

## MORPHOTAXONOMIC RE-EVALUATION OF *GANGAMOPTERIS*(?) *BURIADICA* FEISTMANTEL

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### ABSTRACT

Re-examination of the specimens of *Gangamopteris* (?) *buridica* Feistmantel reported from Karharbari Formation of the Giridih Coalfield suggests that its inclusion in the genus *Gangamopteris* is doubtful. In its venation pattern, the form seems closely akin to *Noeggerathiopsis* Feistmantel, but it differs in the presence of interconnections between the erect, spreading veins forming elongate-narrow meshes. Considering this, a new generic name *Karharbariphyllum* is proposed to accommodate the leaves with mixed morphological characters of *Noeggerathiopsis* and *Gangamopteris*.

**Key words :** *Gangamopteris* (?) *buridica*, *Karharbariphyllum*, Karharbari, Giridih.

### INTRODUCTION

Leaf genera belonging to the order Glossopteridales were identified upon the basis of venation pattern. The forms are *Glossopteris*, *Gangamopteris*, *Belemenopteris*, *Sagittophyllum*, *Euryphyllum*, *Noeggerathiopsis*, *Palaeovittaria* and *Rhabdotaenia*. The survey of literature shows that the two genera viz., *Euryphyllum* and *Noeggerathiopsis* are similar in the presence of dichotomising veins without any anastomosis. The former differs from the latter in the presence of arched veins in the lateral areas. In *Noeggerathiopsis*, the veins are erect in the entire laminal parts. Likewise, *Belemenopteris* and *Sagittophyllum* resemble one another in cordate shape of leaf, distinct median mid-rib and reticulate pattern of venation. However, *Belemenopteris* is distinguished from *Sagittophyllum* by two lateral costae from the mid-rib, running opposite to each other in the backward position of the lamina. *Palaeovittaria* and *Rhabdotaenia* are alike in the presence of mid-rib and bifurcating and non-anastomosing lateral veins, but in *Palaeovittaria* lateral veins form acute angle with the mid-rib and in *Rhabdotaenia* the veins are at 90° with respect to the mid-rib. From these examples, it is evident that the nature of venation is one of the most important characters in the identification of Glossopteridales genera. Taking this feature into

account, the specimens of *Gangamopteris*(?) *buridica* Feistmantel were re-examined. The study has led to the conclusion that the species is not referable to any of the so far known genera of Glossopteridales and needs to be assigned a new generic status. Therefore, a new genus *Karharbariphyllum* is instituted to accommodate the Feistmantel's species.

Feistmantel (1879, p.15) reported *Gangamopteris*(?) *buridica* with the following diagnosis :

“Fronde pinnate, leaves lanceolate-spathulate, truncated, nerves radiating from attenuated base, somewhat strong, bifurcating and anastomosing, forming very erect, long and narrow meshes.”

While describing this form, Feistmantel (1879, p.15) also remarked :

“Amongst the plants from the Karharbari beds there are some which by radiary deposition of the veins and their anastomosing belong apparently to the genus *Gangamopteris*, but the shape of the leaf is conspicuously different. The leaves are lanceolate spathulate, pretty long, broader and obtusely rounded at the apex and narrower at the base. The veins pass out from the attenuate base as several strong veins, which are soon divided into branches, which, however, are anastomosing again and form long and narrow, straight radiating nets. By this straight

radiation of the veins the present form differs from those mentioned before, so that I think it will represent a new species."

Subsequently, Feistmantel (1886, p.54, pl. 30, fig. 4, specimen no. 5167 GSI) recorded leaves with similar venation, but larger in size and becoming narrower throughout with obtuse apex from the Buriadi of the Giridih Coalfield.

Arber (1905, p. 115) has remarked, "The shape and nervation of this frond, especially the erect course of the nerves recalls some of the leaves included under *Noeggerathiopsis hislopi*(Bunbury), from which it differs chiefly in the anastomosing nervation. There is no real evidence that these leaves formed portions of a pinnate frond, as Feistmantel has suggested".

The specimens of *Gangamopteris*(?) *buriadica* (specimen nos. 5123 and 5124 GSI) preserved at the Geological Survey of India, Calcutta have been re-examined by the author to ascertain the generic status of the leaves. The study shows that all the characters, as detailed above, are present in the specimens and as such they do not tally with the generic circumscription of either *Noeggerathiopsis* or *Gangamopteris*. Rather, they represent a new leaf form of the Glossopteridaceae, having intermediate morphological features of both the genera. Considering this very fact and to accommodate this characteristic frond, a new name *Karharbariphyllum* is proposed here.

#### SYSTEMATIC DESCRIPTION

*Genus Karharbariphyllum* n. gen.

(*Genotype Karharbariphyllum buriadicum*  
(Feistmantel) n. comb.)

*Derivation of name* : The new leaf genus is named after the Karharbari Formation from where it is known.

*Diagnosis* : Leaf simple, symmetrical, linear, lanceolate, spatulate in shape, base narrow; tapering or contracted; apex broadly rounded or obtuse; veins erect, running subparallel, repeatedly dichotomised and

anastomosing by cross-connections between veins, forming elongate narrow meshes.

