
Aparna M. Yadav
P. G. Department Of Botany, J. M. Patel College, Bhandara, 441904 (Ms), India.

Received: July 22, 2018
Accepted: October 09, 2018

**ABSTRACT**

A present petrified fruit is bilocular capsular collected from the Deccan Intertrappean beds of Jamsavali (Lat 21°, 30 to 22°, 55 N and Long 78°, 15 to 79°, 20 E) Madhya Pradesh, India. The present fruit is triangular in shaped, dicotyledonous, bilocular capsule. It is sessile and showing loculicidal dehiscence. Out of two locules, one fertile and one sterile. Pericarp differentiated into epicarp, mesocarp and endocarp. Seed coat unitegmic. Embryo ill preserved. On comparison it shows close affinities with the characters of living family Acanthaceae.

**Keywords:** Bilocular, Triangle, Loculicidal, Pericarp and Seed.

**INTRODUCTION**

The dicotyledonous fruits described from the Deccan Intertrappean beds are generally capsules, berries and drupes. The present investigation deals with the bilocular capsular fruit collected from the locality of Jamsavali exposures. The capsular fruits that have been reported from Deccan Intertrappean beds of India are as under, *Enigmocarpon parijai* (Sahni B. 1943), *Daberocarpon gerhardii* (Chitaley and Sheikh 1973), *Chitaleocarpon intertrappea* (Kapgate V.D. 2000), *Schizocarpon aliformii* (Bhowal and Sheikh 2002), *Bicarpelarocarpon singhpurii* (Bhowal and Sheikh 2008), *Tiliaceocarpon jamsavlii* (Meshram S. et.al 2013), *Rodeocarpon mohargaonense* (Konde L. 2015), *Pentaloculocarpon Intertrappean* (Khursel and Narkhede 2016), *Portulacaceocarpon bhuterensis* (Borkar S. et al. 2016) and *Tamaricaceocarpon mohgaonense* (Yadav A. M. 2017)

The present fruit specimen gives additional information to the knowledge of bilocular fruit from the Deccan Intertrappean flora of India.

**MATERIAL AND METHOD**

A petrified triangular shaped fruit was obtained on breaking a fossil chert from Jamsavali, M.P., India. The peels were obtained in transverse section, after etching with Hydrofluoric acid. Anatomical details of both part and counterpart were studied. Camera lucida sketches in series were drawn and photographed.

**DESCRIPTION**

**Fruit Morphology**

The fruit is almost triangular in shape, bilocular, sessile and measuring 288µm in length and 108µm in breadth. The bilocular fruit is separated by single transverse septa. The upper locule is broad and lower locule is narrow with single transverse septa in between giving the triangular structure to the fruit (Text Fig. 1; Plate Fig. 1).

**Fruit Anatomy**

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

**Pericarp:** The pericarp thickness varies between 172.23µm and 266.64µm. It is multilayered and differentiated into three major zones. Epicarp is the outermost layer of the fruit wall. It is 66.66µm across its width. It is one to two layered, made up of thin walled parenchymatous cells. Mesocarp is thewell-defined broad middle layer of the pericarp. The width of this region varies a lot between 98.12µm and 133.33µm cells, it is sclerenchymatous three to four layered at some places and single layered at other. The cells is pentagonal to hexagonal. Endocarp is the inner most layer of the pericarp. The width of this region is 99µm. The cells are one to two layered made up of soft tissues may be parenchymatous in nature (Text Fig. 3; Plate Fig. 2).

**Locules:** It is bilocular fruit with two well developed locules, that is upper and lower, upper locule is sterile or empty and lower locule is fertile and includes an embryo. The upper locule measures about 66µm in height and 174µm in breadth. Lower locule 228µm in height and 138µm in breadth. (Text Fig. 1; Plate Fig. 1).
Seed coat: The seed coat is unitegmic and is not differentiated into testa and tegmen. It is ill preserved. In the upper locule, obliquely cut part cells of seed coat appears which are narrow and cylindrical and show distinct annular, spiral thickening presumably to give strength to the seed coat (Text Fig. 2; Plate Fig. 4).

Embryo: Embryo dicot, ill preserved. It is 180µm in length and 30µm in breadth. Cells of the embryo is not well preserved but at some places it is pentagonal to polygonal (Text Fig. 1; Plate Fig. 3 & 5).

Dehiscence: The bilocular capsular fruit dehisces loculicidally (Text Fig. 1; Plate Fig. 1).

DISCUSSION & IDENTIFICATION

From the above description, based on the fruit morphology and fruit anatomy it is clear that the present specimen shows following important characters which are used for its identification. The fruit is a capsule with loculicidal dehiscence as has been already observed. It becomes evident that the present petrified fruit is bilocular probably formed from bicarpellary, syncarpous, ovary with single seed in fertile locule. Pericarp is well differentiated into three zones:- epicarp, mesocarp and endocarp. Seed coat unitegmic and undifferentiated. Embryo dicot in nature and ill preserved.

Comparisons are made with the earlier reported capsular fruit for its identification. Enigmocarpon pariijii (Sahni B. 1943) is 6-12 locular with spongy wall, each locule contain the rows of seeds. Daberocarpon gerhardii (Chitaley and Sheikh 1973) is a ten locular capsule with a one seed in each locule. Chitaleocarpon intertrappea (Kapgate V. D. 2000) is a seven locular capsule with 2-8 seeds in each locule. Schizocarpic aliformii (Bhowal and Sheikh 2002) differs in having irregular eye shaped bilocular fruit with two fertile chambers and with empty middle space. Bicarpealocarpon singhpurii (Bhowal and Sheikh 2008) vary in having empty air chamber in the septa. Tiliaceocarpon jamsavili (Meshram S. et. al 2013) is hexagonal shape and unilocular indehiscent capsule. Rodeocarpon mohgaonse (Konde L. 2015) differs in having dicotyledonous, multilocular and multisegded with axile placentation. Pentalocalocarpon Intertrappean (Khursel and Narkhede 2016) is pentalocular shape with persistent calyx. Portulacaceocarpon bhuterensis (Borkar et. al 2016) vary in having unilocular, multisegded dehiscent capsule and Tamariaceocarpon mohgaonse (Yadav A. M. 2017) is unilocular indehiscent capsule. The above discussion reveals that the present petrified fossil fruit is incomparable with any of the earlier reported fossils.

