



ACHENOCARPON PATANII SP. NOV. A NEW SPECIES OF ACHENE FRUIT FROM THE DECCAN INTERTRAPPEAN BEDS OF MARAI PATAN, TALUKA-JIWATI, DIST.-CHANDRAPUR, MAHARASHTRA, INDIA.

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ABSTRACT: The present paper deals with the description of a new genus of petrified achenal fruit from the Deccan Intertrappean beds of Marai Patan, Tahsil-Jiwati, Dist.-Chandrapur, Maharashtra, India. The fruit is stalked, oblong, dry, indehiscent achene type dicot fruit. Ovary is unilocular, single seeded, with basal placentation. Fruit is 44.77 μm long and 26.05 μm broad. Fruit wall is 1.91 μm thick. The fruit wall is differentiated into three zones. The outer layer epicarp is 0.22 μm thick. Middle layer mesocarp is 0.93 μm thick and inner layer endocarp is 0.79 μm thick. The seed is large and measures about 36.32 μm long and 23 μm broad in size. The seed coat is bitegmic, outer seed coat is testa and inner seed coat is tegmen. Testa measures about 0.31 μm in thickness and tegmen about 0.39 μm thicknesses. Embryo is large and occupies almost all the space of seed cavity. 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 achenal fruits as well as recorded fossil flora of Deccan Intertrappean beds as described earlier except *Achenocarpion sharmaii* (Kapgate et al. 2009) with minor differences hence it is named as *Achenocarpion patanii* sp. nov. The generic name is being after the achene type of fruit *Achenocarpion sharmaii* (Kapgate et al. 2009) and specific name indicates the name of the locality from where it was collected.

Key words: - Achenal fruit, Epicarp, Deccan Intertrappean, Testa, Embryo

INTRODUCTION :

The present specimen incorporates the detailed morphological and anatomical description of an achenal fruit from the Deccan Intertrappean beds of Marai Patan, Taluka-Jiwati, Dist.-Chandrapur, Maharashtra, India. Some reported achenal fruit described so far from the Deccan Intertrappean beds are *Ceratocarpion spinosa* (Adhao, 1986), *Monimiocarpion mohgaonense* (Lanjewar, 1986), *Prakashocarpion mohgaonense* (Dahegaonkar, 2002), *Achenocarpion mohgaonii* (Gedam, 2004), *Achenocarpion intertrappea* (Kapgate, Patil & Ilamkar, 2004), *Boeluneria intertrappea* (Ambwani, Kar, Srivastava & Dutta, 2004), *Cyperceocarpion sahnii* (Dutta & Ambwani, 2005), *Achenocarpion sharmaii* (Kapgate et al., 2009). The Present unilocular

fruit is the additional report of achenal fruit from the Deccan Intertrappean beds of Marai Patan, Taluka-Jiwati, Dist.-Chandrapur, Maharashtra, India.

MATERIAL AND METHOD:-

The material was very well preserved in a black chert collected from the Deccan Intertrappean beds of Marai Patan, Taluka-Jiwati, Dist.-Chandrapur, Maharashtra, India. Only part was available and counterpart lost during breaking. It was exposed in longitudinal view. After etching with hydrofluoric acid and washing with water oblong fruit with single locule was visible to the naked eyes. Serial peel sections were taken along longitudinal plane. The peels were mounted on Canada balsam mountant. Thus the fruit revealed details of morphology &

anatomy through examination of fractured surface, serial sectioning and successive peels. Sony Camera (4X) and Capture Pro 4.6.exe software was used for photography and measurement of material.

Description:

General Description: It is simple, stalked, oblong, dry, indehiscent achene type dicot fruit. Ovary is unilocular, single seeded, with basal placentation. Fruit is 44.77 μm long and 26.05 μm broad. It is a petrified fruit with excellent cellular preservation. The fruit is differentiated in to outer pericarp and inner part containing single locule with one seed (plate I, photo 1-4).

Pericarp: The fruit wall or pericarp is well preserved and moderately thick and measures about 1.91 μm in thickness and is differentiated into outer epicarp, middle mesocarp and inner endocarp (Plate I, photo 6). A parenchymatous gap is seen between fruit wall and seed coat (Plate I, photo 9).

Epicarp: The outer layer epicarp is measures about 0.22 μm in thickness. It is made up of thin walled parenchymatous cells. These cells are rectangular in shape (Plate I, photo 6).

Mesocarp: The middle layer mesocarp is measures about 0.93 μm in thickness. It is made up of multi layered thin walled parenchymatous cell (Plate I, photo 6).

