

**REPORT OF A CAPSULAR FRUIT FROM THE DECCAN INTERTRAPPEAN
BEDS OF PALADAUN, DISTRICT- CHHINDWARA, M. P., INDIA**

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ABSTRACT :

The present specimen incorporates the detailed morphological and anatomical description of a capsular fruit from the Deccan Intertrappean beds of Paladaun, Dist.- Chhindwara, M. P., India. The fruit is a circular, pentalocular dicotyledonous, capsular fruit. It shows septicidal dehiscence with five chambers having one seed in each locule varying from 113.68 μ m X 92.63 μ m in size. Pericarp is 7.94 μ m thick, multilayered; outer and middle zones are thick and inner zone is thin. The seeds are triangular and measures 69.73 x 55.39 mm in size. Five locules with seeds attached to central placenta showing axile placentation. The seed coat is bitegmic, outer seed coat is testa and inner seed coat is tegmen. The testa is made up of single layer of elongated cells measuring about 0.55 μ m in thickness. The tegmen is two cells in thickness and measures about 1.38 μ m. Embryo is dicot type and well preserved. Endosperm cells are in the form of hexagonal parenchymatous patches at places. the present specimen under investigation does not resemble any of the living capsular fruits as well as recorded fossil flora of Intertrappean beds as described earlier except Sahnioecarpon harrisii (Chitale and Patil, 1973) with minor differences hence it is named as Sahnioecarpon paladaunii sp. nov. The generic name is being after the fruit Sahnioecarpon harrisii (Chitale and Patil, 1973) and specific name indicates the name of the locality from where it was collected.

Keywords: Capsular fruit, Pentalocular, Septicidal dehiscence, Bitegmic, Intertrappean beds.

Introduction:

The present specimen incorporates the detailed morphological and anatomical description of a capsular fruit from the Deccan Intertrappean beds of Paladaun, Dist.- Chhindwara, M. P., India. Many dicotyledonous capsular fruits have been reported from the Deccan Intertrappean beds of India. Some of the reported dicotyledonous capsular fruits are as follows – *Sahnioecarpon harrisii* (Chitale and Patil, 1973), *Sahnioecarpon ganeshii* (M. B. Bobade, 2011), *Harrisocarpon sahnii* (Chitale and Nambudari, 1973), *Daberocarpon jhargadii* (Chitale and Sheikh, 1971), *Deccanocarpon arnoldii* (Paradkar, 1975),

Orygiocarpon jhargadi (Yawale & Channe, 1998), *Hexaloculocarpon intertrappea* (Dahegaonkar, 2002), *Chitaleocarpon intertrappea* (Kapgate et al., 2006). The Present capsular fruit is the additional report of capsular fruit from the Deccan Intertrappean beds of Paladaun, Dist.- Chhindwara, M. P., India.

Material and method:

The material was very well preserved in a black chert collected from the Deccan Intertrappean beds of Paladaun, Dist.- Chhindwara, M. P., India. Both parts were available after breaking the chert. It was exposed in transverse view. After etching with hydrofluoric acid and washing with water circular fruit with five locules were visible to the naked eyes. Serial peel sections were taken along transverse plane. The peels were mounted on Canada balsam mountant. Thus the fruit revealed details of morphology and anatomy through examination of fractured surface, serial sectioning and successive peels. Sony camera was used for photography and Capture Pro 4.6.exe software for measurement of material.

Description:

General Description : The fruit is pentalocular, five seeded, dehiscent, capsular fruit having axile placentation. The fruit measures 113.68 μm in length and 92.63 μm in breadth (plate I, photo 1-4). It is a petrified fruit with excellent cellular preservation. The fruit is differentiated into outer pericarp and inner part containing five locules with seeds.

Fruit Morphology : The petrified fruit is small, circular in shape (Plate I, photo 1-4). Five Locules containing seeds are separated by septum and are attached in center of fruit showing axile placentation. Locules are triangular in shape and at the ends of angle horn like projection of size 15.26 μm is present. Pericarp is present at some distance above the locules. A gap is seen between pericarp and locules. Pericarp is not continuous and is separated from each other along the septum which forms triangular shape. Some pericarps at triangular edge shows small balloon like parenchymatous outward extension (Plate I, photo 1-4).

Pericarp : The fruit wall or pericarp is well preserved and moderately thick, measures about 7.94 μm and is differentiated into outer epicarp, middle mesocarp and inner endocarp (Plate I, photo 6). Five conspicuous notches are distinctly seen on pericarp along septation. Pericarp is present at some distance above the locules. A gap is seen between pericarp and locules. Pericarp is not continuous and is separated from each other along the septum which forms triangular shape (Plate I, photo 1-4). Some pericarps at triangular edge shows small balloon like parenchymatous outward extension (Plate I, photo 10).

