

New fern-like foliage from the Lower Permian of Hura Coalfield, Rajmahal Basin*

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Bajpai, Usha 1992. New fern-like foliage from the Lower Permian of Hura Coalfield, Rajmahal Basin. *Geophytology* **23**(1): 65 — 69.

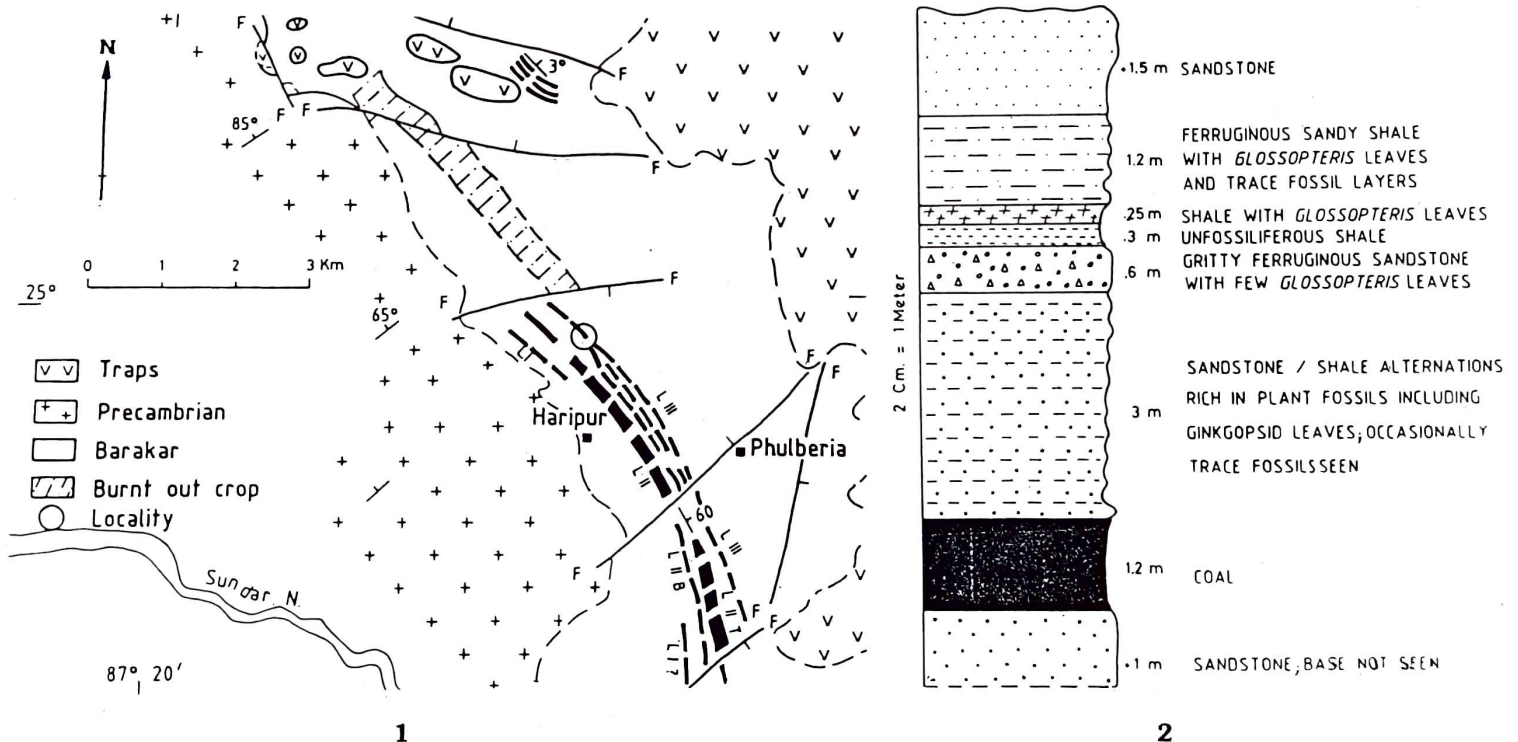
A new tripinnately branched fern-like foliage is reported from shales associated with Lalmatia Coalseam in the Hura Coalfield, Rajmahal Basin. The foliar 'shoot' is thick and articulate. The ramification of foliage into flabelliform pinnules of unequal size is seen at the 'nodes'. The foliage is unlike any one known so far from the Gondwana. It, however, does superficially resemble *Dactylophyllum digitata* fronds reported from Australia. In the absence of knowledge about fertile structures, its exact affinities remain uncertain. The taxon is named as *Maheshwariopteris digitata* gen. et sp. nov.

