



A NEW PETRIFIED BILOCULAR CAPSULAR FRUIT *GENTIANACEOCARPONSINGHPURI* GEN. ET SP. NOV FROM THE DECCAN INTERTRAPPEAN BEDS OF SINGHPUR, M.P., INDIA.

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ABSTRACT:

The present petrified bilocular capsular fruit was collected from the locality of Singhpur of Chhindwara dist. M.P., India. It is stalked and formed from bicarpellary syncarpous, superior ovary with free central placentation. Fertile locule is large in size and incorporates single seed while sterile locule is small in size and is undeveloped. The present fossil fruit shows close affinities with the living family Gentianaceae.

KEYWORDS: Singhpur, Intertrappean, Bilocular Capsular Fruit.

INTRODUCTION:

The present investigation deals with the bilocular capsular fruit collected from the locality of Singhpur exposures. So far many capsular fruit have been reported from Deccan Intertrappean beds of India. Some notable ones are *Enigmocarponparijae* (Sahni, 1943), *Indocarpaintertrappea* (Jain, 1964), *Harrisocarpon sahnii* (Chitale & Nambudiri, 1973), *Sahnicarpon harrisii* (Chitale & Patil, 1972), *Daberoocarpon gerhardii* (Chitale & Sheikh, 1973), *Deccanocarpon arnoldii* (Paradkar & Dixit, 1975) and some bilocular fruits such as *Biloculaireintertrappea* (Kate, 1974), *Biloculocarpon intertrappea* (Yawale, 1975), *Oleaceocarpon nagpurensis* (Mahajan, 1987), *Mahabalecarpon deccani* (Sakundarwar, 1987), *Nautiyalocarpon singhpurii* (Juneja, 1993), *Schizocarpon aliformii* (Bhowal, 2002), *Bicarpelarocarpion singhpurii* (Bhowal, 2008) and *Rodeocarpon deccanii* (Saxena, 2004)

Present fruit is different from the above reported specimens and hence formed the matter of present investigation.

MATERIAL & METHOD

The black chert containing this fruit was collected from the locality of Singhpur of Chhindwaradist. M.P., India. The anatomical details were studied by etching the chert with hydrofluoric acid. The peel section were prepared without grinding the material and were studied a number of times to understand the morphology and anatomy of the fruit thoroughly. The fruit appeared in longitudinal plane. Unfortunately the counterpart is missing. The camera lucida sketches were drawn & the important stages were photographed.

DESCRIPTION

FRUIT MORPHOLOGY.

The longitudinal section of fruit shows bilocular capsule on well preserved stalk. Fruit is long & elongated, oblong in shape. Of the two locules, only one which is larger in size, incorporates a seed i.e. (Fertile locule) while the other one is smaller and is undeveloped i.e. (Sterile locule) theseed shows well

preserved dicotyledonous embryo. The whole fruit measures 4900 μ m in length and 1700 μ m in width. (Plate I, Fig 1 to 12 Text Fig 1 to 12)

FRUIT ANATOMY.

On the basis of anatomical study the present petrified capsular fruit is described in details under following heads:-

Pericarp: -It is dry, smooth and measures 175 μ m thick and differentiated into outer epicarp, middle mesocarp and inner endocarp. The outer epicarp is single layered composed of small, oval to elongated thick walled parenchymatous cells and measures 39 μ m in thickness. The middle mesocarp is multilayered consisting of thin walled parenchymatous cells, which are irregularly arranged and measures 101 μ m in thickness. The inner endocarp is two to three layered, consisting of thick walled parenchymatous cells, which are compactly arranged without any intercellular spaces showing some dark brown depositions and measures 29 μ m in thickness. (Plate II, Fig 17 Text Fig 15)

Locule: - The fruit consist of two locules (Chamber) separated by a septa. One is large fertile locule and another is small sterile locule. In longitudinal section, the sterile locule appears towards the apical portion of the fruit whereas the fertile locule present towards the basal portion of the fruit. Later on, the sterile locule starts disappearing & after some peel section sterile locule is totally absent and L.S of fruit shows only single fertile locule at the end. (Plate I, Fig 1 to 12, Text Fig 1 to 12), Fertile chamber measures 3000 μ m in length and 1000 μ m in width. Sterile chamber measures 600 μ m in length and 250 μ m in width. (Plate II, Fig 13, 14, Text Fig 13)

Seeds: -Fertile locule contain single large seed. It is elongated in shape and measures 2794 μ m in length and 936 μ m in width. Seed is free from the wall of fruit or pericarp. Attachment of seed is not clearly preserved the seed lie free inside the locule, shows free central placentation. Seed coat is undifferentiated and consisting of dark coloured cells. Inside the seed dicotyledonous embryo is well preserved. The present fossil fruit is capsular with dry pericarp may dehisce by separating two locules from the middle partition wall. (Plate II, Fig 13,14,15,16 Text Fig 13, 14)

