

Centrospermocarpon mohgaonse sp. nov. A new species of capsular fruit from the Deccan Intertrappean beds of Mohgaonkalan, District-Chhindwara, M. P., India.

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ABSTRACT

The present paper deals with a description of a new species of petrified fruit from the famous Deccan Intertrappean beds of Mohgaonkalan, District-Chhindwara, M. P., India. The Fruit is a dicotyledonous, capsular, obovate. It is multicarpellary, multilocular, syncarpous with axile placentation having many ovules with loculidial dehiscence. The fruit measures 944µm in length and 773µm in breadth. Many locules are seen with well preserved seeds. The average total number of seeds in the fruit is found to be 12. The seeds are obovate, gradually become narrow towards the apex and measures 1.1x1.2 mm in size. The embryo is dicotyledonous having two cotyledons with endosperm. The embryo is well preserved, relatively large and curved. 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 fossil capsular fruits described earlier. As the fruit has central seed hence it is named as *Centrospermocarpon mohgaonse* sp. nov. The generic name is after the name of genus *Centrospermocarpon* (Sheikh & Kubalkar, 1979) and specific name is after the name of locality from where it was collected.

Keywords: Deccan Intertrappean, Dicotyledonous, Capsular fruit, Multicarpellary, Syncarpous.

INTRODUCTION

The present specimen incorporates the detailed morphological and anatomical description of a capsular fruit from the Deccan Intertrappean beds of Mohgaonkalan, District-Chhindwara, M. P., India. A number of dicotyledonous capsular fruits have been described from Deccan Intertrappean beds of India. *Indocarpa intertrappea* [1], *Daberocarpon gerhardii* [2], *Harrisocarpon sahnii* [3], *Sahnioocarpon harissi* [2], *Deccanocarpon arnoldii* [4], *Enigmocarpon sahnii* [5], *Centrospermocarpon chitaleyii* [6], *Hexaloculocarpon intertrappea*, *Duabangocarpon deccanii* [7], *Chitaleocarpon intertrappea* [8], *Rodeocarpon mohgaonse*, *Portulacaceocarpon bhuterensis* are the dicotyledonous capsular fruits reported from the Deccan Intertrappean beds of Mohgaonkalan, M. P., India. The Present capsular fruit is the additional report of capsular fruit from the Deccan Intertrappean beds of Mohgaonkalan, District-Chhindwara, M. P., India.

METHODOLOGY

The material was very well preserved in a black chert collected from the Deccan Intertrappean beds of Mohgaonkalan, Dist. Chhindwara, M. P., 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 obovate fruit with many seeds were 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.

DESCRIPTION

GENERAL DESCRIPTION

The fruit is multilocular, multiseeded & dehiscent having axile placentation. The fruit measures 944 μ m in length and 773 μ m in breadth (plate I, Figure 2). It is a petrified fruit with excellent cellular preservation. The fruit is differentiated in to outer pericarp and inner part containing many locules with seeds.

FRUIT MORPHOLOGY :

The petrified fruit is small, obovate in shape (Plate I, Figure 1). It is broad in the middle and narrower towards apex than the base. The fruit apex is marked by the presence of two small blunt projections called umbos, whereas the base is marked by blunt end. The umbo is bent and directed to two ends of apex. It measures about 315 μ m in length and 378 μ m in breadth and is elevated above the pericarp (Plate I, Figure 6) .

PERICARP :- The fruit wall or pericarp is well preserved and moderately thick, measures about 520 μ m and is differentiated into outer epicarp, middle mesocarp and inner endocarp (Plate I, Figure 3). Four conspicuous notches of about 157 μ m are seen distinctly on pericarp.

EPICARP :- It is outermost layer of the fruit and is measuring about 44 μ m in thickness. It is separated during preservation and is seen lying some distance away from the mesocarp (Plate I, Figure 3).

MESOCARP :- In between epicarp and endocarp parenchymatous mesocarp is present. It appears to be 150 μ m in thickness (Plate I, Figure 3) .