*Comparison and Discussion* : The leaves of *Gangamopteris*(?) *buriadica*, at first glance, resemble those of *Noeggerathiopsis* Bunbury due to the presence of subparallel, erect, dichotomising veins, but the former differs from the latter in the

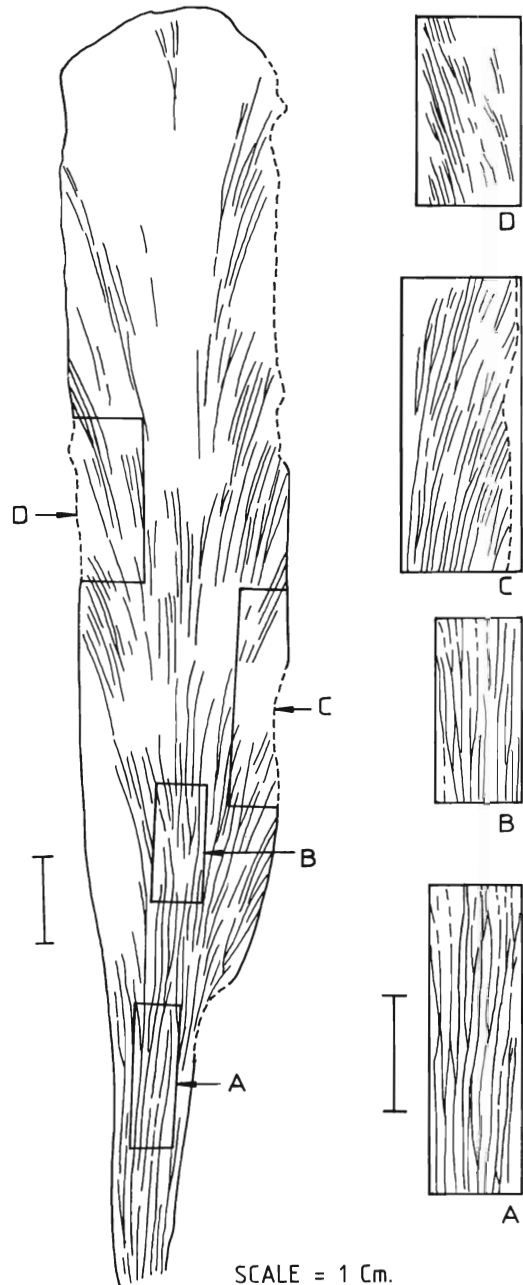


Fig.1. *Karharbariphyllum buriadicum*. A, B, C, D, areas enlarged to show interconnections between veins, forming meshes.

presence of interconnections between veins to form meshes. Due to the presence of vein meshes, Feistmantel (1879) attributed these leaves doubtfully to *Gangamopteris*. However, it does not agree with the generic circumscription of *Gangamopteris* McCoy, as the median subparallel veins with lateral veins are absent in *Karharbariphyllum*. The forms can best be said to be representative of a *Noeggerathiopsis* leaf with meshes. Since no leaf with such features is known from the Gondwana continent, a new generic name *Karharbariphyllum* is proposed to accommodate them.

Cuticular features are well known in both the genus *Noeggerathiopsis* and *Gangamopteris*. In the former genus, the stomata are arranged in linear rows, while the latter genus shows their irregular orientation. In the absence of known epidermal features, it is speculated here that the genus *Karharbariphyllum* will be having stomata orientation in linear row and oblique at the point of interconnections in accordance with its morphology.

*Karharbariphyllum buriadicum* (Feistmantel)  
n. comb.

(Pl. I, fig. 1; Fig. 1)

*Gangamopteris(?) buriadica* Feistmantel, 1879, p.15, pl. 18, figs. 2,2a.- in Feistmantel, 1880, p. 54. pl. 30. fig. 4.

*Gangamopteris* comp. *buriadica* Feistmantel, in Feistmantel, 1886, p. 33, pl. 8A, fig. 7.- Arber, 1905, p. 115, Text-fig. 27a.

**Emended Diagnosis** : Lanceolate leaf, apex broadly obtuse, base contracted, measuring 15-19cm in length and 2.5-3cm in breadth; eight erect subparallel veins emerging at base, dichotomising repeatedly, somewhat divergent towards lateral sides, veins density 10 veins per cm, meshes narrow-elongate, formed by cross-connections.

**Lectotype** : 5124 Geological Survey of India, Calcutta.

**Locality** : 11A shaft (bottom seam), Buriadi, Giridih Coalfield.

**Horizon** : Karharbari Formation, Lower Gondwana.

**Age** : Early Permian.

## DISCUSSION

The specimen no. 5124 preserved at the Geological Survey of India is a complete leaf. It is hereby selected as the lectotype for the *Karharbariphyllum buriadicum* n. comb. The other specimen 5123, longer in size and width, is, however, incomplete at the base.

The specimen no. 5167 figured by Feistmantel (1880, pl.30, fig.4) was not available for re-examination. From the figured diagram, it can be commented that the leaf is linear in outline with an acute apex. Possibly it represents a distinct form of *Karharbariphyllum*. The taxonomic position of this leaf can only be determined after re-examination.

## ACKNOWLEDGEMENTS

Sincere thanks are due to the Director General, Geological Survey of India for the kind permission to examine the specimens of *Gangamopteris(?) buriadica* preserved at the Geological Survey of India, Calcutta.

## REFERENCES

- Arber, E.A.N. 1905. *Catalogue of the fossil plants of the Glossopteris Flora in the British Museum (Natural History)* : London
- Feistmantel, O. 1879. The fossil flora of the Lower Gondwanas. I. The flora of the Talchir-Karharbari beds. & supplement. *Mem Geol. Surv. India, Pal. Ind., Ser. 12 Pt III (1)* : 1-63
- Feistmantel, O. 1886. Fossil flora of the Gondwana System : The fossil flora of some of the coalfield in Western Bengal. *Mem. Geol. Surv. India., Pal. Ind. Ser. 12 Pt IV (2)* :

Manuscript Accepted September, 1998

## EXPLANATION OF PLATE

### Plate I

1. *Karharbariphyllum buriadicum* (Feistm.) n. comb., 5124  
Geological Survey of India, Scale = 1 cm.