Embryo: - Inside the seed is present dicotyledonous embryo consisting of two large cotyledons. As the embryo fills the entire seed cavity endosperm tissue is not seen. The embryo measures approximately 2470 μ m in length and 886 μ m in width. (Plate II, Fig 13,14,15,16 Text Fig 13, 14)

Stalk of fruit: -The bilocular capsular fruit is well preserved on the stalk. Stalk of fruit is multilayered and measures 900 μ m long & 300 μ m broad and consisting of compactly arranged parenchymatous cells. (Plate II, Fig 15, 16 Text Fig 13, 14)

DISCUSSION & IDENTIFICATION

The present petrified fruit is bilocular capsule, shows following main features:-

- It is long & elongated, oblong in shape.
- Bilocular capsule is well preserved on small stalk.
- Fertile locule is large in size and incorporates single seed.
- Sterile locule is small in size and is undeveloped.
- Pericarp is dry, differentiated into epicarp, mesocarp & endocarp.
- Seed coat is undifferentiated and shows free central placentation.
- Embryo is well preserved with two cotyledons thus, shows dicotyledonous nature of fruit.

From all the features, it is evident that the present petrified bilocular capsular fruit is stalked and formed from bicarpellary syncarpous, superior ovary with free central placentation. Fertile locule is large in size and incorporates single seed while sterile locule is small in size and is undeveloped. The simple undifferentiated fruit wall indicate a simple dry pericarp so that fruit is not drupe or berry. The dehiscence mechanism could not be ascertained but may be at the septal region. Now, the present specimen is compared with both reported fossil fruit and also with modern genera to trace its identity.

The present specimen is first compared with the modern (Living) families having bilocular fruit such as *Bombaceae*, *Campanulaceae*, *Goodeniaceae*, *Oleaceae*, *Pittosporaceae*, *Rubiaceae*, *Solanaceae*, *Loganiaceae* and *Gentianaceae*. (Cook, 1967; Hooker, 1961; Mathew, 1983)

Fruit of *Campanulaceae*, *Goodeniaceae* & *Rubiaceae* resembles in having two to many locules but differ in numerous seeds, axile placentation and loculicidal dehiscence. Fruit of *Bombaceae*, *Oleaceae* & *Pittosporaceae* are resembles in bilocular superior ovary but vary from present specimen in having loculicidal dehiscence, axile placentation and hairy capsule. Fruit of *Solanaceae* shows close resemblance with the present specimen in having bicarpellary, bilocular oblong fruit but the difference encountered in having multiseeded capsule showing septicidal dehiscence and seed with axile placentation. Fruits in family *Loganiaceae* are capsular with many seeds and embryo usually straight but seed is solitary in present fossil specimen, hence differ. But the fruit of *Gentianaceae* shows close resemblance with the present fruit in having bilocular septicidal capsule the only difference encountered is presence of parietal placentation.

Now, the present fossil fruit is compared with the reported capsular fruit but the structure of fossil fruit is much different from all other previously reported capsular fruit such as, *Enigmocarponparijae* (Sahni, 1943), is compared with present fossil fruit it differs in having two rows of seeds in each locule while the fruit *Indocarpaintertrappea* (Jain, 1964), is tetralocular capsule with fleshy testa which is not observed in present fossil fruit. *Harrisocarponsahnii* (Chitaley & Nambudri, 1973) and *Sahnicarponharrisii* (Chitaley & Patil, 1972) both show pentalocular condition and are loculicidal capsules. *Harrisocarponsahnii* has two seeds in each locule which is totally different from the present fossil fruit. In *Daberocarpongerhardii* (Chitaley & Sheikh, 1973) ten locules are present varying from the present fossil fruit. *Deccanocarponarnoldii* (Paradkar & Dixit, 1975) does not resemble in having eight locular capsule. *Biloculaireintertrappea* (Kate, 1974), is a bilocular schizocarpic fruit with a single large seed in each locule. *Biloculocarponintertrappea* (Yawale, 1975), is a bilocular drupe with a single seed in each locule. *Oleaceocarponnagpurensis* (Mahajan, 1987), is bilocular ellipsoidal fruit, having two seeds in each locule and with axile placentation. *Mahabalecarpondeccani* (Sakundarwar, 1987), is bilocular drupaceous fruit with irregular outgrowth of fruit wall.

Nautiyalocarponsinghpurii (Juneja, 1993), is bilocular drupaceous fruit with one ovule in each chamber. *Schizocarponaliformii* (Bhowal, 2002), is irregular eye shaped bilocular fruit with two fertile chamber & with middle empty space. *Bicarpelarocarpionsinghpurii* (Bhowal, 2008), is bilocular sessile fruit with an empty air chamber in the septa and showing loculicidal dehiscence. *Rodeocarpondeccanii* (Saxena, 2004) is bilobed, bilocular septicidal capsule with numerous seeds. Thus, the present specimen does not show resemblance with any of the above earlier reported capsular fruits.

From the above discussion the present fossil fruit shows close affinities with the living family *Gentianaceae* but does not resemble in *Toto* with any particular genera of family. Hence can be placed under the family *Gentianaceae* and named as *Gentianaceocarponsinghpurii* gen. et sp. nov. The generic name is after the family *Gentianaceae* to which it shows close affinities and specific name is after the locality singhpur from where it was collected.

