

## A PETRIFIED BILOCULAR FRUIT FROM THE DECCAN INTERTRAPPEAN BEDS OF SINGHPUR, MADHYA PRADESH

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### ABSTRACT

The fruit *Verbenaceocarpon mahabalei* is small, ovoid to ellipsoidal in shape and 2.4 mm x 1.4 mm in size. The fruit is bilocular with one seed in each locule. Pericarp is differentiated into epicarp of 77 $\mu$  thick with compactly arranged parenchymatous cells and mesocarp of 182 $\mu$  in thickness with thick walled parenchymatous cells and air cavities. Endocarp is single layered, barrel shaped thin walled parenchymatous cells and measures 21  $\mu$  size. The two locules are more or less equal in size with upper locule 1.3 mm and lower locule 1.1 mm in diameter and a seed in each locule. The seed is exarillate, exalbuminous and bitegmic with embryo. After comparing the living and fossil specimen, the fruit showed a close resemblance with the family Verbenaceae. Hence for time being it is named as *Verbenaceocarpon mahabalei* gen. et sp. nov., the generic name is after the family Verbenaceae and specific name is after the eminent paleobotanist T. S. Mahabale.

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**No: of Figures 16**

**No: of References 18**

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## INTRODUCTION

The present paper deals with the petrified drupaceous fruit from the intertrappean beds of singhpur, Madhya Pradesh, India. The deccan intertrappean flora is rich in fossil Angiosperm.

The records of petrified fossil fruits are plenty. The dicot fruit described is either capsular or berry. *Enigmocarpon parijai* (Sahani, 1943), *Enigmocarpon sahani* (Chitale & Kate, 1977), *Indocarpa intertrappea* (Jain, 1964), *Sahnio-carpon harisi* (Chitale & Patil, 1973), *Harrisocarpon sahani* (Chitale & Nambudiri, 1968), *Daberocarpon gerherdi* (Chitale & Sheikh, 1973), *Deccancarpon arnoldi* (Paradkar, 1975), *Triloculocarpon mahabalii* (Kapgate, 1988) are some of the capsular fruit. *Kremocarpon aquatic* (Chitale & Kate, 1975), *Kremocarpon indicum* (Upadhye, 1979), *Centrospermocarpon chitaleyii* (Sheikh & Khubalkar, 1978), *Mohganocarpon eyedii* (Yawale, 1977), *Chitaleyocarpon deccanii* (Kumar, 1984) are some of the berries reported from the Deccan Intertrappean.

Beds of India. *Nautiyalocarpon singhpurii* (Juneja, 1993), *Erythroxylocarpon intertrappea* (Khubalkar, 1982), *Euphorbiocarpon drypetoids* (Mehrotra et al., 1983), *Biloculocarpon mohgaonse* (Yawale, 1975), *Biloculaire intertrappea* (Kate, 1974) are the drupaceous fruit reported from singhpur and mohgaonkalan locality.

## MATERIAL AND METHOD

A petrified fruit was preserved in a piece of chert. It was broken into part and counterpart. The material was etched with

hydrofluoric acid and serial peel sections were taken by usual peel method.

## RESULT AND DISCUSSION

The specimen is small, ovoid to ellipsoidal in shape and 2.4mm x 1.4mm in size (Plate 1, Figs. 1, 2, & 3; Text Figs. 1 to 6). The fruit is bilocular with one seed in each locule. Pericarp is distinctly differentiated into outer epicarp, middle mesocarp and inner endocarp (Plate 1, Fig. 1; Text Fig. 13). It is slightly wavy and measures 77 $\mu$  in thickness. It is made up of 2 to 3 layers of compactly arranged parenchymatous cells which are rounded to polygonal in shape (Plate 1, Fig. 7; Text Fig. 13). Individual cells measure 28 $\mu$  x 35 $\mu$  in size. It is the broadest zone of pericarp. It measures 182 $\mu$  in thickness. This layer is made up of thick walled parenchymatous cells which are polygonal in shape (Plate 1, Fig. 7; Text Fig. 6). In mesocarp small air cavities are present which measure about 63 $\mu$  to 42 $\mu$  x 49 $\mu$  to 28 $\mu$  in size (Plate 1, Fig. 7; Text Fig. 13). It is the inner most layer of pericarp and is made of a single layer barrel shaped thin walled parenchymatous cells (Plate 1, Figs. 6 & 7; Text Fig. 13). It is about 21 $\mu$  in thickness. The individual parenchymatous cells measure about 21 $\mu$  to 28 $\mu$  in