ENDOCARP :- It is the innermost layer of pericarp and measures about 326 μ m in thickness and consist of 3-7 layers of thick walled hexagonal cells (Plate I, Figure 3). In between pericarp and seeds a few thin walled parenchymatous cells are preserved at places (Plate I, Figure 3) .

LOCULES :- In longitudinal section many locules are seen with well preserved seeds (Plate I, Figure 1). The diameter of locule is 1.1x1.2 mm in size (Plate I, Figure 5).

PLACENTA :- The placentation is axile ; the seeds are attached with their funicle to the placenta (Plate I, Figure 8).

SEED :- Seeds are arranged in axile placentation (Plate I, Figure 8). The average total number of seeds in the fruit calculated from the serial transverse sections is found to be 12. The seed are obovate, gradually becomes narrow towards the apex and measures 1.1x1.2 mm in size (Plate I, Figure 5).

SEED COAT :-The seed coat is bitegmic, outer seed coat is testa and inner seed coat is tegmen. The testa is made up of 6-7 layers of elongated cells measuring about 1044µm in thickness. The tegmen is 2-3 layers of cells in thickness and measures about 144 µm. A gap is observed between the tegmen and the embryo (Plate I, Figure 4).

EMBRYO :-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 (Plate I, Figure 7). The embryo is dicotyledonous having two cotyledons with endosperm (Plate I, Figure 7).

DEHISCENCE : - Along the pericarp wall distinct gaps are seen which shows loculicidal dehiscence (Plate I, Figure 9).

DISCUSSION AND IDENTIFICATION

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

1. Fruit is obovate, multilocular , multiseeded with loculicidal dehiscence .
2. Fruit wall is differentiated in to Epicarp, Mesocarp and the Endocarp.
3. Presence of two umbos and four notches on fruit wall.
4. Total number of seeds is 12.
5. Seed coat is thick and differentiated into Testa and Tegmen.
6. Embryo is large, curved and dicotyledonous with endosperm.

From these characters it is evident that the described fruit was formed from multicarpellary, multilocular, syncarpous with axile placentation having many ovules with loculicidal dehiscence. Nature of the fruit appears to be capsular due to fleshy pericarp and dehiscence.

COMPARISON WITH FOSSIL FRUITS

The previously described fossil fruits from the Deccan Intertrappean beds of India are different from the present fruit in number of character. *Indocarpa intertrappea* [1] is tetralocular and multiseeded capsule. *Harrisocarpon sahnii* [3] is ribbed pentalocular capsule

with two seeds in each loculus. *Sahnioocarpon harrissi* [9] is pentalocular capsule with one seed in each locule. *Daberoocarpon gerhardii* [2] is ten locular with one seed in each locule. *Deccanocarpon arnoldii* [4] is eight locular capsules with one row of seeds in each locule. *Centrospermocarpon chitaleyii* [6] differs in having one umbo, one notch, seeds arranged in two rings; seeds in peripheral rings are non-endospermic and in five tiers with spiny seed coat. *Orygiocarpon jhargadi* [10] differs in having pentalocular, many seeded, loculicidal capsule. *Duabangocarpon deccanii* [7] differs from the present fruit as it is multiseeded, multilocular capsular fruit with persistent calyx. *Hexaloculocarpon intertrappea* differs in having hexalocular, single seed in each locule, and capsular fruit with septicidal dehiscence. *Chitaleocarpon intertrappea* [11] differs from the present fossil as it is seven locular, seven ribbed capsular fruit with loculicidal dehiscence. *Zygophyllaceocarpon tetragonii* differs in having septicidal capsule having one to many seeds of oblong to linear shape in each locule. *Rodeocarpon mohgaonse* differs in having multilocular, multiseeded, some locule with two seeds and axile placentation. *Portulacaceocarpon bhuterensis* differs in having dehiscent capsule, unilocular with 18 seeds, free central placentation. Thus the present fossil fruit does not resemble any of the fossil capsular fruits described earlier.

