



## A PETRIFIED DICOTYLEDONOUS LEAF *MOHGAOPHYLLUM DECCANII* FROM MOHGAONKALAN, M.P, INDIA

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### ABSTRACT:

A petrified dicotyledonous leaf from the Deccan Intertrappean Cherts of Mohagaonkalan, Chindawara district, M.P., India. so far many dicotyledonous and monocotyledonous leaf impression have been studied by many workers. There is scanty record of petrified leaves from these beds. Leaf petrified, dicotyledonous, dorsiventral, hypostomatic, epidermis hairy, unilayered, mesophyll differentiated into palisade, spongy parenchyma, canals in mesophyll, arc shaped vascular bundle in midrib with distinct bundle sheath, vascular bundle conjoint, collateral, concentric, veinlet bundle, conjoint, collateral, concentric with bundle sheath. It is named as *Mohgaophyllum deccanii* gen. et sp. nov. generic name is given after the locality and the specific name is given the horizon.

**Key words:** - fossil leaf, sedimentary beds, dicotyledonous, dorsiventral etc.

### INTRODUCTION:

This chapter deals with the detailed description of dicotyledonous leaf from the Deccan Intertrappean Cherts of Mohagaonkalan, Chindawara district, M.P., India. so far many dicotyledonous and monocotyledonous leaf impression have been studied by many workers. There is scanty record of petrified leaves from these beds. Sheikh and Kolhe (1978) reported petrified dicotyledonous leaf that is, *Deccanophyllum intertrappea* from Mohagaonkalan. Kolhe (1980) included two more leaf genera *Dorsiventrophyllum* and *Morphophyllum* from the same beds. Karanjekar (1982) reported new leaf genus *Cornaceophyllum intertrappea*. *Julianiophyllum sahnii* Kapgate (1982), *Salicaceophyllum mohgaonsis* Kapgate D.K & Sheikh M.T. (2008), *Deccanophyllites sheikhii* (Kokate P.S, 2014), *Acanthophyllum shiblii* (Ramteke D.D & Kapgate D.K., 2014). The leaf studied here is the further addition to the knowledge of leaves from this area.

### MATERIAL AND METHODS :-

Some silicified cherts were collected from Mohagaonkalan. While observing the pieces of these cherts, the present leaf specimen was seen showing good preservation. After etching it with hydrofluoric acid, serial peel section were taken from transverse plane.

**DESCRIPTION:** The leaf is dorsiventral, swollen in the midrib portion showing main vascular bundle

and lateral veins in the lamina. Stomatal gaps are seen on the lower side. Lamina is hairy and canals are also seen in the lamina (Plate I, Figs. 1 & 2).

The leaf is dorsiventral, having swollen midrib on lower side (Plate I, Figs. 1,2&4). It is 0.57 mm thick in the midrib and 0.20 mm thick in the laminar region. The lamina is board measures 12.12-12.30 mm in breadth, on right side 7.42-8 mm broad and on the left side 3.6-3.9 mm broad from the midrib. Lamina is more or less uniform in thickness expect at veins and veinless where it is slightly bulged ranging in thickness from 0.2-0.28 mm.

The upper epidermis is single layered, covered with thick cuticle, the cells of which are squarish, 20-25 $\mu$  in diameter (Plate I, Figs. 2,3,4&5). Unicellular hairs are seen arising from the upper epidermis. These are poorly preserved. These are 21-23 $\mu$  in length and 3-6 $\mu$  in breadth.

This layered is followed by mesophyll tissue which is differentiated into single layered palisade and 2-3 layered spongy parenchyma. The palisade cells are compactly contents (Plate I, Figs. 2,3,&4). These are 53.9-69.3 $\mu$  in length and 23.1-30 $\mu$  in breadth. The cells of spongy parenchyma are polygonal, loosely arranged measuring 23.1-40.5 $\mu$  in diameter (Plate I, Figs. 2&3). Roundish canals are seen in mesophyll, measures 0.1mm in diameter. These are bounded by a single layer of epithelial cells. These cell are thin walled. Brownish

dark contents are seen in the canals (Plate I, Figs. 3).

Spongy parenchyma is followed by lower epidermis. It is poorly preserved and cells are same as upper epidermis but these are comparatively smaller measuring 18-22.4 $\mu$  in diameter. (Plate I, Figs. 3). hairs are not prominent on this layer. Some gaps are observed on the lower epidermis (Plate I, Figs. 2). However typical stomatal structure is not clear.

The midrib region is triangular in shape, showing centrally situated vascular strand (Plate I, Figs. 2&4). The vascular bundle is arc shaped, conjoint, collateral and concentric. Xylem elements are 10-12 facing the upper side (Plate I, Figs. 2&4). Xylem vessels are 26-46 $\mu$  in diameter. A prominent bundle sheath is seen enclosing the vasculature. The cells of this layer are sclerenchymatous and thick walled, 28-30 $\mu$  in diameter (Plate I, Fig. 4).

The vascular strands of the lateral veins are seen in the lamina. it is conjoint, collateral and concentric. They show 6-7 xylem elements, 40-42 $\mu$  in diameter surrounded by thin walled polygonal parenchymatous cells (Plate I, Fig.5). These cells are 30-35 $\mu$  in diameter.

