

# *Loganiocarpon deccanensis* gen. et sp. nov., a bilocular capsular fruit from Deccan Intertrappean Beds of Mohgaonkalan, Madhya Pradesh, India

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## ABSTRACT

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A petrified, bilocular capsular fruit, *Loganiocarpon deccanensis* gen. et sp. nov., has been described from the Deccan Intertrappean Beds of Mohgaonkalan, Chhindwara District, Madhya Pradesh. The fruit is well preserved to reveal its anatomical details, showing close affinity to the family Loganiaceae.

**Key-words:** *Loganiocarpon deccanensis* gen. et sp. nov., dicotyledonous fossil fruit, Loganiaceae, Intertrappean beds, Mohgaonkalan, Madhya Pradesh.

## INTRODUCTION

A number of petrified, capsular fruit genera have so far been described from the Deccan Intertrappean beds of India. These are: *Enigmocarpon parijai* Sahni 1943, *Indocarpa intertrappea* Jain 1964, *Harrisocarpon sahnii* Chitale & Nambudiri 1973, *Sahniocarpon harrisii* Chitale & Patil 1973, *Daberocarpon gerhardii* Chitale & Sheikh 1973, *Deccanocarpon arnoldii* Paradkar 1975 and *Wingospermocarpon mohgaonense* Sheikh & Kapgate 1984.

## MATERIAL AND METHOD

The chert, containing the fossil fruit specimen,

was collected from the Deccan Intertrappean beds of Mohgaonkalan in Chhindwara District, Madhya Pradesh. After breaking the chert, the fossil fruit was found obliquely exposed in longitudinal section. The serial sections were taken by peel method for detailed anatomical studies.

