



Report of a Triserial Capsular Fruit from the Deccan intertrappean series of Paladaun, M.P., India

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ABSTRACT

The present paper deals with the report of a new trilocular, triserial, capsular, monocot fruit from the Deccan Intertrappean Beds of Paladaun (Lat. 22° 3' 25.78"N; Long. 78° 56' 17.53" E), Chhindwara district, Madhya Pradesh, India. The specimen is tricolular, elongated multiseeded, capsular, dehiscent fruit. The fruit measures about 8 mm in length and 3 mm in cross section tapering at both ends. The anatomy of fruit consists of outer pericarp, Pericarp is thick and differ into epicarp, mesocarp and endocarp. Each locule contains 12 seeds in two rows of 6 seeds each. Central axis is thick. Locules are separated by thin septa. Seeds are small and total 36 in all. Embryo is monocot type. Placentation is axile. Vasculature is seen along the central axis. Dehiscence is loculicidal type. The fossil fruit is named as *Liliaceocarpon paladaunensis* gen.et sp.nov.

Keywords: Deccan, Intertrappean, fossil, capsular, trilocular, fruit

INTRODUCTION

The present paper deals with the report of a new trilocular, triserial, capsular, monocot fruit from the Deccan Intertrappean Beds of Paladaun (Lat. 22° 3' 25.78"N; Long. 78° 56' 17.53" E), Chhindwara district, Madhya Pradesh, India. The number of capsular fruits is reported from the Deccan Intertrappean beds of India, but very few are monocot fruits. The capsular fruits reported are- *Tricoccitespp* (Sahni, Rode 1937 and Chitaley 1956), *Enigmocarpon parijai* (Sahni 1943), *Indocarpa intertrappea* (Jain 1964), *Harrisocarpon sahnii* (Chitaley and Nambudri 1973), *Sahnioocarpon harrissi* (Chitaley and Patil 1972), *Daberocarpon gerhardli* (Chitaley and Sheikh 1971), *Deccanocarpon arnoldi* (Paradkar 1975) etc. Some drupaceous fruits described from the same locality include *Biloculocarpon mohgaoense* (Yawale 1975) and *Grewia mohgaoense* (Paradkar and Dixit 1980). There are also record of Leguminous fruits from the Deccan traps described as *Leguminocarpon eocenium* (Yawale 1973) and *Lomentocarpon deccanii* (Yawale 1982). The baccate fruits are *Kremocarpon aquatica* (Chitaley and Kate 1975) *Mohgaocarpon eyedi*

(Yawale, 1977), *Kremocarponindicum* (upadhye 1979), *Centrospermocarpon chitaley* (Sheikh and Khubalkar 1979), *Ramanujamocarpon indicum* (Kolhe 1980), *Tilliaceocarpon intertrappeae* (Dixit 1984), *Juglandiocarpon agashii* (Adhgo 1986), *Erythroxylocarpon intertrappea* (Khubalkar 1982), *Chitaleyocarpon deccani* (Kumar 1984), achenical fruits *Ceratocarpon spinosa* (Adhao 1986), winged seeded unilocular fruits are also reported. *Wingospermocarpon mohgaoense* (Sheikh and Kapgate 1984) and *Wingospermocarpon arilis* (Sheikh and Kapgate 2000.), *Schizocarpon aliformii* a shizocarpic fruit by (Bhowal 1998).

This report will add some more information in the reports of the flora of Deccan Intertrappean beds of India.

MATERIAL AND METHOD

The material was collected from Paladaun locality of Chhindwara district in Madhya Pradesh during the field visit in the form of black chert. While breaking the chert the present fruit specimen was exposed in longitudinal plane. After etching with Hydrofluoric (HF) acid serial peels of the material are taken along its longitudinal plane with cellulose acetate peel technique. The peels were mounted in DPX mountant and observed under micro-scope. Micro photographs are taken and camera lucida sketches are also drawn for detailed study. The x-ray photographs are also carried out in the laboratory of Florida University, USA for detailed study.

Description :

The fruit is exposed in longitudinal plane shows elongated shape in appearance. The fruit measures about 8 mm in length and 3 mm in cross section tapering at both ends. The anatomy of fruit consists of outer pericarp, three locules with two series of 6 seeds in each locule showing axile placentation, well preserved central axis with vasculature, seeds are well preserved with prominent monocot type embryo. The fruit shows dehiscence zone at its upper end. Stalk is not found.

Pericarp- The pericarp (fruit wall) well preserved and is about 334 μm in thickness divided into three zones i.e. outer Epicarp, middle Mesocarp and inner Endocarp. The upper portion of pericarp shows dehiscence zone.

Epicarp- it is the outermost layer of pericarp measuring about 98 μm in thickness made up of 4-5 layers of thick walled compact parenchymatous cells.

Mesocarp- it is the middle layer of the pericarp. It is thicker than epicarp and endocarp and measuring about 173 μm in thickness made up of 8-9 layers of thin walled loosely arranged parenchyma giving it a soft nature.

