



# A New Schizocarpic Fruit *Labiataeocarpon mohgaonse* gen. et sp. nov. From The Deccan Intertrappean Beds Of Mohgaonkalan, M. P., India.

Machhindra P. Nandeshwar

Department of Botany, S. A. Science College Salekasa, Dist. Gondia

Email:- mpnandeshwar@gmail.com

**Abstract:** - The present specimen deals with the investigation of a new fossil dicotyledonous schizocarpic fruit from the Deccan intertrappean bed of the Mohgaonkalan, M.P., India. The dicotyledonous fruits described from these beds are generally capsules, berries, and drupes. Occasional occurrences of schizocarpic fruits have also been reported. The capsular fruits include *Enigmocarpon parijae*; *Indocarpon intertrappea*; *Harrisocarpon sahnii*; and *Drupaceocarpon sheikhii*. A few schizocarpic fruit *Daberocarpon gehardii* and *Schizocarpon aliformi* from central India.

**Key-words:** *Schizocarpic*, *dicotyledonous*, *Intertrappean*, *Labiataeocarpon*.

## 1. INTRODUCTION: -

The present specimen deals with the investigation of a new fossil dicotyledonous schizocarpic fruit from the Deccan Intertrappean bed of the Mohgaonkalan, M.P., India. The dicotyledonous fruits described from these beds are generally capsules, berries, and drupes. Occasional occurrences of schizocarpic fruits have also been reported. The capsular fruits include *Enigmocarpon parijae*, *Indocarpon intertrappea*, and *Harrisocarpon sahnii*. A few drupes reported from these beds are *Erythroxylocarpon intertrappea*; *Grewia mohgaonse*; *Juglandiocarpon agashii*; *Oleaceocarpon nagpurensis*; *Nautiyalocarpon singhpurii* and *Drupaceocarpon sheikhii*. schizocarpic fruit *Daberocarpon gehardii* and *Schizocarpon aliformi*.

## 2. MATERIAL AND METHOD: -

A piece of black chert showing very fine preservation collected from the Deccan Intertrappean beds of Mohgaonkalan when broken, showed well-preserved dicot fruit in oblique transverse view on part and counterpart. Several serial sections were taken by using the peel method after etching the surface with hydrofluoric acid and peels were mounted in Canada balsam.

## 3. DESCRIPTION: -

The studied fruit has four locules, the upper and lower ones are fertile, while two middle locules are sterile (Text Figs. 1 to 10; Plate I Figs., 1 to 8). Investigated fruit have part and counterpart after etching with a hydrofluoric acid total of 180 sections made, so from peel no. 21 on words, a sterile chamber starts diminishing in such a way that in peel no. 39 shows two fertile chambers and ultimately form separate fruit lets. The counterpart of fruit initially shows four locules, upper and lower and two middle but in peel no. 99 the septa disappear and it shows three locules, but in peel no. 153 again a septa develops in the middle chamber forming the four locular fruit. The pericarp shows tapering in such a way that, the fruit appears like a samara. The oblique transverse section of the fruit appears oblongate in shape and measures about **6.0 mm** in length and **1.8 mm** across the middle. The fruit was initially two + two (Four locular). The complete material is found in part and counterpart. The first few Sections of the part and counterpart show 2-fertile and 2 - sterile chambers, which gives the idea it is tetralocular after the few sections of the part the sterile chamber disappears



one by one and in the counterpart, the fertile chamber disappears one by one. There is no dehiscence and splits into distinctly separate fruit-lets or mericarps. This points to the possibility of the fruit to be of schizocarpic in nature.

The anatomical details of the fruit are as follows.

**PERICARP:** The pericarp is well preserved and is moderately thick measuring **225 µm** in thickness. It is differentiated into three major zones - the outer epicarp, middle mesocarp, and inner endocarp. (Text Fig. 11 and 12; Plate, Figs., 9 and 10). The pericarp of the upper and lower locule shows tapering giving the fruit a samaroid appearance.

1. **EPICARP:** - This is the outermost well-developed layer of the fruit; it is two to three layered in thickness, measuring **30 µm** made up of thick-walled well preserved parenchymatous cells with dark brown contents. It is bounded by an unilayered epidermis and stomata are also seen (Text Fig. 11 and 12; Plate Fig., 11 and 12).
2. **MESOCARP:** - This is the well-defined broad middle layers of the pericarp. The width in the broader region is **150 µm**. It is made up of thin-walled parenchymatous cells with dark brown contents due to which the mesocarp looks dark brown.
3. **ENDOCARP:** - This is the innermost region of the pericarp. It is one-celled layer thick, measuring **60 µm**. and made up of thick-walled tubular and undifferentiated cells lining the lumen containing the seed (Text Fig. 11 and 12; Plate Fig., 9 and 10).

