

STUDIES IN THE GLOSSOPTERIS FLORA OF INDIA—  
35. ON TWO NEW FOSSIL PLANTS FROM THE  
GANJRA NALLA BEDS, SOUTH REWA GONDWANA BASIN

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ABSTRACT

Two new species, one of *Gangamopteris* and one of *Palmatophyllites* are described from the Ganjra nalla beds, South Rewa Gondwana Basin.

INTRODUCTION

PLANT fossils from the Ganjra nalla beds, Johilla Coalfield, Madhya Pradesh, have been described earlier by Feistmantel (1882) and Hughes (1884). Saksena (1952, 1955, 1963) added a new species of *Phyllothea* and two new species of *Samaropsis* and some other plant fossils from these beds. Recently Lele and Maithy (1964) described two new species of *Noeggerathiopsis* from Ganjra nalla beds.

The following genera and species are hitherto known from the Ganjra nalla beds: *Phyllothea sahnii* Saksena, *Gangamopteris cyclopteroides* Feistmantel, *Gangamopteris* sp., *Gangamopteris communis* Feistmantel, *Glossopteris indica* Schimper, *G. brownii* Feistmantel, *Noeggerathiopsis hislopi* Feistmantel, *N. indica* Lele & Maithy, *N. gondwanensis* Lele & Maithy, *Samaropsis ganjrensis* Saksena, *S. johillensis* Saksena and *Buriadia* sp.

DESCRIPTION

*Gangamopteris* McCoy

*Gangamopteris srivastavae* sp. nov.

Pl. 1, Figs. 1-7

*Diagnosis* — Leaves simple, lanceolate; apex acute; margin entire; midrib absent but median region occupied by subparallel veins, forming elongate meshes by interconnections; secondary veins emerge at acute angle; course of veins more or less straight, somewhat arched near the margin.

Leaf amphistomatic; (?) lower cuticle thickly cutinized, mesh and vein areas distinct, cells over veins 4-6 cells wide,

elongate-rectangular, placed end to end, cells of meshes 5-6 sided, more or less equal size, placed end to end, cells over vein and mesh areas papillate; papillae more or less rounded only in mesh areas fairly close, irregularly orientated; stomatal apparatus haplocheilic, monocyclic or partially dicyclic, subsidiary cells 4-9 in number; guard cells thin, stomatal opening a vertical slit, the margins of the aperture cutinized. (?) Upper cuticle, thin, nonpapillate, cells of mesh and vein areas distinct; cells over the veins more or less rectangular or square (or trapezoid), arranged end to end; stomata scarce, stomatal apparatus haplocheilic, monocyclic; subsidiary cells 5-7, non-papillate.

*Holotype* — 33755/556, Birbal Sahni Institute of Palaeobotany, Lucknow.

*Horizon* — Karharbari stage.

*Age* — Lower Permian.

*Locality* — Ganjra nalla beds (1½ miles S.W. of Birsinghpur Railway Station), Johilla Coalfield, South Rewa Gondwana Basin, Madhya Pradesh.

*Description* — There are about ten incomplete specimens in the collection. The apex is bluntly acute but the base is not known. The margin of the leaves is entire. The median region is occupied by subparallel veins which form elongate-rectangular meshes by interconnections. The meshes are more or less equal in size. The secondary veins after emerging at acute angle follow more or less a straight course but they become somewhat arched towards the margin. The meshes are broad near the median region and are elongate-rectangular in shape (PL. 1, FIG. 1).

The cuticles are of two types which presumably belong to the lower and upper surface of the leaf. The one regarded as upper cuticle is thin and non-papillate. The cells over the veins are 2-3 cells wide, more or less rectangular or square in outline, 80-120  $\mu$  in length. The cells over the mesh area are 4-8 cells wide, rhomboidal (PL. 1,

FIG. 2). Stomata are few. It is haplocheilic, monocyclic. Stomata measures  $25-45 \mu \times 6-12 \mu$  and is  $\pm$  polygonal or rectangular shape. Subsidiary cells are like epidermal cells, 5-6, 2 polar, 4 or 3 lateral. Guard cells are thin. The stomatal opening is verticle slit (PL. 1, FIG. 3).