As is clear from the above discussion, comparisons are now made, with the living families of order Oleales, Gentianales and some families like, Polemoniaceae, Convolvulaceae, Hydrophyllaceae, Verbenaceae, Callitrichaceae, Labiatae, Scrophulariaceae, Acanthaceae, Pedaliaceae, Gesneriaceae and Lentibulariaceae.

The order Olealescomprises only one family that is Oleaceae. It shows syncarpous, bicarpellary, bilocular fruit with ovules 2 per locule. Loculicidal capsule are seen in Syringa and Forsythia, circumsessile capsule in Menodora or samara as in Fraxinus, whereas the studied fruit is loculicidal capsule. (Rendle A. B. 1963, Bhattacharyya and Johri 1998, Hooker J. 1961and Cook C. 1958).

Order Gentianales has the following families, Loganiaceae, Gentianaceae, Apocyanaceae, and Rubiaceae. In Loganiaceae, the ovary is syncarpous, bicarpellary, bilocular with many ovules, fruit capsule, seeds sometimes winged but in present studied fruit it is capsule with loculicidal dehiscence. Family Gentianaceae, shows syncarpous, bicarpellary, ovary usually unilocular but present studied fruit have bilocular ovary. In Apocyanaceae, the carpel lobe rarely exceeds two and ovules are anatropus, but the number of ovules is infinity, fruit follicle (Plumeria and Nerium), capsule (Allemanda), drupe (Thevetia) or a berry (Arissa). Whereas the studied fruit is two celled, loculicidal capsule.

In Rubiaceae, fruits though capsular but are with septical or loculicidal dehiscence and show many seeds in each locules, if indehiscent then it separates into one seceded segments (Galium, Rubia, Oldenlandia). Seeds are sometimes winged.

Fruit of Polemoniaceae are trilocular with loculicidal capsule, seeds sometimes with muelilaginous coating (Collomia and Gilia), Convolvulaceae, Labiatae, Callitrichaceae, Pedaliaceae, shows two ovules in each locule or tetralocular by the formation of false septum and one ovule per locule. Fruit of Hydrophyllaceae is unilocular, seeds sometimes carunculate, reticulate sculptured or muricate. In Verbenaceae, the ovary superior, two to four celled, ovules two sometimes one in each cell, fruits usually drupe with as many pyrenes as the number of ovules in the ovary or nutlet as in Verbenae, if capsule two to four valued. Scrophulariaceae, is similar in having syncarpous, bilocular ovary but differ in having septical capsule. Gesneriaceae, have unilocular ovary, ovules many, fruit loculicidal capsule, seed numerous. Lentibulariaceae, is similar in having syncarpous, bicarpellary, superior ovary, but vary in capsule dehiscing by two to four valves or by an irregular splitting.

Family Acanthaceae, bears closest resemblance with present petrified fruit such as bicarpellary, syncarpous, superior, bilocular ovary, fruit normally loculicidal dehiscent capsule, ovules one or more in
each locule. Most of the genera of Acanthaceae shows bilocular ovary with two ovules in each locule (Cooke C. 1958). But there are some genera like Lepidagathis and Hypoestes which shows ovary bilocular, ovules two (rarely one) in each locule. In Monechma ovary is bilocular with one or two ovules in each locule and present petrified fruit also shows one ovule in each locule.

To sum up, from the comparison made above it can be concluded that the present petrified fruit shows greater affinities towards the living family Acanthaceae and its genera Monechma. Hence, the fossil fruit is named as Acanthaceocarpon jamsavlii gen. et sp. nov., the generic name is given after the family Acanthaceae and the specific name is given after the locality Jamsavali.

**DIAGNOSIS**

*Acanthaceocarpon jamsavlii* gen. et sp. nov.

Fruit triangular in shape, dicotyledonous, bilocular capsule. It is sessile and showing loculicidal dehiscence. Out of two locules, one fertile and one sterile. Pericarp differentiated into epicarp, mesocarp and endocarp. Seed coat unitegmic. Embryo ill preserved.

**Holotype:** AMY. / Fruit-1. Department of Botany, J. M. Patel College, Bhandara.

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

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

**Age:** ? Upper Cretaceous.

**REFERENCES**


**ACKNOWLEDGEMENT:**

The author is thankful to United Grant Commission (UGC) for providing the fund for the research project and also thankful to the principal of J.M. Patel College, Bhandara for providing all the necessary facilities to carry out research.
Explanation of text figures

1. Enlarged bilocular fruit which is separated by single transverse septa with upper smaller (sterile) & lower bigger (fertile) locules.
2. Upper locule shows annular spiral thickening.
3. Pericarp differentiated into (Ep) epicarp, (Me) mesocarp and (En) endocarp.

Explanation of the plate

1. Fruit showing loculicidal dehiscence (100X)
2. Enlarge pericarp showing epicarp, mesocarp & endocarp (400X)
3. Lower locule showing dicot embryo (100X).
4. Upper locule shows annular spiral thickening (400X).
5. Seed coat & embryo (100X).