*Verbenaceocarpon mahabalei* gen. et sp. nov.

## Plate 1 Figs. 1 to 9

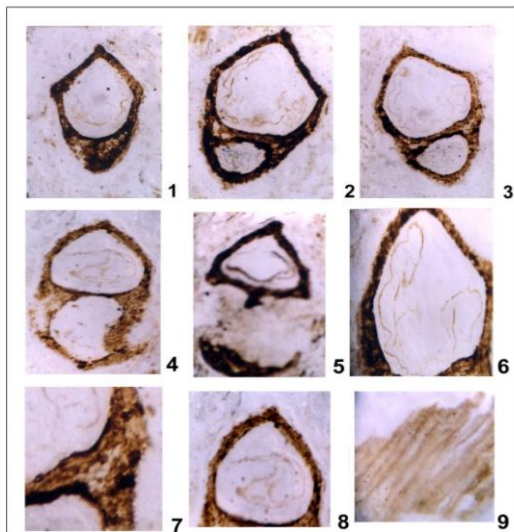
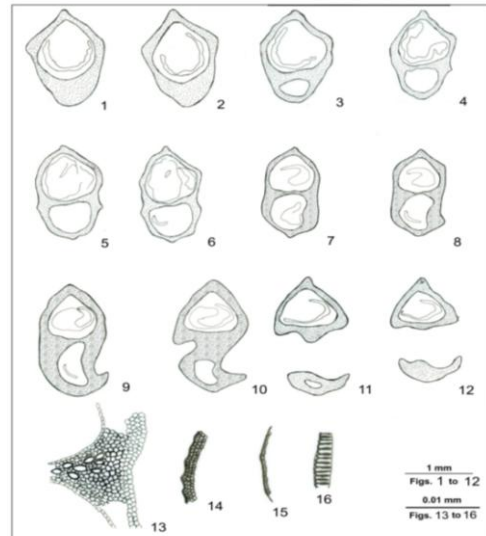


Plate **Fig.1**. T.S. of Fruit showing single locules **Figs. 2,3,& 4**. T.S. of Fruit showing two locules.**Fig. 5**. T.S. of Fruit showing second locule completel disappears. **Fig.6**. Magnified chamber showing large irregular seed.**Fig. 7**. Enlarged view of fruit wall showing air cavities in the mesocarp. **Fig. 8**. Magnified seed showing embryo.**Fig. 9**. Seed coat showing spiral thickening.

The two locules are more or less equal in size. But at places the upper locule is 1.3mm in diameter and lower locule is 1.1mm(Plate 1, **Fig. 3** ; Text **Figs. 3 to 7** ). Each locule contains a single seed attached parietally to the wall of the locule (Text **Fig. 6**).A single irregular shaped seed is present in each locule of the fruit(Plate 1, **Fig. 4**; Text **Figs. 6 to 9**). As the seeds are cut in oblique planes, their shape and size varies.

*Verbenaceocarpon mahabalei* gen. et sp. nov.

## Text Figs. 1 to 16



**Text Figs. 1 & 2**. T. S. fruit showing single locule with one seed. **Figs 3, 4 & 5**. T. S. fruit showing two locules with one seed in upper locule.**Figs. 6, 7, 8 & 9**. T. S. fruit showing two locules with two seeds in each locule. **Figs. 10, 11 & 12**. T. S. fruit showing second locule disappearing. **Fig. 13**. Fruit wall showing epicarp, mesocarp with small air cavities & endocarp. **Fig 14**. Seed coat with outer wall wavy & inner soft tissue. **Fig. 15**. Wall of embryo **Fig. 16**. Spiral thickenings in seed coat.