**LOCULE:-** T.S. of the fruit shows four well-preserved locules. The size of the upper locule is **1.42 mm**, the middle left is **1.35 mm**, the middle right is **2.16 mm**, & lower is **1.50 mm**; the seeds are seen only in two locules. However, two are empty. Among the four locules of the fruit two locules are fertile with a single seed in each locule and two locules are sterile. The size of the locules varies in different sections at different stages.

**SEED:-** The seed is large measuring about **1.52 mm** in diameter and oval in shape. The seed of each chamber is attached to the central axis showing an axil placenta ion.

**SEED COAT:-** The seed coat is bitegmic and thin-walled. It measures about **45 µm**, in thickness. It is differentiated into testa and tegmen and it is made up of parenchymatous cells.

**EMBRYO:-** The embryo is not seen.

**DEHISCENCE:-** The fruit does not show dehiscence in any typical fashion and persists till the last peel. At this stage, the fruit splits into distinctly separate fruitlets or mericarps each enclosing a seed in it. This points to the possibility of the fruit being schizocarpic in nature.

#### 4. DISCUSSION AND COMPARISON:

From the above description of the fruit, it reveals certain important characteristics e.g. four chambered fruit with two being sterile and two fertile with seed in it, the pericarp is differentiated. The seed coat is undifferentiated. The fruit is schizocarpic dehiscing. Fossil fruit offers several peculiarities when a detailed study of the same is made. The present fruit is tetralocular with two fertile and two sterile locules. The fertile locule contains a single seed. The fruit is probably derived from the bicarpellary, syncarpous ovary, and *bilocular in the early stage but becomes tetralocular in a later stage*. Ovary superior, four-chambered, axils placentation, single ovule in each locule. The fruit is four nuts lets like. The fruit is schizocarpic dehiscing in the sterile two chambers and forms independent fruitlets. All those characters make it possible to as certain their affinities with the living families and assign them to a family of its closest resemblance. In dicot, the series bicarpallatae shows the presence of two carpels. The ovary is syncarpous and superior. We come across these attributes in the fossil Specimen under study. So, its affinities with the families under the series have been examined. Many fruits are investigated from various localities and this fruit has been compared with many living families but those families have a Capsule with loculicidal dehiscence. (Cooke, 1956; Rendle, 1963; and Chopra, 1965). So the affinities with the other order i.e. 1) *Gentianales*, 2) *Santalales*, & 3) *Tubiflorae* have been investigated.

**ORDER – *Gentianales*** - It has these families -1) *Loganiaceae*, 2) *Gentianaceae*, 3) *Apocynaceae*, and 4) *Asclepiadiaceae*. *Loganiaceae*, bears gynoecium syncarpous bi-carpellary ovary bilocular, axile placentation, superior ovary, ovules many, fruit a capsule, rarely a berry or a drupe. *Gentianaceae*, bears gynoecium syncarpous carpellary, ovary usually unilocular with two parietal placentations, bilocular with parietal placentation in "*Exacum*". Ovule numerous. Fruit a Septicidal capsule, seeds with fleshy endosperm, and a small embryo. *Apocynaceae* bears gynoecium composed of two



carpels which may be either fully syncarpous as in *Carissa* or many remains free below with two distinct as in *Catharanthus*. Each ovary is superior or half inferior unilocular with parietal placentation with syncarpous, and bilocular with axile placentation. Ovule two too many. Fruit a follicle (*Plumeria*, *Nerium*) Capsule (*Allemanda*) drupe (*Thevetia*), or a berry (*Carissa*), seed with fleshy endosperm and straight embryo. **Asclepidaceae**, gynoecium apocarpous, bicarpellary, ovary unilocular, placentation marginal, superior, ovule numerous. Fruit is an etaerio of follicles, seed many, usually flattened crowned with the fruit of long silky hairs.

The above-described families are different from the present fossil fruit because it has four chambers, that's why this fruit is teralocular and has the schizocarpic characteristic.