Key-words—India, Gondwana, Rajmahal Basin, Pteridosperm, Fern-like foliage.

INTRODUCTION

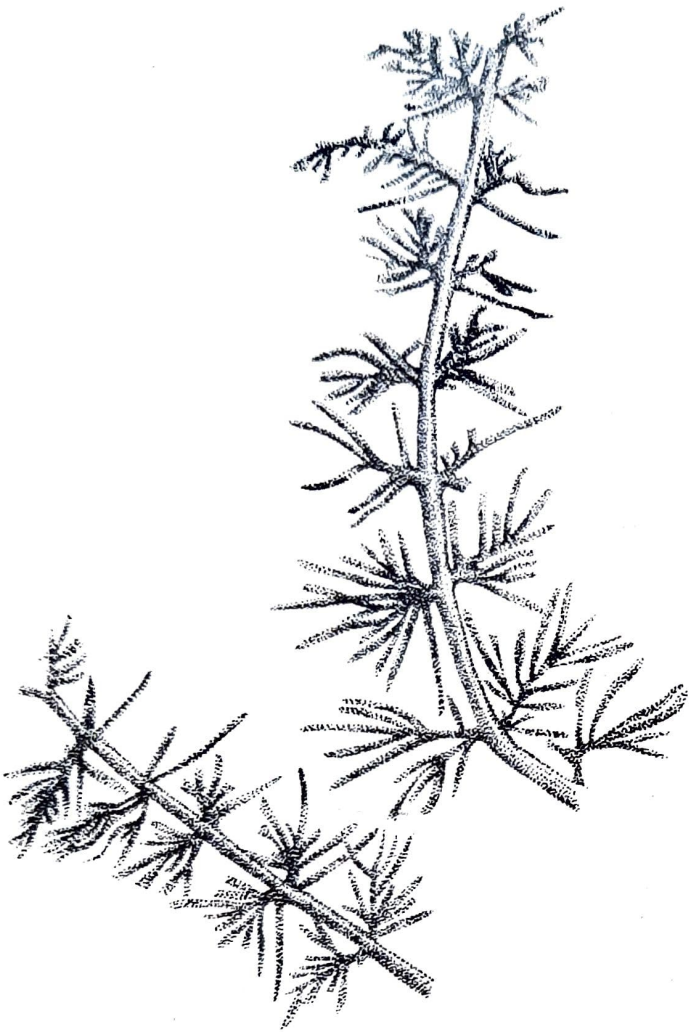
THE HURA Coalfield is the northernmost outlier of coal-bearing formations in the Rajmahal Basin. Coal is

being exploited in the area since long (Ball, 1877) by the local people who intermittently dig shallow pits to collect coal for their own use. Raja Rao (1987) has reported few coal-seams in the Barakar Formation. Now large scale



Text-figure 1. Map of a part of the Hura Coalfield, showing the general location of the abandoned pit.

