

STUDIES IN THE GLOSSOPTERIS FLORA OF INDIA—40.
SPHENOPTERIS POLYMORPHA FEISTM. (1881) EMEND.
 FROM THE BARAKAR STAGE OF SOUTH KARANPURA
 COALFIELD, BIHAR, INDIA

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ABSTRACT

A large number of impressions of *Sphenopteris* fronds are described from the Barakar Stage of South Karanpura Coalfield. Their study reveals that *Sphenopteris polymorpha* Feistm. (1881) and *S. hughesi* Arber (1905) are one and the same species. *S. polymorpha* Feistm. is emended and retained on the basis of nomenclatural priority.

INTRODUCTION

SPHENOPTERIS Brong. is known from all the horizons of Lower Gondwana formations of India above the Talchir Stage. So far only three species have been recorded, viz. *S. polymorpha* Feistm. (1881), *S. hughesi* (Feistm.) Arber (1905) and *S. lobifolia* Morris (1845). *S. polymorpha* is known from the Karharbari, Barakar and the Raniganj Stages. *S. lobifolia* is known from the Barakar and Raniganj Stages and *S. hughesi* from the Barakar, Barren Measures and the Raniganj Stages (SURANGE, 1966).

A large number of *Sphenopteris* fronds in the form of impressions were collected from the Lower Nakkari seam, Nakkari incline, Saunda section of the South Karanpura coalfield. They reveal a much wider range of variation than known so far in *Sphenopteris polymorpha*. This species is hence emended.

Sphenopteris polymorpha Feistm. Emend

Pl. 1, Figs. 1-5; Text-figs. 1-4

Synonymy —

1850 *Pecopteris affinis*, M'Clelland

1861 ?*Pecopteris*, Bunbury

1861 ?*Cladophlebis*, Bunbury
 1877a *Dicksonia* cf. *concinna*, Feistm.
 1880 }
 1886 } *Cyathia* cf. *tchihatcheffi*, Feistm.
 1881 *Dicksonia hughesi*, Feistm.
 1902 *Sphenopteris* (*Dicksonia hughesi*, Zeiller)

1905 *Sphenopteris hughesi*, Arber

Emended Diagnosis — Imparipinately Uni- or bipinnate compound fronds, rachis cylindrical and longitudinally grooved, faintly ribbed, secondary pinnae emerge alternately at an angle of about 40-60°, pinnules alternately arranged on the pinna, pinnules on the basal pinnae sessile, spatulate, apex acute, margins deeply lobed, 2-7 lobes in each, incision reaching $\frac{1}{2}$ of the pinnules; pinnules on the apical pinnae alternate, sessile, with round apex attached to the pinna with their whole base, margin entire, single vein in the middle, giving out 2-7 secondary veins, some secondary veins dichotomizing.

Lectotype — 5165, Geological Survey of India, Calcutta. (Figured by FEISTMAN 1881, PL. XVA, FIG. 1).

Isotype — 34055, Birbal Sahni Institute of Palaeobotany, Lucknow (PL. 1, FIG. 1; TEXT-FIGS. 1-4).

Locality — Lower Nakkari Seam, Nakkari incline, Saunda Section, South Karanpura Coalfield.

Horizon — Barakar Stage.

Description — There are fifteen specimens in the collection. The largest (PL. 1, FIG. 1) is described here. The frond is compound and imparipinately bipinnate. The primary rachis is probably cylindrical showing longitudinal ribs on the surface.

TEXT-FIGS. 1-4 — Pinna from the basal portion of the frond to show crenate pinnules. $\times 3$. 2. Apical portion of the frond to show entire pinnules. $\times 3$. 3. Median pinnae to show crenate and entire pinnules, both. $\times 1.5$. 4. Pinnules to show dichotomizing venation. $\times 3$.



It measures 24.6 cm. in length and 2 mm. in breadth at the base, attenuating to 0.5 mm. towards the apex.

Secondary pinnae emerge at an angle of 45° from the primary rachis. They are alternate somewhat widely placed in the basal part but closely set in the apical part. Secondary rachis is 3-80 mm. long, cylindrical with faintly ribbed surface. The pinnae are shorter in length towards the apical portion of the frond.

The specimen (PL. 1, FIG. 1) is unusually interesting as it shows a transition from the crenate pinnules in the basal region of the frond to the entire pinnules in the upper region.

Pinnules in the basal part of the frond are sessile, alternate and spatulate with acute apex and round base (PL. 1, FIG. 3). Margins of the pinnules are deeply lobed, the incisions reaching nearly $\frac{1}{2}$ of the pinnules. There are 2-7 alternate, pointed lobes in each pinnule. The mid vein gives rise to secondary veins, which are alternate to subopposite and sometimes dichotomously branched (TEXT-FIG. 1). The pinnules may have 2-5 secondary veins in different regions of the frond. Generally their number is larger towards the basal part of the frond (PL. 1, FIG. 5; TEXT-FIG. 4).

Pinnules in the apical part of the fronds are alternate, sessile and rhomboidal in outline with round apex and are attached to the pinna rachis with their whole base (PL. 1, FIG. 2). Margins of the pinnules are entire. Each pinnule is supplied by one mid vein, giving rise to secondary branches which dichotomize once (rarely twice) before reaching the margins (TEXT-FIG. 2).

Pinnules in the median portion of the frond show transitional forms between the lobed and unlobed pinnules (PL. 1, FIG. 4). A gradual reduction in the incision of pinnules is observed as we examine the frond

from the lower middle part to apical middle. In many cases one observes in the same pinna the pinnules of the basal part with lobing, whereas the pinnules in the apical part without lobing (TEXT-FIG. 3) although other arrangements remain the same.