The surface regarded as lower is thickly cutinized and papillate. The cells over the veins are elongate-rectangular or trapezoid and measure  $80-120 \mu \times 40-80 \mu$ . The cells over the mesh areas are 4-6 sided (commonly 4 sided), papillate and these measure  $60-110 \mu \times 40-70 \mu$  (PL. 1, FIGS. 4, 5). Stomata many and are irregularly orientated and distributed. The stomatal apparatus is haplocheilic and monocyclic (PL. 1, FIG. 6) or partially dicyclic (PL. 1, FIG. 7) in structure. Two to 4 cells are common. Subsidiary cells are papillate and 4-9 in number. Commonly two subsidiary cells occupy the polar position. The stomata is rectangular to oval in outline. The stomatal aperture is a vertical slit. The guard cells are thin and their inner margins are cutinized.

*Comparison* — The leaves of *G. srivastavae* are comparable externally to *G. cyclopteroides* Feistmantel (1879) but the cuticle of latter is not known. Recently Maithy (1965b) proposed *G. gondwanensis* for those leaves of *G. cyclopteroides* from the Karharbari Stage of the Giridih Coalfield in which epidermal characters are known. *G. srivastavae* differs from *G. gondwanensis* externally in having more or less acute apex and arched veins. In *G. srivastavae* the leaves are amphistomatic, epidermal cells papillate and the stomata are monocyclic or partially dicyclic, whereas in *G. gondwanensis* the leaves are hypostomatic, epidermal cells non-papillate and the stomata are monocyclic.

### *Palmatophyllites* Maithy

#### *Palmatophyllites debilis* sp. nov.

Pl. 1, Fig. 8; Text-fig. 1

*Diagnosis* — Protective bract oblanceolate; apical portion deeply lobed, lobes narrow and acuminate, the incision of each lobe reaches upto the  $1/3$  of the bract length; Median ridge or groove absent.

*Holotype* — 5217, Birbal Sahni Institute of Palaeobotany, Lucknow.

*Horizon* — Karharbari Stage.

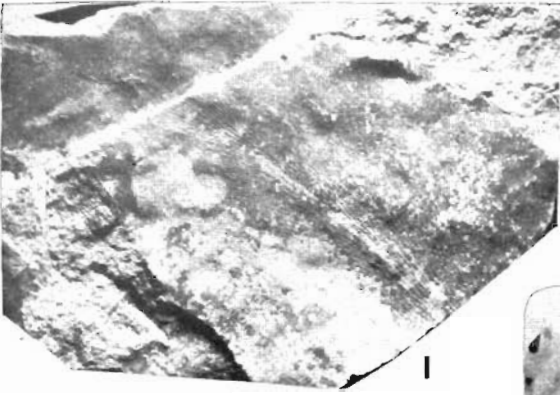
*Age* — Lower Permian.



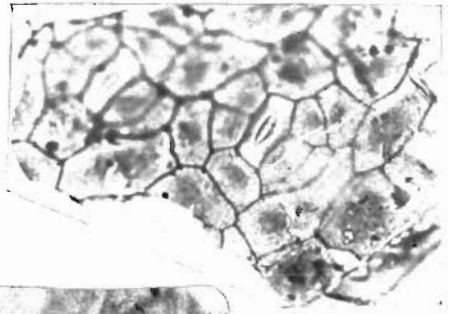
TEXT-FIG. 1 — *Palmatophyllites debilis* sp. nov.  $\times 5$ .

*Locality* — Ganjra nalla beds ( $1\frac{1}{2}$  miles South-West of Birsinghpur Railway Station), Johilla Coalfield, South Rewa Gondwana Basin, Madhya Pradesh.

*Description* — There are about ten impressions of bract-like structure on a sandy micaceous shale. In all of them thin carbonized crust is preserved, but no cuticle could be obtained. The specimens appear frail. They measure  $3-3.5 \times 0.8-1$  cm., elongate-lanceolate in shape with tapering bases. The apex of the bract is deeply incised into 10-12 pointed finger-like lobes. Veins arise from the base and dichotomize repeatedly, each apical lobe receiving one vein. The median groove or ridge is absent.