Endocarp- it is innermost layer of the pericarp measuring 63 μm in thickness made up of 3-4 layers of elongated compact parenchyma.

Central Axis – Central axis is well preserved and can be clearly seen along the longitudinal and transverse plane. It measures about 0.6 to 0.7 mm in its cross section. It is made up of multiple layers of circular to oval parenchyma. The vasculature can be seen along the central axis.

Locules – The longitudinal section shows only two locules but the cross section it is clear that the fruit is trilocular. Each locule is 2.45 mm X 1.05 mm in size separated by thin parenchymatous septa. Each locule contains two series of 6 seed i.e. each locule contains 12 seeds in two rows of 6 seeds each.

Seed- The fruit contains 3 locules each containing two rows of 6 seeds i.e. the fruit contains 36 seeds in all. The larger seed measures 1.25 X 0.96 mm in size while the smaller seed measures 0.90 X 0.75 mm in size. the seeds show axile placentation. The seed coat is thin and undifferentiated. The seeds are smaller in size and endosperm tissue is not clear. Embryo is ill preserved but it seems to be monocot type.

Placentation – the seeds shows their attachment to the central axis indicating the axile placentation.

Vasculature – Along the central axis the vascular tissue can be clearly seen to supply nutrition to the developing embryos.

Dehiscence – At the upper portion of the pericarp breakage is clearly observed indicating its dehiscence zone. This indicated that the fruit is mature and about to dehisce. The dehiscence is clearly loculicidal type.

DISCUSSION AND IDENTIFICATION

From the above description the present specimen fruit shows following characters-

- The specimen is tricolular, elongated multiseeded, capsular, dehiscent fruit.
- Pericarp is thick and differ into epicarp, mesocarp and endocarp.
- Each locule contains 12 seeds in two rows of 6 seeds each.
- Central axis is thick.
- Locules are separated by thin septa.
- Seeds are small and total 36 in all.

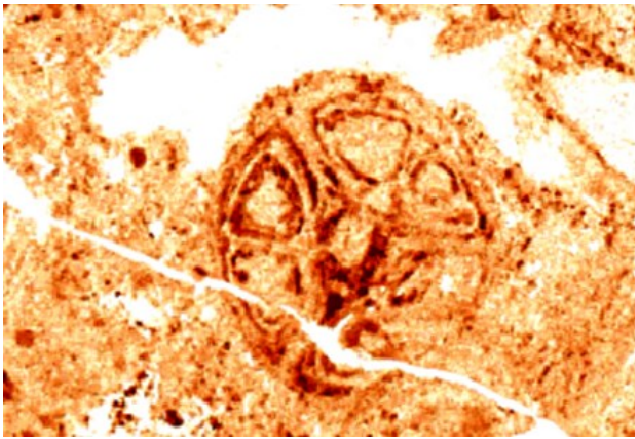
- Embryo is monocot type.
- Placentation is axile.
- Vasculature is seen along the central axis.
- Dehiscence is loculidial type.

From the above discussion the present fruit specimen is compared with living genus of the modern families and with the reported fossil capsular fruits for its identification.