**ORDER – SANTALALES:-** The present fossil specimen compared with the order - Santalales, Order- Santalales includes 7 families. The Oleaceae family belonging form Santalales is compared with the present fossil specimen. This family has been given the character i.e. gynoecium syncarpous, 3 to 4 carpellary, ovary superior, often appearing as inferior due, to adnation to the surrounding disc, 3 to 4 locular, placentation axile, Fruit a drupe or a berry. Present fossil specimen fruit have a tetralocular but schizocarpic hence it is different from this family. It is again compared with the families of Order Tubiflorae Different families such as (1) Convolvulace, (2) Boraginaceae, (3) Verbanaceae, (4) Labiateae (5) Calitrichaceae, and (5) Pedaliaceae. **Convolvulaceae** bears gynoecium syncarpous, bicarpellary ovary bilocular, placentation axile, 2 ovules in each locule or tetralocular by the formation of the false septum and one ovule per locule, fruit a loculicidal capsule, indehiscent and fleshy in "*Argyria*". **Boraginaceae** bears gynoecium syncarpous, bicarpellary ovary bi-or tetralocular superior, one ovule in each locule on axile placentation, the fruit of 4 nutlets (2 – nutlets in *Cerenthe*) or a 1 to 4 seed nut or a drupe as in *Cordioidae*. **Verbanaceae** bears gynoecium syncarpous, bi - tetra *Duranto*) or pentacarpellary (*Geunsia*), ovary superior, locule as many as number of carpels or twice the number by false septation, placentation axile, ovule 1 per locule. Fruit is usually a drupe with many pyrenes as the number of ovules in the ovary or nutlets, as in *Verbena*, or 2 to 4 valved capsules, as in *Avicennia*. Seed without endosperm and a straight embryo. **Callitrichaceae** bears gynoecium syncarpous, bicarpellary ovary superiors, bilocular or tetralocular by the formation of a false septum, placentation axile, and ovule 1 per locule. Fruit a drupe splitting into 2 or 4 pyrenes or drupelets, seeds with fleshy endosperm, and a straight embryo. **Pedaliaceae** bears gynoecium syncarpous, bicarpellary ovary superior of the interior as in *Trapella*, bilocular but tetralocular later due to formation of a false septum, placentation axile ovules one too many on each placenta Fruit a loculicidal capsule or nut. **Labiatae** bears gynoecium syncarpous, bicarpellary syncarpous, ovary bilocular, in early stage but tetralocular in later stage, ovary superior, 4 chambered, axile placentation, Single ovule in each locule. Fruit schizocarpic, carcerulus, 4 nutslets developed. The families of **ORDER - TUBIFLORAE** have been compared with the present fossil specimen; no Compromising character gives the families of Tubiflorae except one i.e. "**Labiatae**". The family Labiatae of the **Order – Tubiflorae and Sub – Order –Laminales**, Show great similarities with the present fossil fruit studied in being four chambered ovaries formed by false septum. In the family Labiatae, the ovary becomes a Tetralocular means it has a four-chambered ovary formed by false septation and each chamber with one ovule. But the above-studied fossil in being four - chambered ovary formed by false septation two chambers are fertile and the other two are sterile. The fruit has also shown this variation in being four one-seeded nutlets. In the family Labiatae species *Ocimum sanctum* gives some similar characteristics like 2 carpels (bicarpellary), syncarpous ovary bilocular in the early stage but tetralocular in the later stage, ovary superior 4 - chambered, axile placentation, single ovule in each locule, fruit schizocarpic, carcerulus, 4 nutlets developed. The present fossil specimen is further compared with some reported fossil specimens, by this comparison, gives some clues to identify the present fossil specimen. **Enigmocarpon parijae** (Sahni, 1943). It is **2.3 mm** long, **1.5 to 2mm** broad, and 6 - 12 locular with a thick spongy wall each locule contains a row of seeds but the present specimen is tetralocular with a single seed in each locule. Hence it is different from the present specimen. **Indocarpa intertrappea** (Jain, 1963), It is a septifragal capsule with columella and fleshy testa. It is **3.0 x 2.5 cm** in size and much larger than the present specimen. It has a similar character such as tetralocular but it is different from the present specimen because of schizocarpic fruit and single seed in each locule. **Indocarpa intertrappea** contains 80 - 100 seeds. **Nautiyalocarpon singhpurii** (Juneja, 1993), is a bilocular, bicarpellary, oblongate, syncarpous superior ovary with two chambered drupaceous fruit. The seed coat is differentiated into testa and tegmen. The present fossil specimen is completely different. **Daberocarpon gerhardii** (Chitaley and Sheikh, 1973), is a tetralocular septicidal fruit containing