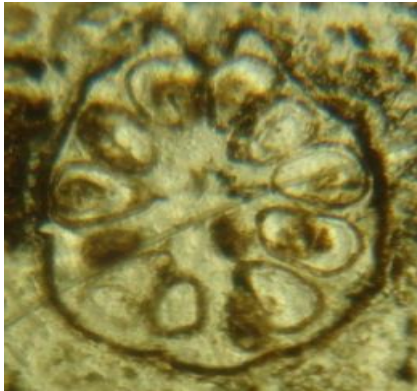
COMPARISON WITH THE MODERN TAXA

The present fossil fruit is compared with the many modern dicotyledonous families like Zygophyllaceae, Dilleniaceae, Marcgraviaceae, Clusiaceae, Ternstroemiaceae, Geraniaceae, Balsaminaceae, Onagraceae, Myrtaceae, Flacourtiaceae, Malpighiaceae, Passifloraceae, Sterculiaceae etc. which resembles in shape and size of the fruit, many seeds, type of embryo, presence of endosperm and capsular fruits. Family Zygophyllaceae differs in having septicidal nature of fruits with membranous testa and axile placentation, while the present fruit shows loculicidal dehiscence. Family Dilleniaceae differs in having funicular aril and few or solitary seeds. Family Marcgraviaceae shows spherical capsule and numerous small seeds, while Clusiaceae differs in having septifragal opening. Family Ternstroemiaceae possesses 2 to 5 chambered capsular or baccate fruits.

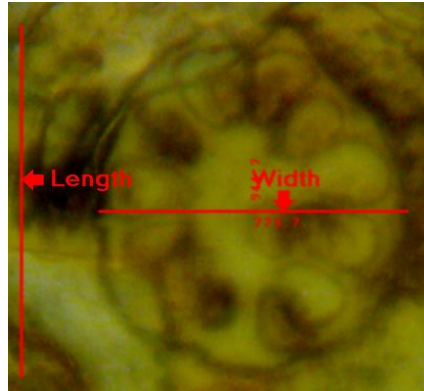
Family Balsaminaceae differs in loculidial dehiscence with compressed seeds. Family Onagraceae differs in having central column bearing seeds with persistent calyx. Family Myrtaceae differs in having persistent

calyx at the crown of the fruit, while in family Flacourtiaceae the fruit is 3-5 chambered. Family Passifloraceae differs in pulpy fruit, seeds having sac like aril.

Plate - I



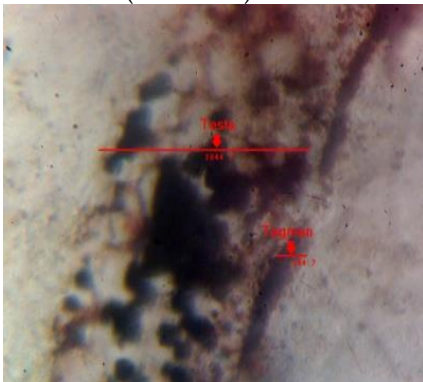
1 (Fruit-X10)



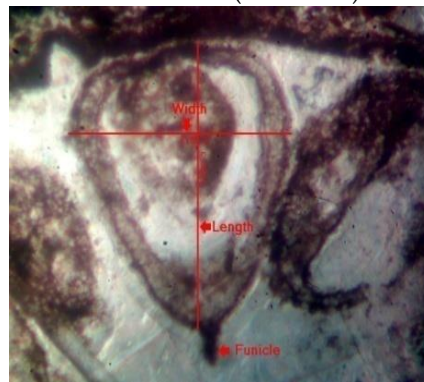
2 (Fruit-X10)