**IDENTIFICATION AND DISCUSSION:** From the above description, it is evident that the fossil leaf under consideration is dorsiventral and therefore belongs to dicotyledonous family. The important anatomical characters of this leaf are as follows:

1. Single layered hairy epidermis with cuticle.
2. Absence of hypodermis.
3. Mesophyll differentiated into single layered palisade and 2-3 layered spongy parenchyma.
4. Presence of canals in mesophyll.
5. Stomatal gaps restricted to lower epidermis.
6. Single median vascular bundle with bundle sheath.

This leaf is compared with earlier reported fossil leaves. When it is compared with *Deccanophyllum intertrappea* (Kolhe and Sheikh, 1978). It is seen that present leaf differs in, not having palisade in two rows and air cavities in spongy parenchyma. Canals and hairy epidermis are also lacking.

*Dorsiventrophyllum agashii* (Kolhe, 1980) shows large parenchymatous epidermis cells with conical apex, vascular bundle without sheath and absence of canals. These characters are not seen in present leaf.

*Julianiophyllum sahani* (Kapgata, 1982) differs from this leaf in having smooth epidermis and vessels of midrib are radially arranged.

*Cornaceophyllum intertrappea* (Karanjekar, 1982) differs from the present specimen in having idioblast cells, large parenchymatous pith, in vascular bundle, vessels are radially arranged, additional subsidiary bundles and absence of canals.

From the above characters it is seen that the present leaf is different from the other leaves reported from this horizon.

The affinities were further traced with modern genera. The specimen is comparable with Guttiferae, Hypericaceae, Julianiaceae, Celastraceae and Cornaceae, families of Angiosperm.

The leaves of family Guttiferae shows similarity in the presence of canals, stomata on lower side, arc shaped vascular bundle and hairy epidermis. But in Guttiferae hypodermis is present and mesophyll is reticulate (Metcalf and Chalk, 1950). The leaves Hypericaceae although identical, does not show bundle sheath which is definite character of the present specimen.

The leaves of family Julicaniaceae are comparable with this specimen but occurrence of resin canals in phloem of vascular bundles of veins and enlarged idioblasts in the mesophyll, are the characters lacking in this leaves.

The family Celastraceae show following characters comparable with this leaves, like epidermis with cuticle, secretory canals in mesophyll, stomata on lower side, simple and single vascular strand. But sclerenchyma in vascular bundles of veins and homogenous mesophyll are the two characters which separates it from this specimen.

The Cornaceae leaves are closely comparable with this leaves. When the comparisons are made on generic level, it shows epidermis with unicellular hairs and outer walls of epidermis thickened like *Corokia*, *Curtisia* and *Griselinia*. Mesophyll is differentiated into single layered palisade as in *Cornus* and *Curtisia* and 1-2 layered in *Mastixia* (Metcalf and Chalk, 1950). According to Faure (1924), midrib shows single vascular strand as in *Curtisia* and *Griselinia*. Sclerenchymatous sheath is present as in *Mastixia*. The hypodermis is confirmed only in *Griselinia*. In other species it is not known (Metcalf and Chalk, 1950). Canals observed in the cortex of *Mastixia*.

Thus the present fossil does not resemble extant and extinct genera. The different are assorted among various genera of cornaceae although it is somewhat close to *Curtisia* and *Mastixia*. It is named as *Mohgaophyllum deccanii* gen. et sp. nov.

generic name is given after the locality and the specific name is given the horizon.

#### DIAGONISIS:

##### Generic Diagnosis:-

##### *Mohgaophyllum gen.nov.*

Leaf petrified, dicotyledonous, doriventral, hypostomatic, epidermis hairy, unilayered, mesophyll differentiated into palisade, spongy parenchyma, canals in mesophyll, arc shaped vascular bundle in midrib with distinct bundle sheath, vascular bundle conjoint, collateral, concentric, veinlet bundle, conjoint, collateral, concentric with bundle sheath.

Specific diagnosis:-

*M.deccanii* sp. nov.

Leaf 12.12 x 12.30 mm broad, midrib 0.57 mm thick, lamina 0.20 mm thick, epidermis single layer with thick cuticle 20-25  $\mu$  thick, unicellular hairs present, stomata on lower side, palisade cells thick walled, 53.9 – 69.3  $\mu$  long, 23.1-30 $\mu$  broad, loose spongy parenchyma, cells 23.1-40.5 $\mu$  in diameter, canals roundish, 0.1mm in diameter with brownish content, stomatal gaps on lower epidermis, vascular bundle arc shaped, xylem elements 10-12, vessels 26-46  $\mu$  in diameter, veinlet bundles with 6-7 vessels, 30-35 $\mu$  in diameter.

Holotype- deposited in Department of Botany, Institute of Science, Nagpur.

Locality- Mohagaonkalan, chhindwara district, M.P., India.

Locality- Mohagaonkalan, chhindwara district, M.P., India.

Horizon- Deccan Intertrappean series of India

Age- upper most cretaceous.

*Mohgaophyllum deccanii* gen. et sp. nov.

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#### Explanation of plate I, Figs. 1-5

1. T.S. leaf showing midrib (m) and lamina (1) x 11.
  2. T.S. midrib showing upper epidermis (e), mesophyll (m), vasculature (vb) and stomatal gap (s) on lower side x 45.
  3. T.S. laminar region showing upper and lower epidermis, canal (c) and mesophyll x 150.
  4. T.S. midrib showing arc shaped vascular bundle (vb) with bundle sheath (bs) x 200.
- T.S. lamina showing upper, epidermis and veinlet bundle (vb) with bundle sheath x 140