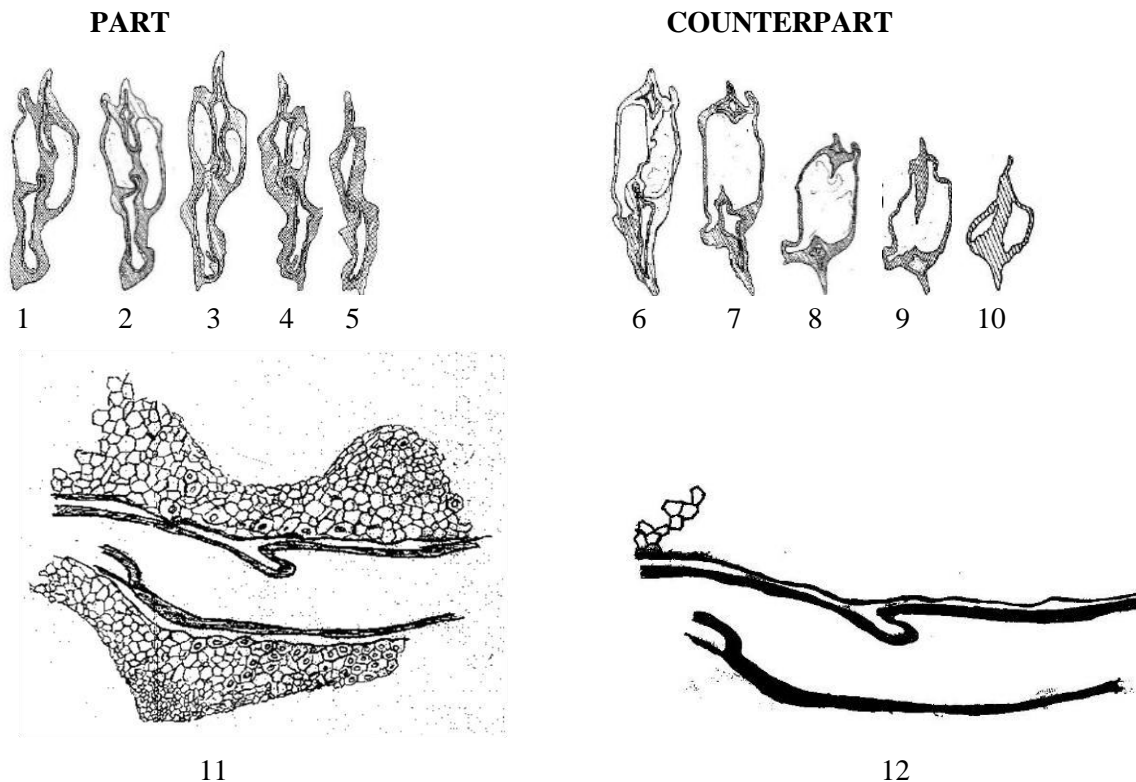
a single seed in each locule. But the present fossil specimen has four locules and one seed in each locule only the Schizocarpic type characteristic is the same but all other characteristics are different. *Schizocarpic aliformii* (Bhowal, 2002) fruit irregular eye-shaped. Fruit bilocular with two fertile chambers and middle empty space. Two untegmic seeds in each locule, each with a distinct embryo sac. Fruit dehisces in the sterile chamber and forms two independent fruitlets. *Drupaeocarpon sheikhii* (Khursel, 2022) fruit dicotyledonous indehiscent drupe, trilocular with two fertile locules and one sterile locule. This present fossil fruit differs by the presence of four locules (tetralocular)

The above discussion points out that no resemblance presents fossil fruit to any reported fossil specimen. This present fossil specimen gives character resemblance with *labiatae*. *Labiatae* family gives the many similar characters. Hence the fossil fruit is named as *Labiataeocarpon mohgaonse gen. et sp. nov.* The generic name is after the family *labiatae* and the specific name is after the beds.

### 5. DIAGNOSIS:-

*Labiataeocarpon mohgaonse gen. nov.* Fruit irregular, tetralocular, pericarp differentiated epicarp, mesocarp & endocarp seed bitegmic. Fruit is tetralocular. Fruit is schizocarpic. Fruit oblongate shaped **6.0 mm** in length and **1.8 mm** in width. Fruit tetralocular with two sterile and two fertile chambers. Pericarp **210 µm** to **225 µm** in thickness. Epicarp measures **25 µm** to **30 µm**. Three to four-layered parenchymatous mesocarp is **150 µm** thick and is 4 to 6 layered outer 8 to 4 layers of thin-walled parenchymatous cells middle layer 3 layered. Inner 2 to 3 layers of thick sclerotic cells. The endocarp is single-layered measuring **60 µm** in thickness with two bitegmic seeds in each locule, embryo is not seen. Fruit is schizocarpic.