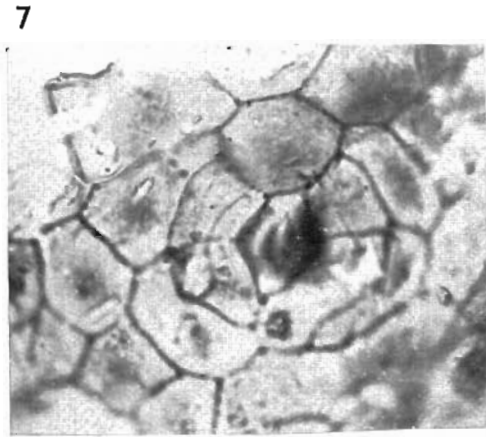
1



5



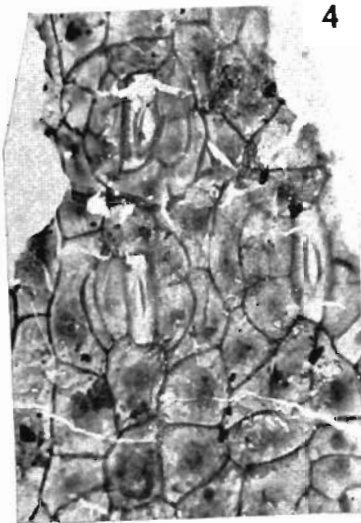
3



7



8



4



6



2

*Comparison and Remarks* — The genus *Palmatophyllites* was instituted by Maithy (1965, 1965a) for the specimens described earlier by Feistmantel (1882) and Zeiller (1902) under *Noeggerathiopsis lacerata*. Zeiller (1902) and Arber (1905) expressed doubts about the inclusion of these forms under *Noeggerathiopsis*. Seward and Sahni (1920) suggested that these specimens probably represent a megasporophyll or a protective bract. Maithy (1965a) recorded some of these forms in association with the *Samaropsis* seeds and the seed in one case was found lying directly on the bract. Although direct organic connection in between the two could not be proved. But on the basis of the evidences available he concluded that they are protective bracts of seed and, therefore, accommodated them under a new generic name *Palmatophyllites*.

*Palmatophyllites debilis* differs from the *Palmatophyllites lacerata* (MAITHY, 1965a) in the following points:

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|--|--|
| <i>P. lacerata</i> Maithy                                      | <i>P. debilis</i> sp. nov.                                     |
| 1. Bracts convex and strong in nature.                         | 1. Bracts flat and frail in nature.                            |
| 2. A prominent median groove or ridge present.                 | 2. Absence of median groove or ridge.                          |
| 3. Lobes bluntly pointed at the apex.                          | 3. Lobes acutely pointed at the apex.                          |
| 4. The incision of the lobes is about 1/5 length of the bract. | 4. The incision of the lobes is about 1/3 length of the bract. |

In view of these differences the specimens from the Ganjra nalla beds are described under a new specific name.

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EXPLANATION OF PLATE

(All the specimens and slides are preserved at the Museum of the Birbal Sahni Institute of Palaeobotany, Lucknow).

PLATE 1

1. *Gangamopteris srivastavae* sp. nov. Holo type No. 33755/556. × Nat. size.
- 2-7. Cuticle recovered from the leaf of *Gangamopteris srivastavae* sp. nov.
2. Upper cuticle showing the cell arrangement. × 250. Slide no. 2795.
3. Upper cuticle showing cell and a stomata.

- × 250. Slide no. 2797.
- 4-5. Lower cuticle showing papillate cells and stomata. × 250. Slide nos. 2795, 2796.
6. Papillate cells of lower cuticle and one monocyclic stomata enlarged. × 500. Slide no. 2797.
7. Cells of lower cuticle and one partially dicyclic stomata enlarged. × 500. Slide no. 2795.
8. *Palmatophyllites debilis* sp. nov., A number of specimens on a sandy micaceous shale. × Nat. size.