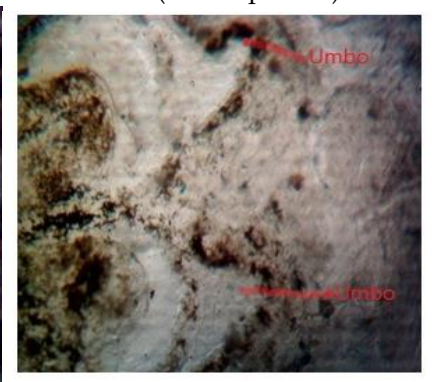
3 (Pericarp-X100)



4 (Seed Coat-X400)



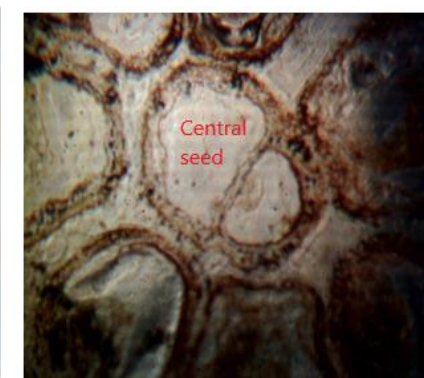
5 (Size of Locule & Seed-X100)



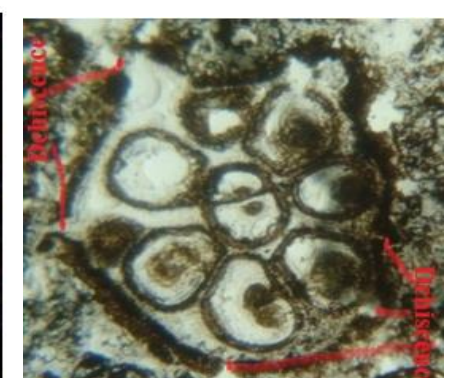
6 (Fruit with two Umbos-X100)



7 (Endosperm & Embryo-X100)



8 (Central seed with Axile Placentation-X100)



9 (Loculicidal dehiscence-X100)

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 fossil capsular fruits described earlier. As the fruit has central seed hence it is named as *Centrospermocarpon mohgaonse* sp. nov. The generic name is after the name of genus *Centrospermocarpon* [6]

and specific name is after the name of locality from where it was collected

DIAGNOSIS

Centrospermocarpon mohgaonse sp. nov. is a dicotyledonous, capsular, obovate fruit. It is multicarpellary, multilocular, syncarpous with axile placentation

having many ovules with loculidial dehiscence. Many locules are seen with well preserved seeds. The diameter of locule is 1.1x1.2 mm in size. Seeds are arranged in axile placentation. The average total number of seeds in the fruit is found to be 12. The seeds are obovate, gradually become narrow towards the apex and measures 1.1x1.2 mm in size. The fruit wall or pericarp is well preserved and moderately thick, measures about 520 µm and is differentiated into outer epicarp, middle mesocarp and inner endocarp. Four conspicuous notches of about 157 µm are seen distinctly on pericarp. Epicarp is outermost layer of the fruit and is measuring about 44 µm in thickness. It is separated during preservation and is seen lying some distance away from the mesocarp. In between epicarp and endocarp parenchymatous mesocarp is present. It appears to be 150 µm in thickness. Endocarp is the innermost layer of pericarp and measures about 326 µm in thickness and consists of 3-7 layers of thick walled hexagonal cells. The seed coat is bitegmic, outer seed coat is testa and inner seed coat is tegmen. The testa is made up of 6-7 layers of elongated cells measuring about 1044 µm in thickness. The tegmen is 2-3 layers of cells in thickness and measures about 144 µm. A gap is observed between the tegmen and the embryo. Embryo appears to be made up of thin walled cells with single layered epidermis. It is well preserved, relatively large and curved. The embryo is dicotyledonous having two cotyledons with endosperm.

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

Horizon : Deccan Intertrappean beds.

Locality : Mohgaonkalan, Madhya Pradesh, District-Chhindwara, India.

Age : ? Uppermost Cretaceous

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

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