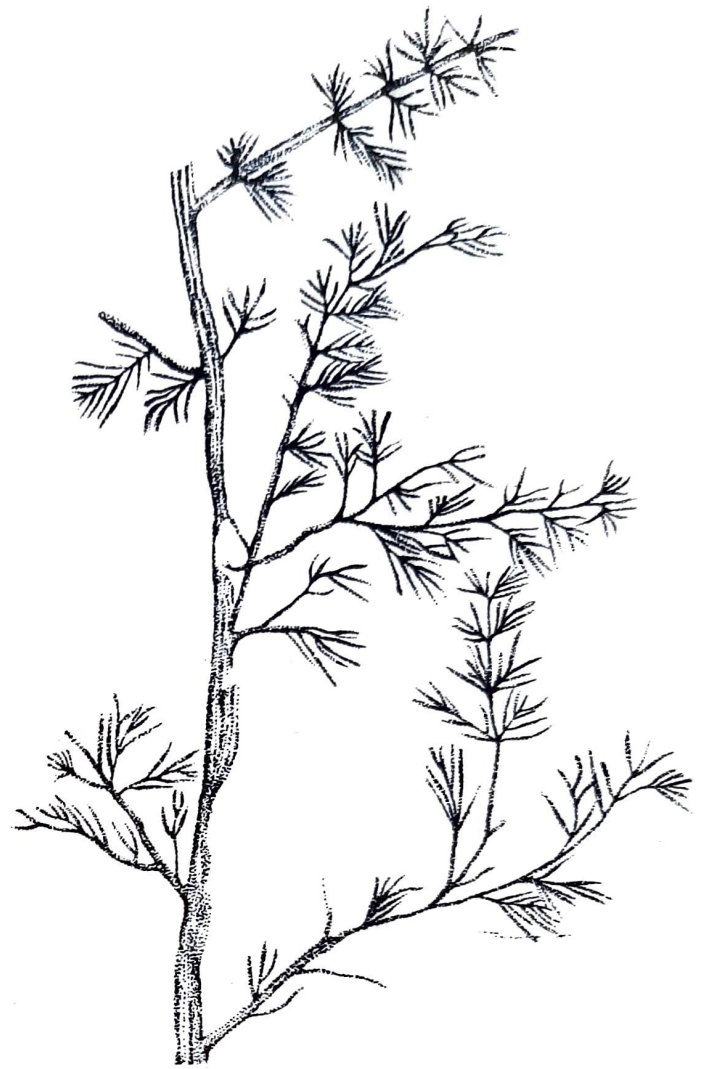
Text-figure 2. Lithological succession in the abandoned pit.



Text-figure 3. *Maheshwariopteris digitata*. Phototracing of the holotype. BSIP Specimen no. 36766, x 2.

mining is being done by the Rajmahal Open Cast Project in Lalmatia (L-II and L-III) seams. Some of the buff-coloured arenaceous shales between seams L-II and L-III are fairly rich in plant fossils which are preserved solely as impressions.

The first report of plant fossils from the area was from near Lohandia (Feistmantel, 1881). These included a few leaves of the genus *Glossopteris*, scale leaves and seeds. Almost a hundred years later, Singh, Srivastava and Maheshwari (1986) recorded a heterophyllous sphenophyll *Sphenophyllum gondwanensis* and the



Text-figure 4. *Maheshwariopteris digitata*. Phototracing of another specimen showing general habit of the frond. BSIP Specimen no. 36770, x 2.

equisetalean *Lelstotheca* from shales dug out of the Lalmatia Open Cast Project. Bajpai and Maheshwari (1991), and Maheshwari and Bajpai (1992) have recently described a number of ginkgophyte leaves, and infructescences *Birbalsahnia divyadarshanii* and *Veekaysinghia durgavataiae*; both the latter are branched structures.

The collection also includes, besides *Rhabdotaenia*, Ginkgophytes, ferns and *Sphenophyllum*, a typical fern-like foliage unlike any known from the Indian Gondwana

Plate 1

Maheshwariopteris digitata gen. et sp. nov. →

1. Fragments of the frond covered with brittle carbonified crust. BSIP Specimen no. 36767, x 1.
2. Holotype. BSIP Specimen no. 36766, x 1.
3. Specimen in figure 2 magnified to show ramifications of the axis into pinnules. BSIP Specimen no. 36766, x 2.
4. Specimen showing general habit of the frond. BSIP Specimen no. 36768, x 1.
5. A part of the specimen magnified to show the nature of the pinnae and pinnules. BSIP Specimen no. 36769, x 3.