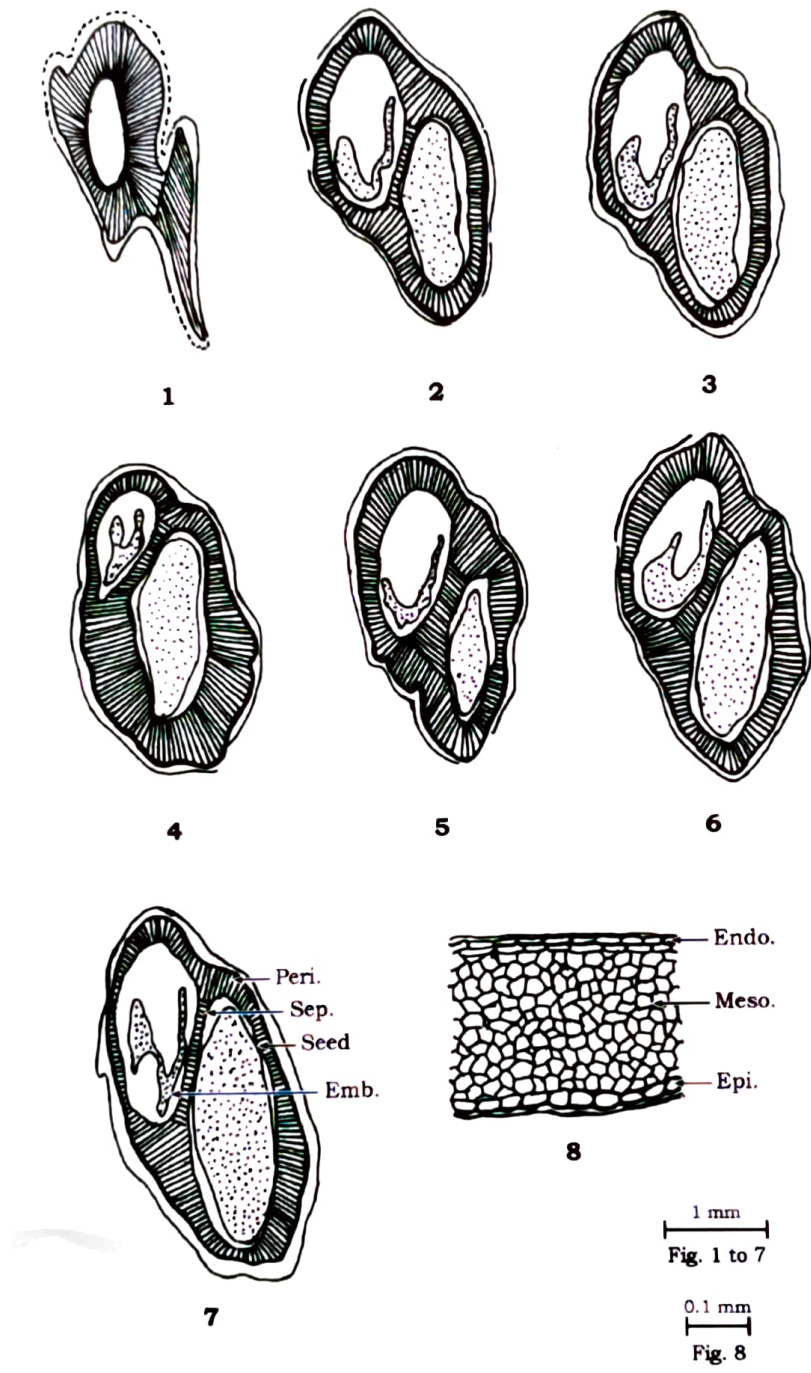
## SYSTEMATIC DESCRIPTION

**Order:** Gentianales

**Family:** Loganiaceae

**Genus:** *Loganiocarpon* P. S. Kokate, E. V. Upadhye & D. G. Bhadange, gen. nov.

**Type species:** *Loganiocarpon deccanensis* gen. et sp. nov.



**Text-figures 1-8.** *Loganiocarpum deccanensis* gen. et sp. nov. 1-6. Serial sections, L.S. of fruit showing bilocular structure. 7. L.S. of fruit showing pericarp (Peri.), septum (Sep.), seed and embryo (Emb.). 8. L.S. of fruit wall showing cellular details of endocarp (Endo.), mesocarp (Meso.) and epicarp (Epi.).

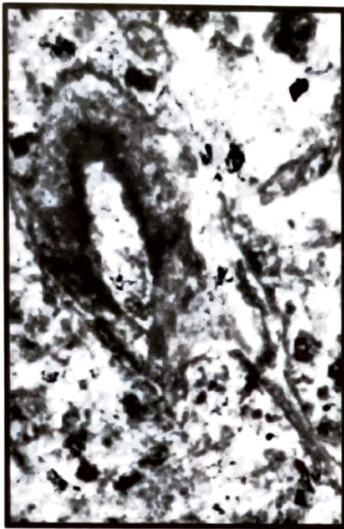
**Generic diagnosis:** Fruit dicotyledonous, bilocular, septicidal capsule with single seed, vertically placed in each locule, placentation axile, seed coat not well differentiated, embryo with two

cotyledons, endosperm not seen.

**Etymology:** The generic name indicates affinity of fossil fruit with family Loganiaceae.

**Plate 1**

1-8. *Loganiocarpum deccanensis* gen. et sp. nov. 1-6. Serial sections, L.S. of bilocular fruit showing solitary seed in each locule, x40. 7. L.S. of fruit showing septum and embryo, x100. 8. L.S. of fruit showing structure of fruit wall, x400.



1



2



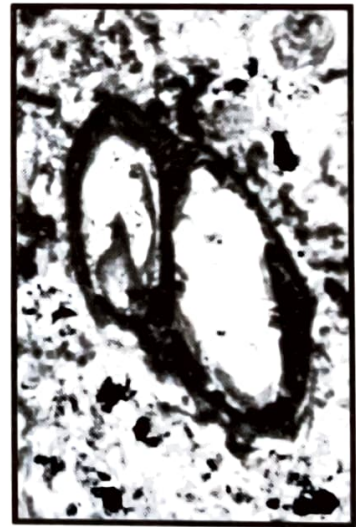
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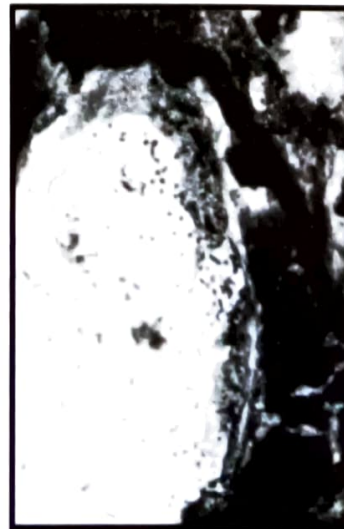
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6



7



8

Plate 1

***Loganiocarpum deccanensis* P. S. Kokate, E. V. Upadhye & D. G. Bhadange gen. et sp. nov.**

Plate 1, figures 1-8, Text-figures 1-8

**Holotype:** Specimen no. MOH/PSK/DICOT FRUIT-V, stored at the Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Akola.

**Locality:** Mohgaonkalan, Chhindwara District, Madhya Pradesh, India.

**Horizon and age:** Deccan Intertrappean Series, Early Eocene.

**Diagnosis:** Fruit bilocular capsule, broad, compressed, measuring 2.99 x 1.57 mm, bivalved, valves separated by partition wall. Solitary seed in each locule, measuring 1.9 mm x 629  $\mu$ m. Pericarp (293  $\mu$ m thick) differentiated into epicarp (32  $\mu$ m thick), mesocarp (222  $\mu$ m thick) and endocarp (39  $\mu$ m thick); mesocarp cells parenchymatous, compactly arranged, measuring 44 x 37  $\mu$ m. Vasculature not seen. Seed oval and compressed, separated by partition wall. Embryo with two cotyledons, measuring 555-925  $\mu$ m in length. Radicle and plumule not very clear. Endosperm not seen.