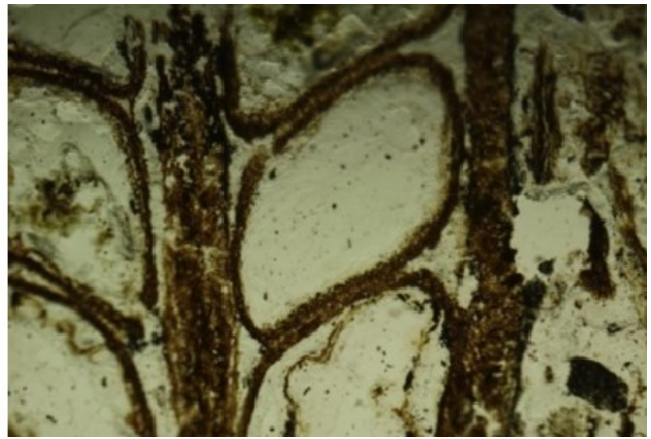


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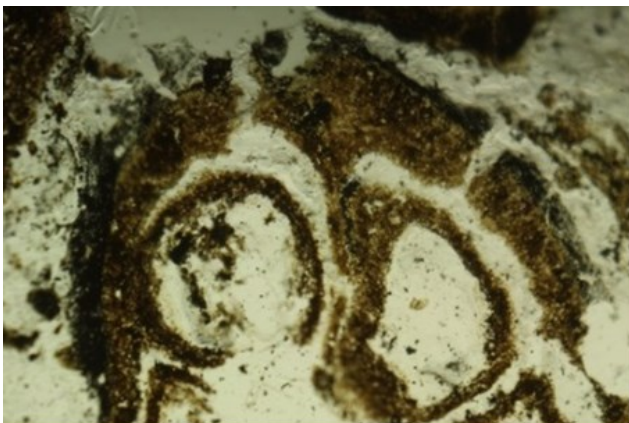
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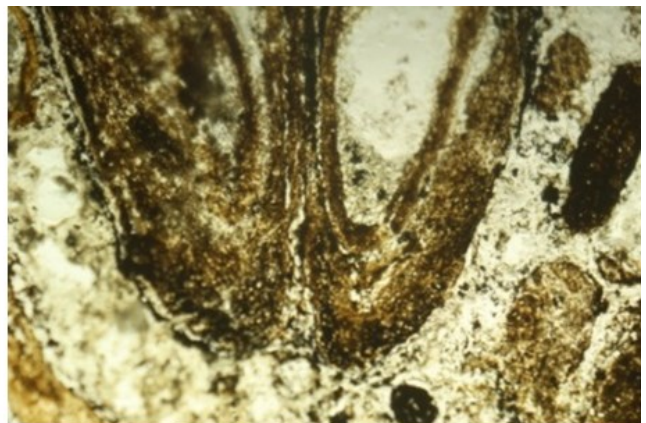
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Figure 1 & 2 : Complete view of fruit in L.S. **Fig. 3:** Complete view of the fruit in T.S., **Fig. 4 :** Showing Pericarp, central Axis & Seeds, **Fig. 5:** A part enlarged showing dehiscence zone, **Fig. 6 :** A part enlarged showing base and vasculature.

Comparison with Modern families

The present fruit is compared with the living genera of the Monocot families showing similar characters. The present fruit is compared with the capsular fruits of modern living monocot families like. Marantaceae, Liliaceae, Xyridaceae, Junacaceae, Ericaulaceae, Burmanniaceae (Cook, 1967; Corner, 1976; Mathew, 1983). In the following families fruit are dry capsular dehiscent but differs from the present in following respect. In family Marantaceae fruits are loculicidal capsules having three locules but differ in having one seed in each locule. Liliaceae shows much resemblance with present fruits in having loculicidal capsules, generally they have 3 locules with two series of many seed in each locule and loculicidal dehiscence (e.g. *Lilium* sp.) but differ in having numerous seeds and wedged pericarp while present specimen is circular in nature. Juncaceae show resemblance in having loculicidal capsule one to three locules but differ in having many minute seeds in each locule. In Ericaulaceae and Burmanniaceae the fruits are loculicidal capsules two to three locules rarely one locule with many seeds. The fossil fruit though comparable with the modern monocotyledonous families in some ways but differ in many aspects. It shows more resemblances to modern family Liliaceae but could not be comparable to the any of the genus of Liliaceae exactly.

Comparison with reported fossil capsular fruits

The present specimen is compared with reported fossil capsular fruits such as- *Enigmocarpon parijae* (Sahni, 1943) is a 6-12 locular fruit with thick spongy wall, with a row of seeds in each locule. *Harrisocarpon sahnii* (Chitale and Nambudiri, 1973) and *Sahnioocarpon harrisii* (Chitale and Patil, 1972) are similar in having pentalocular fruit. *Daberocarpon gerhardii* (Chitale & Sheikh, 1973) differ as it is ten locular with single seed in each locule. *Deccanocarpon arnoldii* (Paradkar and Dixit, 1975) vary as it is eight locular with single seed in each locule. *Loculocidocarpon chitaleii* (Kapgate, 1999) having pentalocular fruit but differ in having loculicidal dehiscence. *Chitaleocarpon intertrappea* (Kapgate, 2000) is a seven locular capsule with 2-8 seeds in each locule. *Lythraceocarpon mohgaonese* (Saxena, 2004) is a hexalocular fruit with hexagonal central axis and 2-8 seeds per locule. *Portulacaceocarpon jamsavlii* (Bhowal, Narkhede and Meshram, 2011) is unilocular multiseeded capsular fruit. *Wingospermocarpon mohgaonese* (Sheikh and Kapgate 1984) unilocular capsular, winged seed, free central placentation of the seed.

Wingospermocarpon arillies (Kapgate and Sheikh 2000) is a unilocular, dicot, pedicellate capsular fruit with arillated seeds. The discussion above point out no resemblance of the fossil to any of the living families except modern family Liliaceae. The reported fossil fruits also do not compare favourably with the studied fossil. Hence the fossil fruit is named as *Liliaceocarpon paladaunensis* gen. et sp. nov. This has been done on the basis of morphological characters of the fruit. The generic name after resemblance with modern family Liliaceae whereas specific name after the locality from where the specimen was collected.

Diagnosis-

Liliaceocarpon gen. nov.

The fruit measures about 8 mm in length and 3 mm in cross section tapering at both ends. The anatomy of fruit consists of outer pericarp, three locules with two series of 6 seeds in each locule showing axile placentation, well preserved central axis with vasculature, seeds are well preserved with prominent monocot type embryo.

Liliaceocarpon paladaunensis gen. et sp. nov.

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Holotype : SPP / TRF-1. Florida Museum of Natural History, Florida, USA.

Locality : Paladaun, M.P.

Horizon : Deccan Intertrappean Series of India.

Age : ? Upper Cretaceous.

Conflicts of interest: The authors stated that no conflicts of interest.

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