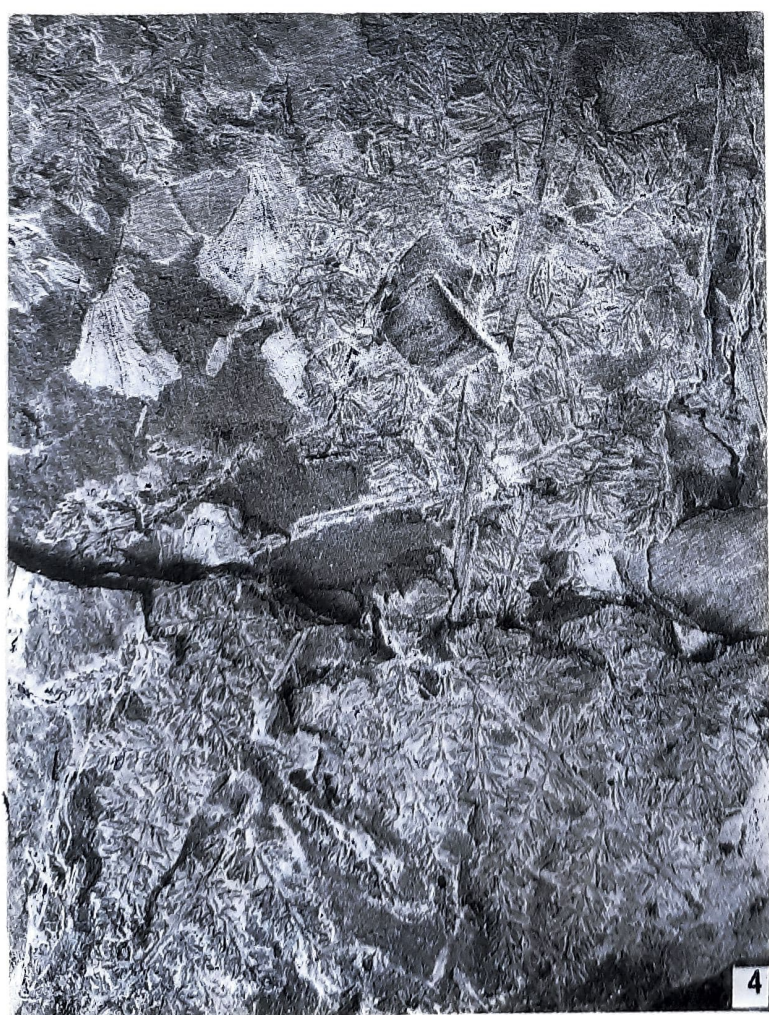