DIAGNOSIS

Gentianaceocarpon gen. nov

Fruit dicotyledonous, bilocular capsule with stalk and with one fertile & one sterile locule.

Gentianaceocarponsinghpurii gen. et sp. nov

Fruit bilocular capsule, well preserved on the stalk. It is Long, elongated and oblong in shape and measures 4900µm in length & 1700µm in width. Fruit wall differentiated into three zones epicarp, mesocarp & endocarp. Percarp measures 175µm thick. Out of the two locule, Fertile locule is large in size and incorporates single seed while sterile locule small in size and undeveloped. Seed coat undifferentiated. Seed shows free central placentation. Embryo well preserved with two clearly preserved cotyledon and measure 2470µm to 886µm in size.

Holotype : APS. / Fruit -5. Department of Botany, Institute of Science, Nagpur.
Locality : Singhpur, Chhindwaradist., M.P. India.
Horizon : Deccan Intertrappean Series of India.
Age : Upper Cretaceous.

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PLATE-I

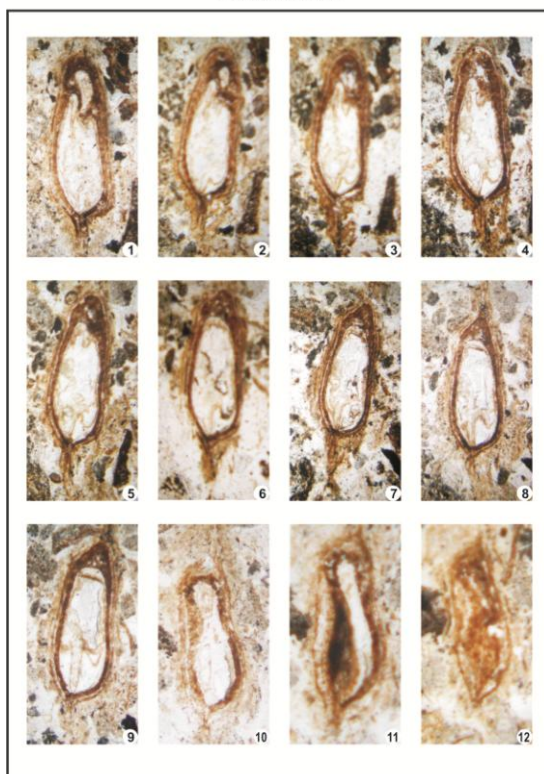
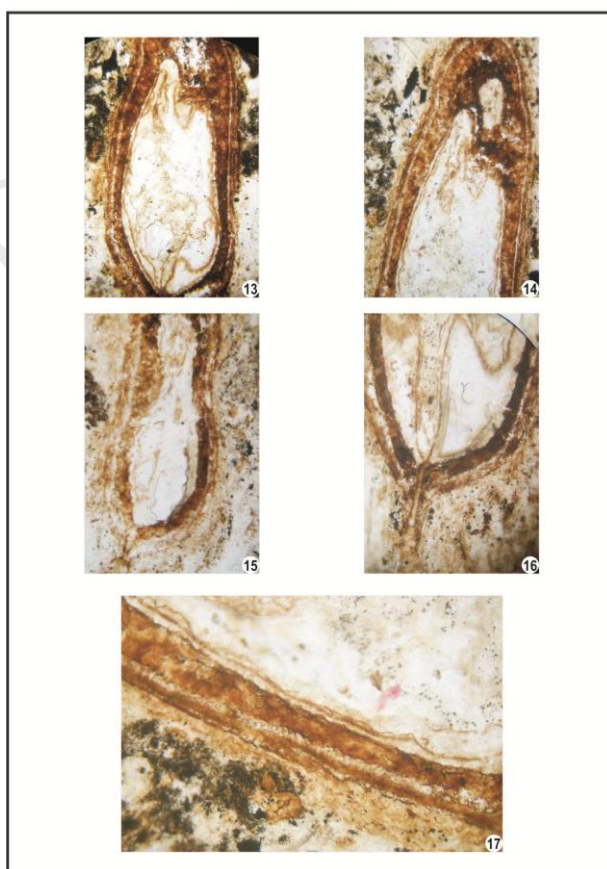


PLATE-II



Gentianaceocarponsinghpurii

gen. et sp. nov

➤ **EXPLANATION OF PLATE-I, FIGS. 1 To 12**

Figs. 1 to 12 : Serial section of the fruit showing different stages of the fruit cut longitudinally. 25X

➤ **EXPLANATION OF PLATE-II, FIGS. 13 To 17**

Fig. 13 : Enlarged fertile locule. 50X

Fig. 14 : Enlarged sterile locule. 50X

Figs. 15 & 16 : Showing stalk of the fruit and Dicot embryo having two cotyledons. 50X

Fig.17 : Enlarged pericarp showing epicarp mesocarp & endocarp. 400X