IOSR Journal Of Humanities And Social Science (IOSR-JHSS)
Volume 19, Issue 8, Ver. II (Aug. 2014), PP 34-38
e-ISSN: 2279-0837, p-ISSN: 2279-0845.
www.iosrjournals.org

A New addition to Paleobiodiversity from the Deccan Intertrappean Beds of Singhpur, M.P., India

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Abstract: *Intertrapppean flora is rich in fossil angiosperm. There is record of large number of angiospermic fruits. The present fossil differs from all reported fruits in having its own unique hydrophytic character. The anatomical details were studied by etching the chert with hydrofluoric acid and peel sections were prepared without grinding the material. The fruit is bilocular, sessile oval to elliptical in shape, pericarp undifferentiated parenchymatous cells present, poor vascularature due to its hydrophytic nature. One fertile locule with single seed and other sterile with arenchymatous chamber. Fruit measures 1 mm in length and 375 µ m in breadth. The fruit wall measures 75 µ m in thickness. The fruit is compared with the reported fruits from the intertrappendeds, butTits differs from all of them, comparision is also drawn with modern living hydrophytic families such as Nymphaecea, Trapaceae, Hydrocharitaceae, Typhacea, Allismataceae, Potomogetonaceae, PortulacaceaeElatinaceae, Onagraceae, scrophulariceae, Pontedariaceae.Howeverit could not be comparable to any genus of these families. Hence new generic name is proposed to accommodate this fruit as Hydrocarponsinghpuriigen et Sp. Nov. The generic nameis after its peculiar character and specific name after the locality from where it was collected. The discovery of these new genus will add to the diversity of Deccan Intertrappean Beds of India.*
Key Words: *Hydrophytic fruits, bilocular arenchymatous chamber, floating devices, Singhpur, Deccan Intertrappean beds.Hence has been taken up for present investigation.*

I. Introduction

Intertrappean flora is rich in fossil angiosperm. There is record of large number of angiospermic fruits. All types of fruits are described so far they are capsules, berries, achenes, legumes, drupes etc. The present fossil fruit is new hydrophytic fruit with air chambers recorded from Deccan Intertrappean beds of SinghpurChhindwara district. This attribute of the specimen is quite interesting.

Material And Method

A piece of chert has been collected from singhpur, Chhindwara district, Madhya Pradesh. The anatomical details were studied by etching the chert with hydrofluoric acid and peel sections were prepared without grinding the material. The Camera lucida sketches of the fruit were drawn and the important stages of the fruits were photographed.

Description

The petrified hydrophytic capsular, bilocular, dehiscent fruit, possess prominent single seed in one locule and other possess many air chambers that are arenchymatous and might be having buoyancy (Text figs. 1, 2, 3; plate I Figs. 1,2,4). The Fertile chmber possess apical notch or beak like structures all these are floating devices and helped the fruit for water dispersal. The fruits was cut in longitudinal section some whatoval to elliptical sessile without stalk. The fertile chambers of the fruit measures 450 µ m in length, and sterile arenchymatous chamber measures 600 µ m in length. The fruit wall undifferentiated (Text figs 2, 3; Plate I Fig. 5)

Anatomically the fruit shows the following structures.

PERICARP:

The fruits wall or the pericarp measures 75um in thickness. The fruit wall is undifferentiated or not demarcated into three layers viz., epicarp, mesocarp, and endocarp. It has no internal stony layer due to its hydrophytic nature. The pericarp is two to three layers consist of thick walled parenchymatous cells with some dark brown deposition (Text Fig : Plate I Fig. 5) . The cells measures 30 µ m in thickness.