Epicarp : It is outermost layer of the fruit and is measuring about 1 μm in thickness. Epicarp is made up of thick walled, sclerenchymatous cells. It shows two layers with gap in two layers are seen (Plate I, photo 6).

Mesocarp : In between epicarp and endocarp sclerenchymatous mesocarp is present. It appears to be 5.52 μm in thickness and consist of 5-6 layers of thick walled hexagonal cells (Plate I, photo 6). In between epicarp and mesocarp a gap is present in middle region but apices of them meet at the apex (Plate I, photo 1-4).

Endocarp : It is the innermost layer of pericarp and measures about 0.63 μm in thickness and consist of 1-2 layers of thick walled hexagonal cells (Plate I, photo 6).

Locules : In transverse section five triangular locules are seen with well preserved seeds (Plate I, photo 8). The diameter of locule is 81.8 x 76.05 μm in size.

Placenta : Five locules are attached in the center of fruit showing axile placentation (Plate I, photo 12).

Seed : One seeds is present in each locule thus there are total 5 seeds. The seeds are triangular in shape and measures 69.73 x 55.39 μm in size (Plate I, photo 8).

Seed Coat : The seed coat is bitegmic, outer seed coat is testa and inner seed coat is tegmen. The testa is made up of 2-3 layers of elongated cells measuring about 0.55 μm in thickness. The tegmen is 5-6 layers of cells in thickness and measures about 1.38 μm (Plate I, photo 7).

Embryo : The embryo appears to be made up of thin walled cells with single layered epidermis. It is well preserved, relatively large and curved; embryo cut in different plane is seen inside the seeds. The embryo is dicotyledonous having two cotyledons with endosperm (Plate I, photo 9).

Dehiscence : The splits are seen in the fruit, separating the seeds from the fruit wall and form the septae. The fruit wall also shows slits or demarcation lines one against each septum. Such structure of the fruit suggests a pentalocular capsule with septicidal dehiscence having one seed in each loculus (Plate I, photo 1-4).

Stalk : A stalk like axis is observed at the base of the fruit in some sections (Plate I, photo 11). It is not in organic connection with the fruit wall but in close association of it. The stalk shows 3-4 layers of thin walled, parenchymatous cells with epidermis around it.

Discussion And Identification :

The above described specimen revealed following important details for its identification.

1. Fruit is circular, pentalocular, five seeded, dry, and dehiscent with axile placentation.
2. Fruit wall is differentiated in to Epicarp, Mesocarp and Endocarp.
3. Presence of five notches on fruit wall.
4. Total number of seeds is five.
5. Seed coat is thick and differentiated into testa and tegmen.
6. Embryo is large, curved and dicotyledonous with endosperm.
7. Septicidal dehiscence of fruit.

From these characters it is evident that the described fruit was formed from pentacarpellary, pentalocular, syncarpous ovary with axile placentation having five ovules. Nature of the fruit appears capsular due to fleshy pericarp and septicidal dehiscence.

Comparison With The Modern Taxa :

It is compared with following families in which the fruits are capsules:- Tiliaceae, Malvaceae, Sterculiaceae, Sapindaceae, Convolvulaceae, Guttiferae, Geraniaceae and

Linaceae. In Tiliaceae, Malvaceae, Sterculiaceae, Sapindaceae and Canvolvulaceae capsules are loculicidal or schizocarpic dehiscing into one or many seeded cocci. This condition is different from the present fossil fruit. The family Guttiferae has capsular fruits with septicidal or septicifragal dehiscence. It has 3-6 locules with many seeds in each locules. In the present fruit there is a single seed in each locules. Geraniaceae is 3-5 locular capsules with endospermic seeds in each locules as that of the present fossil fruit. However, the capsules here are loculicidal. When septicidal condition is there many seeds with false partitions is present. In Linaceae fruits are 3-5 locular with septicidal dehiscence as that of the present fossil fruit. However, the locules in the capsule divide by false septum and the number of seeds is 1-2 per locules. The fruit dehisces by number of valves, which is not seen in the present specimen.