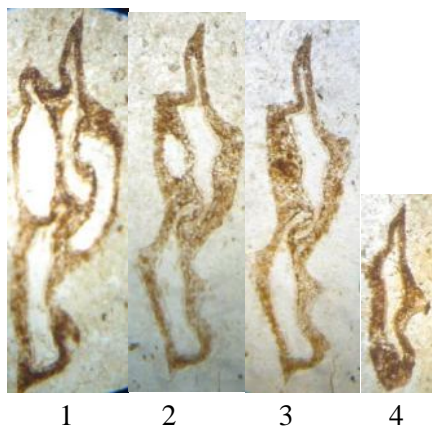
**Explanation of Text figs.:** 1 to 5 show Part of the fruit and four locules to two locules; 6 to 10 show counterparts and fig. 11 shows cellular detail, hexagonal cells, and stomata at the epidermal layer, fig. 12 shows seed coat.



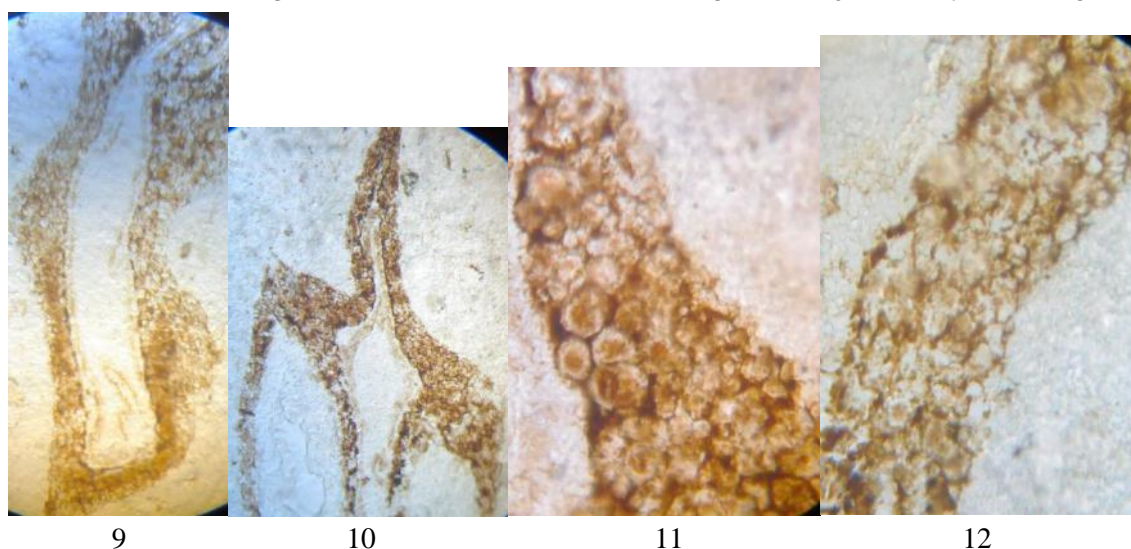
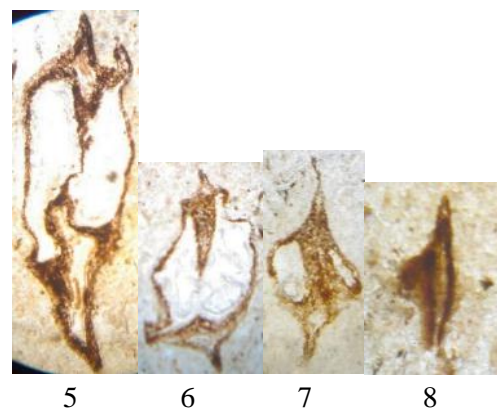
**Explanation of Plate:** 1 to 4 showing Part of the fruit and showing four, three, two, and one locules in part.; 5 to 8 showing four, three, two, locules and vanishing stage in counter part, Plate 9 showing complete seed in locule, 10 showing fruit wall and seed with seed coat, 11 and 12 showing fruit wall.



PART



COUNTERPART



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