LOCULE :- It is a bilocular fruit with two well differentiated locules (Text Figs. 1,3; Plate 1 Figs. 1,2) of the two locules, one locule is fertile with a prominent single seed whereas the another locule is sterile with well

developedarenchymatous chambers. (Text Figs. 4,5,6; Plate 1 Figs. 2,3,4) . The fertile locules possess a beak like structure at its apex with some dark brownish content present in it. This beak like structure gives an indication towards the dispersal of fruits by agency of water, the beak serve as a float (Text figs. 4,5,6; Plate Figs 1,2,3) The sterile locule possesses many air chamber, the arenchymatous natureof fruit it indicates that it provides buoyancy to the fruit (Text Figs. 6,7; Plate 1 Figs. 2,3,4). The air chambers are thin walled some what rounded or oval in shape measures 120µm in diameter.

APICAL BEAK:

A beak like structure is present at the apex of the fruit. It might have served as float (Text Figs. 1-6 ; Plate I Fig. 3) The apical beak measures 225 µ m in length. The apical beak made of thin elongated cell filled with some dark brown contents. The cells of the beak measures 110 µ m in diameter. At first the structure appear singly as a beak but at latter stages the beak shows dichotomous branching covering the apical surface of the fertile locule.

SEED:

A single prominent seed is present in one of the chamber of fruit (Text Fig. 1,3 Plate Fig. 2) The seeds are elongated to oval in shape. It measures about 390 µ m x 220 µ m in size .it appears to have been developed from an orthotropus ovule. The seeds are bitegmic in nature. The seed coat is differentiated into testa and tegman. Attachment of the seed not clearly preserved the seed lie free inside the locule show free central plancentation . Inside the seed no tissue mass is observed. Exalbuminous or non-endospermic in nature. Embryo is not preserved. Hence no comments could make on the embryonic nature of the seed.

DEHISCENCE:

The fruit is a capsule showing loculicidal dehiscence. The fruits shows apicl split on the fertile locule suggests that the dehiscence of the fruit takes place loculicidally ?

DISCUSSION AND IDENTIFICATION

The important characters for the identification of present fruit are:

- Sessile oval to elliptical in shape.
- Bilocular, capsular, dehiscent.
- One locule fertile with single seed and other sterile with air chamber.
- Pericarp undifferentiated.
- A beak like structure present at the apex of fertile locule.
- Seed orthotropus.
- Seed pendulous central manner.
- Non-endospermic exalbuminious .
- Embryo not preserved.
- Fruit shows loculicidal dehiscence.

On the basis of above mentioned description the present fruit is bilocular, sessile, single seed in one locule, other with arenchymatous chamber and apical beak present on apex of fertile chamber, pericarp is undifferentiated with great reduction in vascular elements suggests that , present fruit is hydrophytic fruit. Due to all these hydrophytic character an attempt is made to compare the fruit with modern living hydrophytic families such *asNymphaeceaeTrapaceae, Hydrocharitaceae, Typhaceae,Allismataceae*, *Potomogetonaceae, Portulacaceae, convolvulaceae, Scrophulariceae, Amaranthaceae*, *Pontedariaceae, (*G.P. Roy., B.K. Shulka, BhaskerDatt , 1992).

*Nymphaeceae*differs from the present fruit in having 10-12loculedberry. *Trapaceae* resemblance in having beak like structure 1 seeded but they are drupe. *Hydrocharitaceae*differs from present fossil in unilocular with parietal plancentaton. *Typhaceae, Allismataceae* shows resemblances in having beak like structure but the fruits are achenes that take it apart form the present fruit. *Potomogetonaceae* shows similarity in having beaked 2 locules single seed, pendulous, but it differ from present fruit that is drupe. *Portulacaceae, Elatinaceae,* have capsular fruit but differ in having numerous seeds. Oresemble in having capsular fruit with loculicidal dehiscence but differ in having numerous seeds. Acanthaceae, Convolulaceae, shows similarity in having capsules, sessile, bilocular dehiscing loculicidally but differs in having no beak like structure. *Commelinaceae*, *Scrophulariceae*, similar in having two locules capsular fruit but differ in having many seeds. *Pontederiaceae* are capsular but differ in having 3 locules with axile placenta. *Amaranthaceae* shows similarity in having two locules, seed 1 pendular, capsules but differs in amphitropus nature. Tiliaceae shows similarity in having two locules, single seed having beak 3 fid with spreading branches. The present bilocular, capsular fruit with loculicidal dehiscence, single seed having beak with spreading branches all these character bring the fruit close

to the family Tiliaceae fruit shows much resemblance to the family Tiliaceae but not in all characters so the comparison is not made. The efforts to assign the fossils fruit to a living family did not result in placement under any of the above families due to some basic differences as cited above.