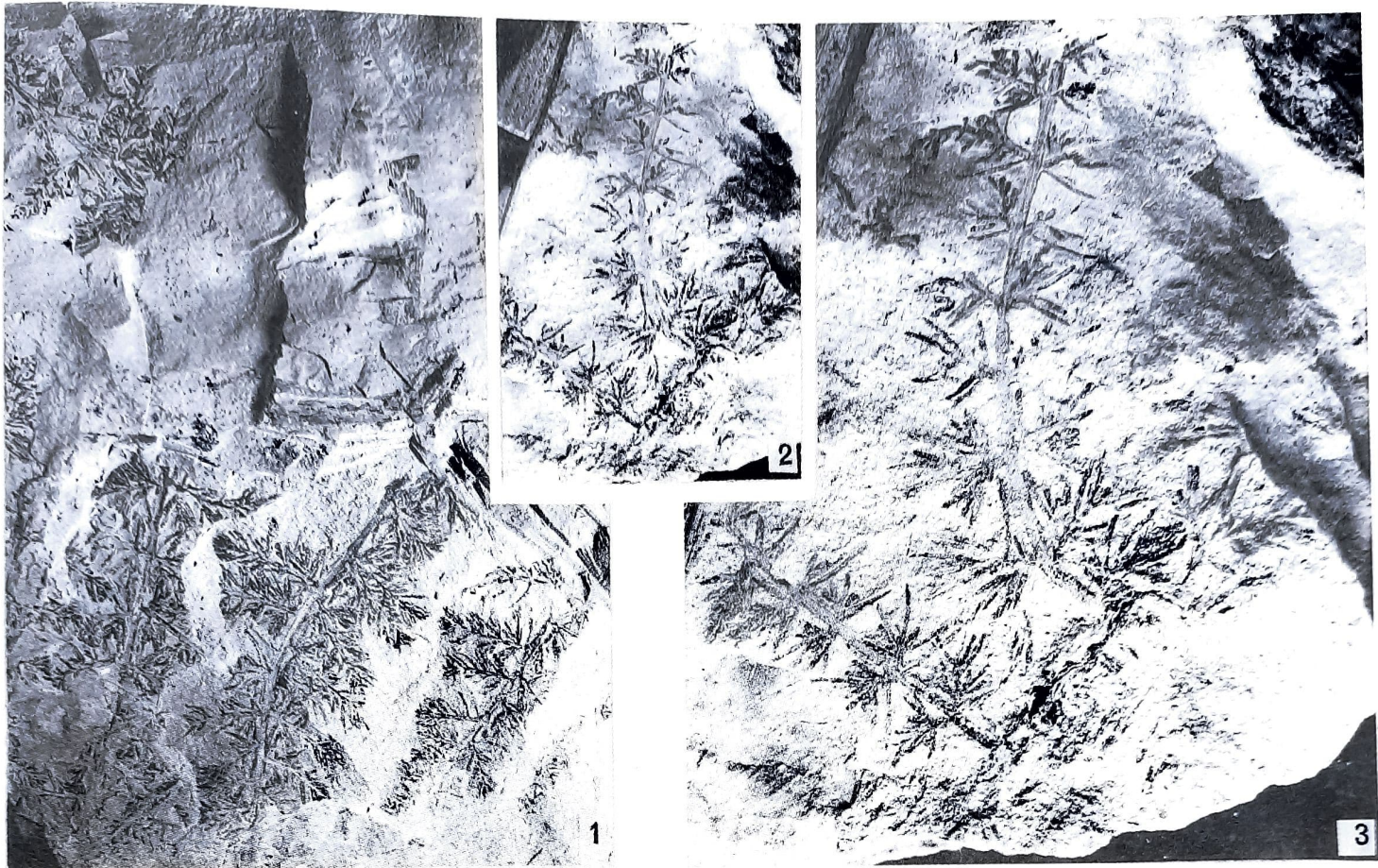