Comparison With Fossil Fruits :

The previously described fossil fruits from Deccan Intertrappean Beds of India differ from the present fruit in number of characters, the differing characters are as follows – *Sahnioecarpon harrisii* (Chitale and Patil, 1973), *Sahnioecarpon ganeshii* (M. B. Bobade, 2011) is dicotyledonous pentalocular, septicidal capsule with one elongated triangular seed in each loculus on axile placentation. *Harrisocarpon sahnii* (Chitale and Nambudari, 1973) is ribbed pentalocular capsule with two seeds in each loculus. *Daberocarpon jhargadii* (Chitale and Sheikh, 1971) is ten locular with one seed in each locule. *Deccanocarpon arnoldii* (Paradkar, 1975) is eight locular capsules with one row of seeds in each locule. *Orygiocarpon jhargadi* (Yawale & Channe, 1998) differs in having pentalocular, many seeded, loculicidal capsule. *Hexaloculocarpon intertrappea* (Dahegaonkar, 2002) differs in having hexalocular, single seed in each locule, and capsular fruit with septicidal dehiscence. *Chitaleocarpon intertrappea* (Kapgade et al., 2006) differs from the present fossil as it is seven locular, seven ribbed capsular fruit with loculicidal dehiscence. Thus the present fossil fruit does not resemble any of the fossil capsular fruits described earlier except *Sahnioecarpon harrisii* (Chitale and Patil, 1973).

Finally summing up the comparison and discussion on the described fossil fruit it can be concluded that the present specimen under investigation does not resemble any of the living capsular fruits as well as recorded fossil flora of Intertrappean beds as described earlier except *Sahnioecarpon harrisii* (Chitale and Patil, 1973) with minor differences hence it is named as *Sahnioecarpon paladaunii* sp. nov. The generic name is being after the fruit *Sahnioecarpon harrisii* (Chitale and Patil, 1973) and specific name indicates the name of the locality from where it was collected.

Diagnosis :

***Sahnioecarpon paladaunii* sp. nov.**

The fruit is a circular, pentalocular dicotyledonous, capsular fruit. It shows septicidal dehiscence with five chambers having one seed in each locule varying from 113.68 μm X 92.63 μm in size. Pericarp is 7.94 μm thick, multilayered; outer and middle zones are thick and inner zone is thin. The seeds are triangular and measures 69.73 x 55.39 mm in size. Five locules with seeds attached to central placenta showing axile placentation. The seed coat is bitegmic, outer seed coat is testa and inner seed coat is tegmen. The testa is made up of single layer of elongated cells measuring about 0.55 μm in thickness. The tegmen is two cells in thickness and measures

about 1.38 μm . Embryo is dicot type and well preserved. Endosperm cells are in the form of hexagonal parenchymatous patches at places.

Holotype : SWP/Ang.Fruit/Deposited in Botany Department, Dr. Ambedkar College, Chandrapur.

Horizon : Deccan Intertrappean beds.

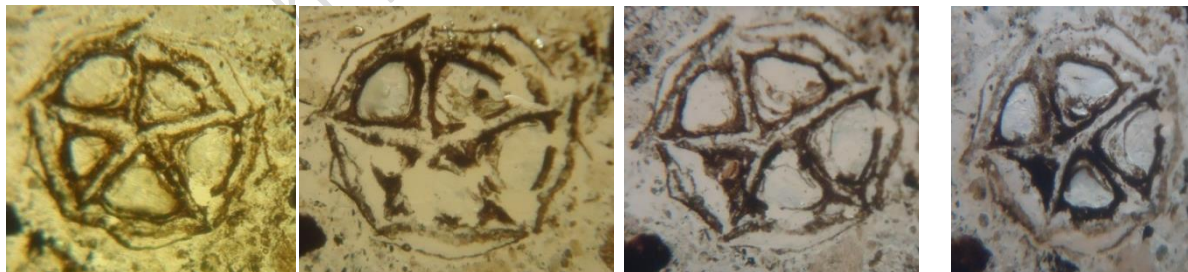
Locality : Paladaun, Dist.- Chhindwara, M. P., India.

Age : ? Uppermost Cretaceous

References :

- Bobade MB & Kokate PS 2011. A new petrified dicotyledonous capsular fruit from the Deccan Intertrappean beds of Mohgaonkalan (M.P.) India. The Botanique 17: 100–105.
- Chitale SD & Nambudiri EMV 1973. *Harrisocarpon sahnii* gen. et sp. nov. from the Deccan Intertrappean beds of Mohgaonkalan, India. Geophytology 3: 36–41.
- Chitale SD & Sheikh MT 1971. Ten locular petrified fruit from the Deccan Intertrappean Series of India. The Palaeobotanist 20: 297–299.
- Chitale SD & Patil GV 1973. *Sahnioocarpon harrisii* gen. et sp. nov. from the Deccan Intertrappean beds of India. Palaeobotanist, Silver Jubilee Vol. 29: 288–292.
- Kapgate VD, Kapgate DK & Sheikh MT 2006. First record of seven locular dicot fruit from Deccan Intertrappean beds of Mohgaonkalan, Chhindwara District, Madhya Pradesh. Gondwana Geological Magazine 21: 109–114.
- Paradkar SA 1975. *Deccanocarpon arnoldii* gen. et sp. nov. A new dicotyledonous fruit from the Deccan Intertrappean series of India. The Botanique 6: 5–10.
- Yawale NR & Channe RV 1998. A capsular fruit from the Jhargad locality of Yeotmal District, Maharashtra, India. The Botanique 11: 64–69.