Comparison — The present specimens are comparable with the species *Sphenopteris hughesi* (Feistm.) Arber (1905) and *Sphenopteris polymorpha* Feistm. (1881). The basal portions of the described frond possessing crenate pinnules are similar to *S. hughesi* (Feistm.) Arber (1905), however, the apical portions are identical with *S. polymorpha* Feistm. in having entire pinnules. There are pinnae which combine the two characters in the same frond and others show intermediate stages. Thus the South Karanpura specimens strongly indicate the specific identity of *Sphenopteris polymorpha* with *S. hughesi*. It is possible that these previously formed species were based on fragmentary and incomplete specimens and, therefore, the authors could not ascertain the range of variation amongst their specimens.

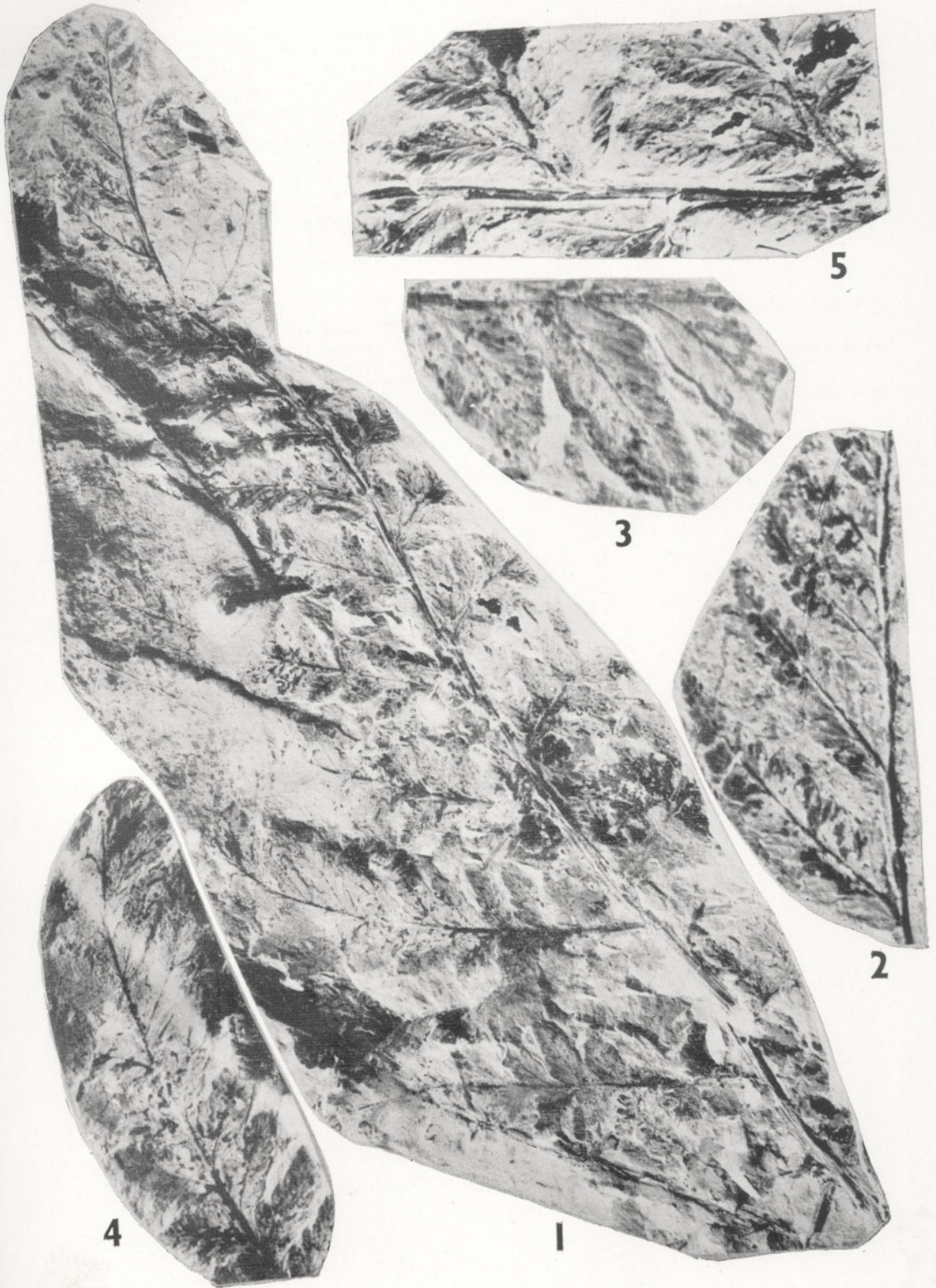
From the present study of more complete specimens and from the photographs of the type specimen by Feistmantel, it seems more appropriate to merge the two species. The specific name *Sphenopteris polymorpha* (Feistm.) emend is retained as it has nomenclatural priority over *Sphenopteris hughesi* (Feistm.) Arber.

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EXPLANATION OF PLATE

Sphenopteris polymorpha (Feistm.) emend

PLATE 1

1. Showing bipinnate frond. The lower pinnae with crenate pinnules, the upper pinnae with entire pinnules and the middle pinnae with intermediate pinnules in between the two. Isotype No. 34055 × 1.
2. Uppermost part of the frond enlarged to show entire pinnules. × 3.
3. Basal pinna enlarged to show crenate pinnules. × 3.
4. Intermediate pinnae enlarged to show crenate and entire pinnules both. × 1.5.
5. Pinnules enlarged to show dichotomizing venation. × 3.