairs, composed of thin-walled polygonal cells (Text-fig. 4, J). In addition, glands are also present. The rest of the portion of the pericarp is of polygonal to round parenchymatous cells with inter-cellular spaces (Text-fig. 4, D).

The five septae separating the five loculi are wide at the centre of the fruit. The cells of the septae are thin-walled and polygonal (Text-fig. 4, D). Central portion of the fruit is hollow, not having any cells. (Pl. 1, Fig. 2).



Text-fig. 4—*Harrisocarpon sahnii*. A, Epidermal cells of fruit wall in t. s.; B, Epidermal cells of fruit wall in surface view; C, Middle zone of seed coat; D, Cells from septum and fruit wall; E, Surface view of cells from middle region of seed coat; F, Cells from inner zone of seed coat; G, Cells from outer zone of seed coat; H, Part of t. s. stalk; I, Part of chalaza; J, Scaly hairs.

Each loculus shows in t.s. a single seed almost filling the whole loculus (Pl. 1, Fig. 2). The seed is round and of 1 to 1.5 mm in diameter. The thick seed coat is differentiated into three regions (Pl. 1, Fig. 3), the outer of a single layer of polygonal cells, (Text-fig. 4, G), the middle 2-3 layers of highly thick-walled elongated cells (Text-fig. 4, C & E) and the inner single layer of roundish cells (Fig. 4 F). Each seed in l.s. shows a slightly elongated stalk at its narrow end. This stalk is attached to the central axis near the fruit base. The cellular details of the stalk are not very clear. At places only a few polygonal, thin-walled parenchymatous cells with a few thick-walled fibres are seen. Endosperm is present in the seed. It is of two layers of parenchymatous cells. The rest of the portion of seed is filled with the two cotyledons and an embryo axis (Pl. 1, Fig. 4). The cotyledons show the outer lining of thin-walled cells. The 450 μ long embryo axis shows an expanded plumule and a short radicle towards the narrow end of the seed. Its broad end is away from the central axis and shows a cap-like chalaza (Pl. 1, Figs. 1, and 5, Text-figs. 4 3 A-C,1).

T. S. through the basal region of the fruit—Structure of the pericarp is similar to that of the middle region. The five septae fuse with each other as well as with the central axis of thin-walled parenchymatous cells. No fibres are seen and seeds are not exposed in this basal region of the fruit.

DISCUSSION

The description of the fruit reveals that it is a dicotyledonous, endospermic, pentalocular fruit. There are many families sharing characters in common with the fruit. These families are Ebenaceae, Sapotaceae, Sarraceniaceae Oxalidaceae, Rutaceae, Simarubaceae, Malvaceae and Tiliaceae. Amongst them, only Malvaceae has more characters similar to the present fruit. Among the members of this family, *Abutilon* has such fruits. The common characters are the pentalocular barrel-shaped hairy fruit with loculi almost separated from each other from periphery inwards, except at the base, where they are fused. Axis is also short in both, where the separated loculi are attached, leaving a hollow centre at the top. Appendages are persistent. Nevertheless, there are many differences between the two in the size and the structure of the fruit wall and the number and the structure of the seeds. Freshly cut sections of different fruits of the above families were studied for comparison.

The only fossil fruit comparable with the present one is *Pondicherria ebenaliodia* described by SAHNI (1933). This fruit is pentalocular like the present one, but differs from it in having a thick pericarp, a single seed in each loculus, and a long axis. It is also much larger in size.

Comparisons not being complete with any of the fossil and living fruits, the present fruit from the Deccan Intertrappean beds is named *Harrisocarpon sahnii* gen. et sp. nov. The generic name is after the veteran Palaeobotanist Prof. T. M. Harris of the University of Reading, England and the specific name being after the renowned Indian Palaeobotanist, late Prof. Birbal Sahni.

DIAGNOSES

Harrisocarpon gen. nov.

Type Species—*Harrisocarpon sahnii* gen. et sp. nov.

Fruit a dicotyledonous, pentalocular, septiçidal capsule. Each loculus with two endospermic seeds in a row, one above the other, attached to a short, central axis. Two whorls of appendages present at the base of the fruit.

Harrisocarpon sahnii sp. nov.

Fruit stalk short, bearing two whorls of alternately placed appendages of five members each. Appendages of outer whorl longer than the inner one.

Fruit—barrel-shaped, 4.3 mm to 6 mm long and 4 to 6 mm broad, with five ridges and five furrows running longitudinally. *Pericarp* 310 to 470 μ thick of thin-walled, parenchymatous cells with intercellular spaces; multi-cellular multiseriate scaly hairs, each 30 μ long, present on fruit wall. Five loculi of fruit almost separated from each other except at the base where attached to the central short axis of 1 mm length. Each loculus containing two large, oval flattish seeds, one above the other in a row. *Seeds* 700 μ in diameter, anatropous; seed coat differentiated into an outer, middle and inner zones, outer and inner zones of parenchymatous, polygonal cells, middle region of 2-3 layers of thick-walled parenchymatous, elongated cells, with pits on their walls. *Endosperm* present. *Cotyledons* two, with embryo axis showing expanded plumule and pointed radicle.