The present fossil fruit differs from all reported fruits in having its own unique hydrophytic character. When it was compared with the fossil fruits showing hydrophytic characters like pantocarpondeccanii (Juneja 1993) is a trilocular fruit of which two locules are fertile and third sterile with air gaps that helped for water dispersal. Chitaleyocarpondeccanii (Kumar 1993) is a unilocularbaccate fruit with reduced number of seeds. Seeds have thin undifferentiated seed coat. Seed shows presence of air chambers or float by detachment of inner endocarp, intact mesocarp and epicarp, that helps the fruit in dispersal. From this it is clear that present fruit does not show any resemblance with reported fossil, hence the name suggested for fruit Hydrocarponsinghpurii. The generic name is after its peculiar character and specific name after the locality from where it was collected.

DIAGNOSIS

Hydrocarpon gen. nov.

Fruit bilocular, sessile, oval to elliptical shape in a capsular pericarp, undifferentiated one fertile locule with single seed and other sterile with arenchymatous chamber, apical beak with spreading branches, loculicidal dehiscence.

Hydrocarponsinghpurii gen. et. Spp. Nov.

Fruit bilocular, sessile, oval to elliptical shape in a capsular pericarp, undifferentiated one fertile locule with single seed and other sterile with arenchymatous chamber. Fruit measure 1000µ m in length, sterile parenchymatous chamber measure600 µ m in length. Fruit wall undifferentiated measure 75 µ m in thickness, fertile locule possess single seed, orthotropus, free central placentation measures 390 µ m x 210 µ m in size, sterile locule of fruit measures 600 µ m in length with arenchymeatous cells thin walled, somewhat rounded or oval in shape, measures 120 µ m in diameter . Apical beak with spreading branches made up of thin walled elongated cells measures 110 µ m in length.

HOLOTYPE	:	SPQ/Ang – 5 / deposited at Botany Department, Institute of Science, Nagpur.
HORIZON	:	Deccan Intertrappean Beds.
LOCALITY	:	Singhpur M.P. India.
AGE	:	Upper Cretaceous?

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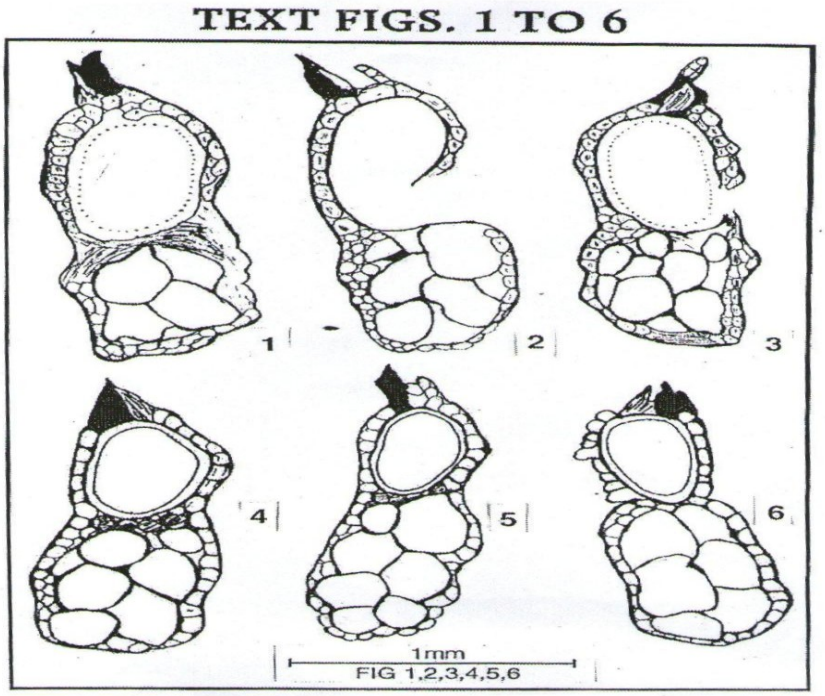
HYDROPHYTIC FRUIT
Hydrocarpon singpurii gen. ET. Sp. Nov.
Explanation of Text Figs. 1 to 6.