The smallest seed is almost elongated and measures  $14 \mu \times 11 \mu$  in size and the largest seed measures  $27 \mu \times 22 \mu$  in size. The seed is elongated with almost rounded end towards the periphery of the fruit and becomes narrow at the center(Plate 1, **Fig. 6**; Text **Figs. 1 to 8**). Seed coat is not clearly differentiated into testa and tegmen. But there is an indication of the presence of outer integument and inner integument (Text **Fig. 14**). The inner integument is made up of a soft tissue and the outer integument shows a pointed outgrowth on the outer side of the wall and is wavy in nature. The cells of the seedcoat shows

spiral vascular supply (Plate 1, **Fig. 9** ; Text **Fig. 16**).

### OBSERVATIONS

In the first section, the fruit appear unilocular with a irregular seed and three notches, one on upper side, second on left side and third on right side (plate-1, **Fig.1**; Text **Figs .1& 2**). From the second section second locule is exposed (Plate 1, Fig.2; Text **Fig. 3**). From the third section the second locule goes on increasing in size (Text **Fig.5**). From the sixth section the seed is seen in the second locule (Text **Figs. 6,7&8**). In subsequent sections, the second locule decreases in size (Plate 1, Figs. 4 & 5; Text Figs. 9 & 10) and in the last section the second locule completely disappears ( Plate1, Fig.5; Text Figs. 11 & 12) embryo.

Inside the seed cavity, thin parenchymatous cells are arranged which are irregular in shape (Plate 1, **Fig. 8** ; Text **Fig. 9** ). The cells of cotyledons are not clear. The cells of embryo are thin walled parenchymatous cells (Text **Fig. 15**).

The verifying characters of the fruit under report are drupaceous. The fossil drupe is bilocular with a single seed in each locule. Pericarp is differentiated into epicarp, mesocarp and endocarp. Small air cavities are present in the mesocarp. Seed are exalbuminous. For identification of the present petrified drupaceous fruit lead comparison is made with the recorded drupaceous fruit such as- *Nautiyalocarpon singhpurii* (Juneja,1993), the latter differs from the present fruit with a third empty chamber. *Erythroxylocarpon intertrappea* (Khubalkar,1982) is not comparable because of presence of indehiscent drupe. *Euphorbiocarpon drypetoids* (Mehrotra et

al., 1983) differs with a trilocular single seeded indehiscent drupe. *Biloculocarpon mohgaonse* (Yawale, 1975) is a bilocular drupe with canals arising from seed locules opening into mesocarp. Where as a fossil fruit is bilocular with single seed in each locule which is different from the present specimen. *Biloculaire intertrappea* (Kate,1974) differs in having schizocarpic fruit with a single large seed in each locule and oil or resin ducts are present in outer and inner zone.

The present fruit was also compared with the modern families – *Oleaceae*, *Verbenaceae*, *Tiliaceae*, *Zygophyllaceae*, *Olacaceae*.

The family verbenaceae resembles with the present specimen in having drupaceous, 2 locule and 1 seed in each locule, dry mesocarp, but differs in bony endocarp which is not present in fossil specimen. As the present fossil fruit shows some resemblance with the family Verbenaceae. It is kept under the genus Verbenaceocarpon, after the family Verbenaceae and under species mahabalei, after the eminent paleobotanist T.S. Mahabale as Verbenaceocarpon mahabalei gen. et sp. nov.

**Holotype** : 2 PF / Ang / Department of Botany, Institute of Science, Nagpur.

**Horizon** : Deccan Intertrappean Beds of India.

**Locality** : Singhpur, M.P., India.

**Age** : Most

**Probable** : Uppermost Cretaceous.

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