Endocarp: The innermost layer endocarp is measures about 0.79 μm in thickness. It is made up of multi layered thick walled sclerenchymatous cell (Plate I, photo 6).

Locule: In longitudinal section single locule with well preserved single seed is seen (Plate I, photo 1-4). The diameter of locule is 36.32 x 23.00 μm in size (Plate I, photo 5).

Placenta: The seed is attached with their funicle to the placenta indicating basal placentation (Plate I, photo 8).

Seed: The present fossil fruit contain a single seed measures about 36.32 μm long and 23 μm broad. The seed is large, dicotyledonous with

seed coat. Seed coat is multicellular and differentiated into testa and tegmen. Embryo is large and occupies almost all the space of seed cavity. (Plate I, photo 10).

Seed Coat: The seed coat is bitegmic, outer seed coat is testa and inner seed coat is tegmen. The testa is 2-3 layers of cells in thickness and measures about 0.31 μm in thickness. The tegmen is 5-6 layers of cells in thickness and measures about 0.39 μm (Plate I, photo 7).

Embryo: Embryo appears to be made up of thin walled cells with single layered epidermis. The embryo is dicotyledonous having two cotyledons. Embryo attached with funicle to placenta showing basal placentation (Plate I, photo 8, 10).

Stalk: Single stalk is seen attached to fruit and is measures about 7.89 μm in length (Plate I, photo 5). A vasculature is seen inside the fruit in continuation of stalk of fruit (Plate I, photo 8).

Discussion and Identification:

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

1. Fruit is oblong, stalked, dry, indehiscent, achen type.
2. Ovary is unilocular, single seeded, with basal placentation.
3. Fruit wall is differentiated in to epicarp, mesocarp and the endocarp.
4. Seed coat is thick and differentiated into testa and tegmen.
5. Embryo is dicotyledonous, large and occupies almost all the space of seed cavity.

From these characters it is evident that the described fruit was formed from unicarpellary, unilocular, apocarpous ovary with basal placentation. Nature of the fruit appears to be achenal due to single seed, fruit wall free from seed coat and indehiscence of fruit.

Comparison with Fossil Fruit:

The previously described fossil achenal fruits from the Deccan Intertrappean beds of India are different from the present fruit in number of character. *Cyperceocarpon sahnii* (Dutta &

Ambwani, 2005) fruit is nut like achene, trigonally-oval, small, pericarp apparently granulate with ridges and furrows. *Achenocarpon mohgaonii* (Gedam, 2004), *Achenocarpon intertrappea* (Kapgate, Patil & Ilamkar, 2004), *Achenocarpon sharmaii* (Kapgate et al., 2009) is obovate in shape with uneven pericarp, dicotyledonous, single seeded, unilocular, dry, indehiscent, achene with basal placentation whereas the studied specimen have smooth pericarp. *Boeluneria intertrappea* (Ambwani, Kar, Srivastava & Dutta, 2004) is an indehiscent achene, more or less circular to oval whereas the studied specimen is oblong. *Ceratocarpum spinosa* (Adhao, 1986) is unilocular, single seeded, achene. Fruit wall is multicellular, spiny with persistent style whereas in present fruit, the fruit wall multicellular, spiny with persistent style is absent. *Monimiocarpum mohgaoense* (Lanjewar, 1986) is oval, unilocular, single seeded achene whereas the studied specimen is oblong in shape. Thus the present fossil fruit does not resemble any of the fossil achenal fruits described earlier except *Achenocarpum sharmaii* (Kapgate et al. 2009).

Comparison with Modern Taxa:

For assigning the fossil fruit to proper family, it was also compared with living genera of modern families. The available literature was thoroughly searched for the anatomical and embryological characters (Cook, 1958). The present fossil fruit is compared with the many modern dicotyledonous families. The achene is the typical fruit of the sunflower family (Asteraceae). It is a small, one-seeded fruit containing a single seed. The seed is attached by a funiculus, but the seed coat is free from the inner wall of the pericarp. Our fruit is stalked which show difference from sunflower fruit. In Rosaceae of genus *Potentilla* the carpels are free, numerous, ovary unilocular persistent styles ovules anatropous, pendulose, achene fruits many on a

dry receptacle not compared with the present fossil fruit. In family Nyctaginaceae it has single carpel, ovary superior, unilocular and fruit is an achene, single seeded and enclosed by perianth base. Seed is endospermic with nearly perisperm surrounded by a large erect folded or curved embryo but in our specimen the embryo is straight or elongated and hence it is different from the present specimen.