Fig: 1 to 6: L.S of fruit showing serial stages with two locules, one fertie and other with arenchyma chamber. Fertile locule showing single seed, with apical beak.

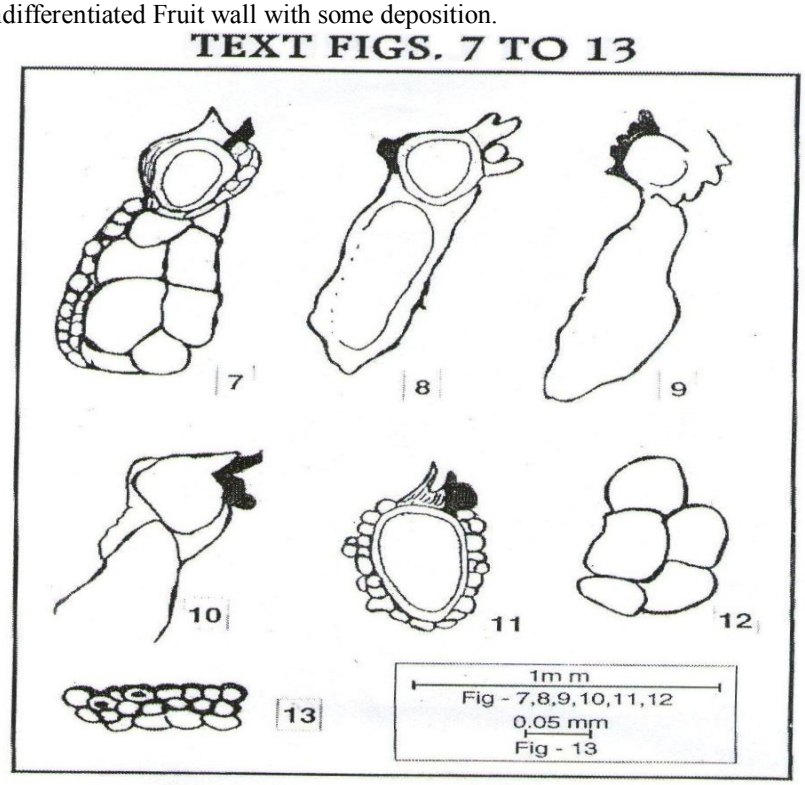
Fig: 2: L.S of Fruit showing loculicidal dehiscence in fertile locule



HYDROPHYTIC FRUIT

Hydrocarpon singpurii gen. et. Sp. Nov.
Explanation of Text Figs. 7 to 13.

Fig. 7 To 10: L.S of Fruit showing different disappearing serial stages.
Fig. 11: L.S of fertile locule showing single seed with apical beak.
Fig.12: Arenchyma cells within arenchymatous chamber.
Fig. 13 : L.S of undifferentiated Fruit wall with some deposition.



HYDROPHYTIC FRUIT
Hydrocarponsingpurii gen. et. Sp. Now.
Explanation of Plate Figs. 1 to 5.

Fig 1 : L.S of Fruit with two locule single seed present in one locule and arenchyma cells in other. 42X
Fig 2 : L.S. of Fruit showing arenchymatous locule. 83X
Fig.3 ; L.S. of Fruit showing fertile locule with single seed present inside the locule. With apical beak like structures present at apex of the fertile locule. 133X
Fig. 4 : L.S of Fruit showing both the locules, one with single seed and other with arenchymatous chamber. 111X
Fig. 5 : L.S of Fruit Showing undifferentiated fruit wall. 133X