Plate 1

so far. The fronds are apparently similar to some of the Carboniferous forms.

MATERIAL

Plant fossils were collected from an abandoned shallow pit, dug by local villagers for coal, near the village Haripur, in the southern part of the Hura Coalfield (Text-figs 1, 2).

DESCRIPTION

Maheshwariopteris gen. nov.

Type Species—*Maheshwariopteris digitata* sp. nov.

Diagnosis—Vegetative, 'articulated' foliar shoot, foliage tripinnately branched, ramifying into flabelliform pinnae, pinnules needle-shaped, unequal in size.

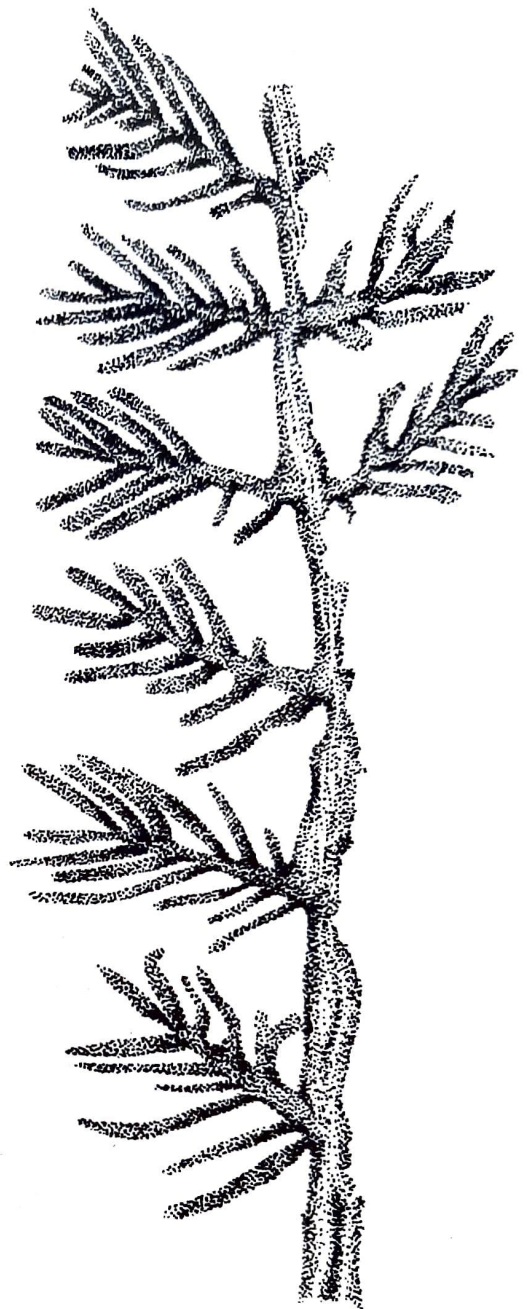
Maheshwariopteris digitata sp. nov.

Pl. 1, figs 1-5; Text-figs 3-5

Diagnosis—As for the genus.

Description—The collection includes a considerable number of fragments of various sizes. Of the 20 specimens studied most are well-preserved impressions. Only in a few cases carbonified material is seen over the surface of the fossils. It is, however, highly oxidized and brittle. It breaks into tiny fragments even with the touch of a fine-haired brush. The axis is thick and 'articulate'. The diameter of the axis varies a little from base to apex. Apparently these fronds were quite large and hence they are not found intact as fossils. The leaf is tripinnate. There is less pronounced difference between the main branch and the side branches. The branches imperceptibly ramify into pinnae. The pinnae are closely and oppositely arranged on the axes thus giving the appearance of nodes and internodes. Pinnules are attached on a reduced rachis, which grows and gets elongated and again the likes of nodes and the internodes are formed. Thus the main axis gives rise to primary branches which in turn give rise to secondary branches. The apparent internodal distance between the branches is up to 1 cm.

Comparison—The ramifications of the foliar shoots resemble pinnae and pinnules of some Carboniferous taxa of fern-like fronds, e.g., *Sphenopteridium*, *Rhodesia*, *Archaeopteris* and *Dactylophyllum*. In most aspects the fronds compare with *Dactylophyllum digitata* known from the Late Carboniferous of New South Wales, Australia. A close scrutiny of the figures of *D. digitata* (Morris, 1975, pl. 8.1, figs d,d'; figs 8.2.a-b, 8.4. e) and their comparison with those of the type species *Dactylophyllum johnsonii* (Read, 1934, pl. 18, figs 2-3) show that the former, most probably, belongs to a different



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Text-figure 5. *Maheshwariopteris digitata*. Ink-sketch of the frond in plate 1, figures 5. BSIP Specimen no. 36769, x 1.5.

taxon.

No other similar or comparable frond is known from the Permian sediments of the Gondwana Supercontinent. The specimens are therefore placed under a new taxon, i.e., *Maheshwariopteris digitata* gen. et sp. nov. In the lack of the data about the fertile parts, the taxonomic status of this unique taxon remains enigmatic as yet. It is possible that it is related to the equally unique fructifications *Veekaysinghia durgavatae* and *Birbalsahnia divadarshanii* which have been recorded from the same horizon; but no firm conclusion can be drawn at this time. It is, however, clear that the Hura Coalfield plant mega-

fossil assemblage shows a certain degree of provincialism.

Derivation of generic Name—After Dr H.K. Maheshwari, Birbal Sahni Institute of Palaeobotany, Lucknow.

Holotype—Birbal Sahni Institute of Palaeobotany Museum Specimen no. 36766; Lower Permian, Barakar Formation, Shales between L-II and L-III seams, near Haripur, Hura Coalfield, Rajmahal Basin.

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