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 achenal fruits as well as recorded fossil flora of Intertrappean beds as described earlier except *Achenocarpum sharmaii* (Kapgate et al. 2009) with minor differences hence it is named as *Achenocarpum patanii* sp. nov. The generic name is being after the achene type of fruit *Achenocarpum sharmaii* (Kapgate et al. 2009) and specific name indicates the name of the locality from where it was collected.

Diagnosis:

Achenocarpum patanii sp. nov.

The fruit is stalked, oblong, dry, indehiscent achene type dicot fruit. Ovary is unilocular, single seeded, with basal placentation. Fruit is 44.77 μm long and 26.05 μm broad. Fruit wall is 1.91 μm thick. The fruit wall is differentiated into three zones. The outer layer epicarp is 0.22 μm thick. Middle layer mesocarp is 0.93 μm thick and inner layer endocarp is 0.79 μm thick. The seed is large and measures about 36.32 μm long and 23 μm broad in size. The seed coat is bitegmic, outer seed coat is testa and inner seed coat is tegmen. Testa measures about 0.31 μm in thickness and tegmen about 0.39 μm thicknesses. Embryo is large and occupies almost all the space of seed cavity.

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

Horizon : Deccan Intertrappean beds.

Locality : Marai Patan, Tahasil- Jiwati, Dist. Chandrapur, Maharashtra, India.

Age : ? Uppermost Cretaceous.

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Plate I Photo 1 – 10



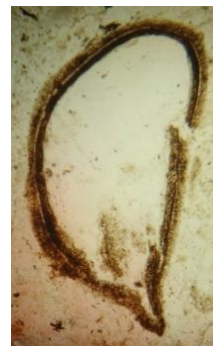
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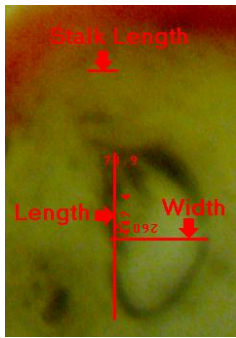
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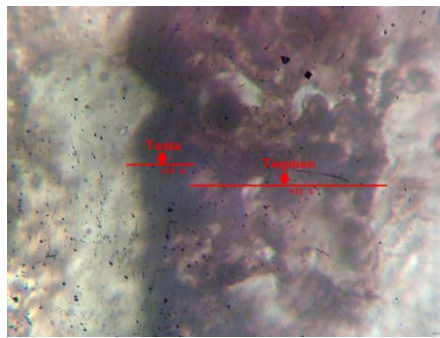
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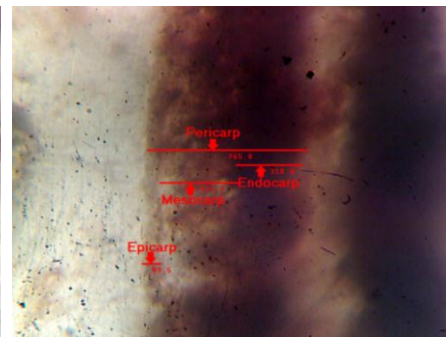
4



5 (Fruit-X10)



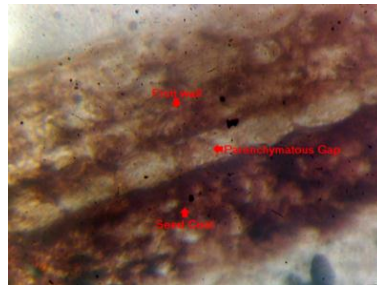
6 (Pricarp- X400)



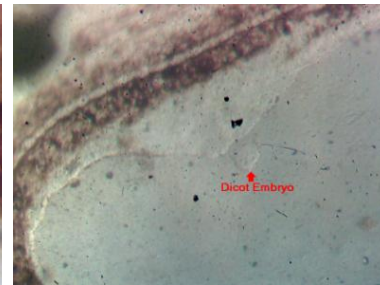
7 (Seed Coat-X1000)



8 (Vasculature, Funicle, Stalk of Fruit-X50)



9 (Gap between Fruit Wall & Seed Coat-X400)



10 (Dicot Embryo-X100)

Explanation of Plate Photo 1 to 10

Photo 1-4. A typical capsular fruit in L.S. showing size of the stalk increasing.....X20.

Photo 5. L. S. of Fruit showing length and width of fruit.X10.

Photo 6. L. S. of Pericarp showing epicarp, mesocarp and endocarp.X400.

Photo 7. L. S. of Seed coat showing Testa and Tegmen.X1000

Photo 8. L. S. of Fruit showing Vasculature, Funicle, Stalk of Fruit.....X50.

Photo 9. Gap between Fruit Wall & Seed Coat.....X400.

Photo10. L. S. of Fruit showing Dicot Embryo.....X100