Holotype—Moh/13 N

Syntypes—Moh/14—19/N,

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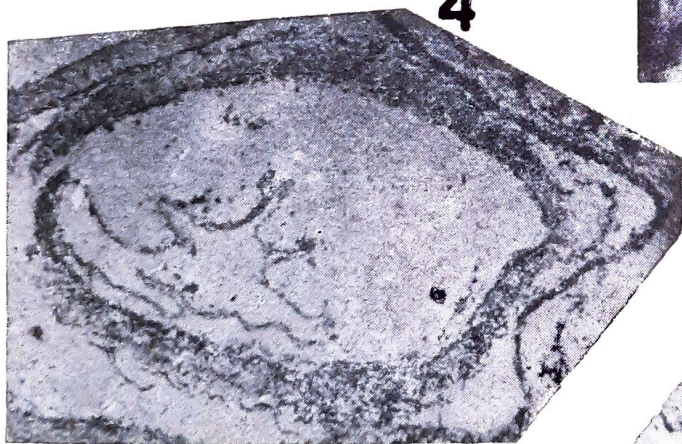
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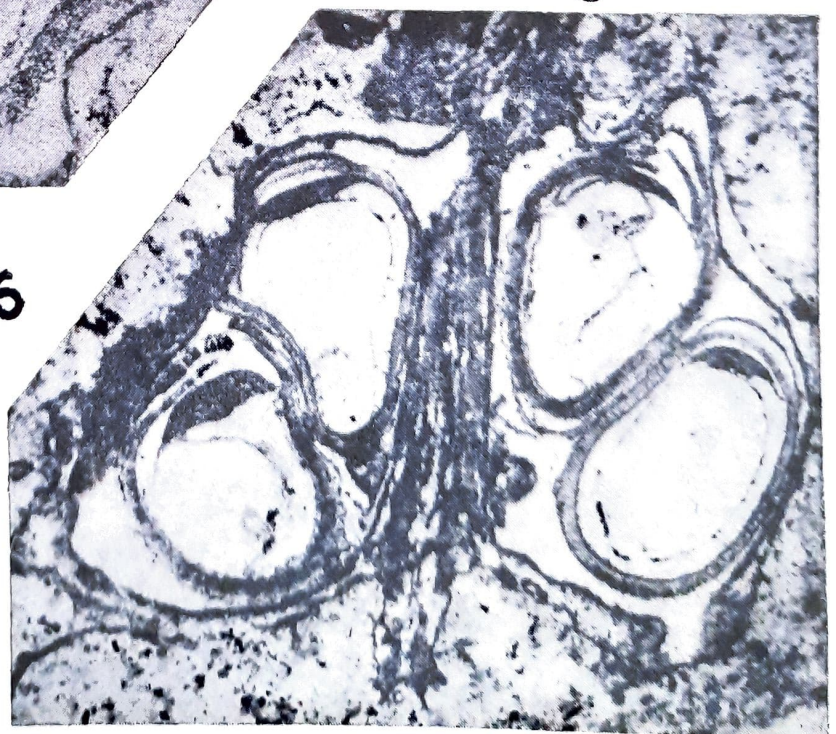
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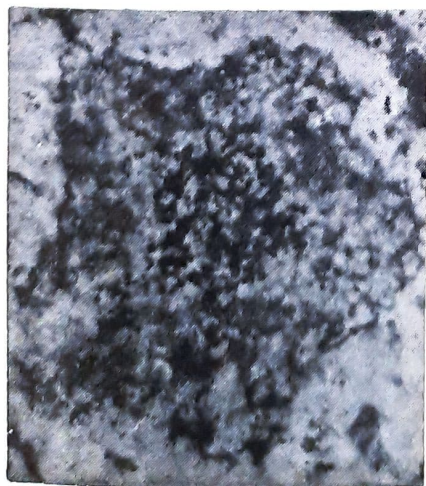
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5



6



Locality—Mohgaon Kalan, Chhindwara Dist., India.

Horizon—Deccan Intertrappean Series.

Age—? Uppermost Cretaceous.

ACKNOWLEDGMENTS

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EXPLANATION OF PLATE 1

Harrisocarpon sahnii gen. et sp. nov.

1. L. S. fruit showing two seeds in each loculus— $\times 10$.
2. T. S. fruit showing five loculi— $\times 10$.
3. Seed coat in t. s.— $\times 80$.
4. Seed in loculus showing embryo— $\times 25$.
5. L. S. fruit showing central axis— $\times 15$.
6. T. S. fruit axis— $\times 80$.