PLATE I PHOTO 1 – 13

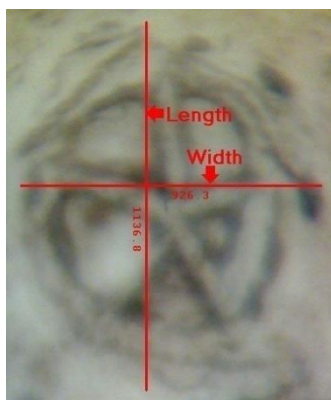


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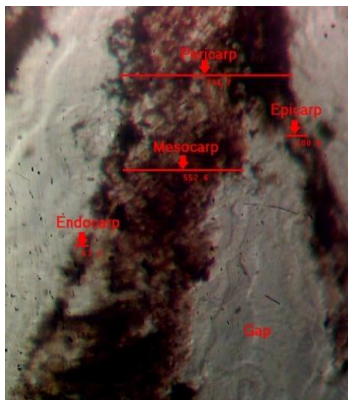
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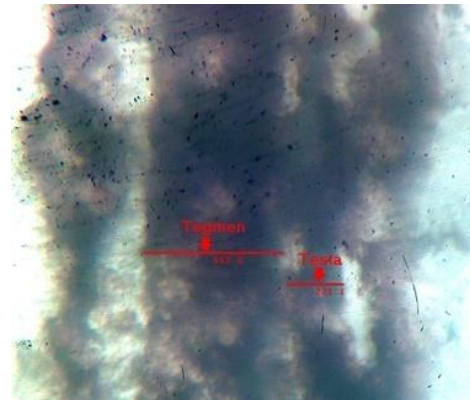
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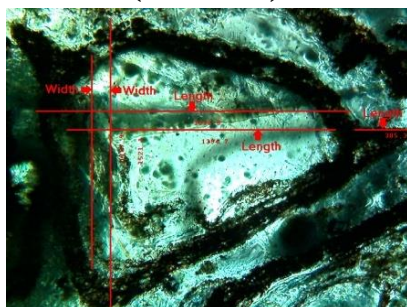
5 (Fruit-X10)



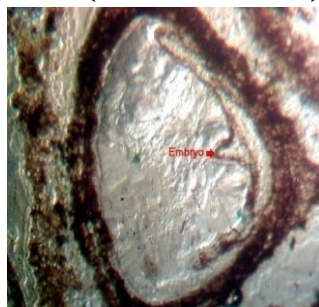
6 (Fruit Wall-X100)



7 (Seed Coat-X400)



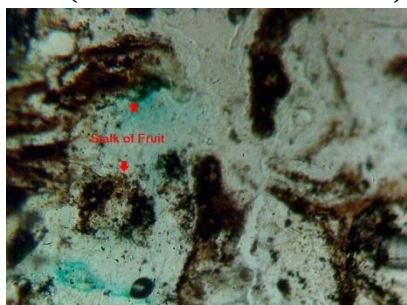
8 (Locule & Seed size-X20)



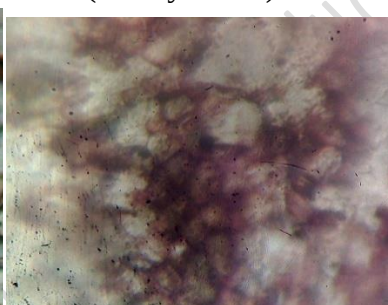
9 (Embryo-X50)



10 (Outgrowth of Epicarp-X50)



11 (Stalk of Fruit-X20)



12 (Axile Placentation-X50)



13 (Endosperm Cells-X50)

Explanation of Plate Photo 1 to 13

- Photo 1-4. A typical capsular fruit in T.S. showing five locules containing single seed with axile placentation. Five conspicuous notches are distinctly seen on pericarp along septation.....X20.
- Photo 5. T. S. fruit....X10.
- Photo 6. T. S. fruit wall (Pericarp) differentiated in to epicarp, mesocarp and endocarp....X100.
- Photo 7. T. S. Seed Coat diffentiated in to testa and tegmen....X400.
- Photo 8. Size of locule and seed.....X20.
- Photo 9. Seed containg embryo and storage region..... X50.
- Photo 10. Outgrowth of Epicarp.....X50
- Photo 11. Stalk of Fruit.....X20
- Photo 12. Five locules attached to central placenta showing axile placentation.....X50.
- Photo 13. Hexagonal, parenchymatous endosperm cells.....X50.