**Description:** Fruit bilocular, 2.99 x 1.57 mm in size. In longitudinal section, it is seen bilocular with single seed in each locule (Plate 1, figures 1-6, Text-figures 1-7). In serial sections, it shows presence of elongated, curved, horn-like structure (Plate 1, figure 1, Text-figure 1). The specimen is preserved in such a way that serial sections are in oblique plane. It is a dicotyledonous, loculicidal capsule fruit having two locules, which are not exactly at the same level (Plate 1, figure 6, Text-figure 7). The fruit wall (pericarp) is dry, smooth, without any scales or hairs and measures 293  $\mu$ m in thickness. In transection, it is seen as 10-12 cells thick layer and is roughly divisible into 3 zones. The outer zone (epicarp) is thin and ill-preserved. The middle zone (mesocarp) is prominent, well preserved and is 8-9 cells (222  $\mu$ m) thick. Mesocarp cells are thick walled, parenchymatous, angular in shape and compactly arranged and measure 44 x 33  $\mu$ m and without lacunae or air spaces. The

innermost zone (endocarp) is 39  $\mu$ m in thickness and consists of 2-3 layers of somewhat elongated and thick walled cells (Plate 1, figure 7, Text-figure 8). Vasculature is not seen. Locules are separated by thin partition wall, which is made up of thin walled parenchymatous cells (Plate 1, figures 6-7, Text-figure 7). Seeds, solitary in each locule, oblong, flattened and compressed with rounded ends (Plate 1, figures 5-6, Text-figure 7). Each seed measures 1.9 mm x 629  $\mu$ m. Placentation might be axile. Seed coat thin, made up of thin walled cells, not well differentiated into testa and tegmen, adherent with endocarp. Inside each seed is present dicotyledonous embryo consisting of two large cotyledons. In one seed, cotyledons are with finger like projections measuring 555 to 925  $\mu$ m in length (Plate 1, figure 6-7, Text-figure 7). They show one layered epidermis of polygonal cells. Plumule not clearly seen. Radicle directed towards the central axis (Text-figure 5). The other seed is not mature having nucellus tissue measuring 1.739 mm x 592  $\mu$ m (Plate 1, figure 8, Text-figure 7). Since embryo fills the entire seed cavity, endosperm tissue is not seen.

**Etymology:** The epithet refers to the Deccan Intertrappean Series, from where the fruit specimen was collected.

## COMPARISON

**Comparison with fossil fruits:** The structure of fossil fruit is distinctly different from all the previously described fossil fruits. *Enigmocarpum parijai* Sahni 1943 differs from the present fruit in having two rows of seeds in each locule. *Indocarpa intertrappea* Jain 1964 is tetralocular capsule with fleshy testa which is not observed in present fruit. *Harrisocarpum sahnii* Chitaley & Nambudiri 1973 and *Sahnioarpum harrisii* Chitaley & Patil 1973 show pentalocular condition and are loculicidal capsules. *Harrisocarpum sahnii* has two seed in each locule and therefore is distinctly different from the present fruit. In *Daberocarpum gerhardii* Chitaley & Sheikh 1973 differs from the present fruit in having presence of ten locules but resembles in having single seed in each locule.

*Deccanocarpon arnoldii* Paradkar 1975 has eight-locular capsule and therefore it is different in number of locules. It is therefore evident that the present specimen is not identical to any fossil fruit.

**Comparison with modern fruits:** There are a few dicotyledonous families, from series Bicarpellate, which share characters with the present fruit. Of them, families having bilocular capsular fruits with solitary seeds are: Gentianaceae, Oleaceae and Loganiaceae. Some families having bilocular fruits, but drupaceous in nature, do not resemble with the present fruit specimen. Fruit of family Gentianaceae, having bilocular septicidal capsule, differs in not having parietal placentae. Fruits of family Oleaceae are capsular, loculicidally two-valved with seeds solitary or two in each cell, erect or pendulous with thin testa resembling with present fossil fruits, but differ in size and shape. The fruits in the family Loganiaceae are capsular with one to many seeds. Seeds are many in number and embryo usually straight. The present fossil fruit is compared with the genus *Buddleia* Linn. and *Mitreola* Linn. of the same family. It was observed that these genera share most of the characters but differ in having numerous small seeds in each locule. On comparing with the fruit of the genus *Mitrasacme* Labil. (Loganiaceae), it is found that it resembles

in having subglobose, ovoid capsule, usually compressed contrary to septum with two horn like structures at the apex. The present genus also differs in not having numerous seeds in each locule. The present fossil fruit shows close affinities with family Loganiaceae but does not resemble exactly with the fruits of any particular extant genus of the family. For this reason, the fossil fruit has been placed under family Loganiaceae.

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