

FIRST RECORD OF *Raniganjia bengalensis* (Rigby) Pant & Nautiyal FROM LOWER PERMIAN BEDS (BARAKAR FORMATION) OF SOUTH KARANPURA COALFIELD, JHARKHAND, INDIA

ANIRUDDHA DE¹, BIMALENDU DE² and SUBIR BERA¹

¹Department of Botany, University of Calcutta, Kolkata - 700 019

²Central Head Quarters, Geological Survey of India, Kolkata - 700 016

Email: subirbera@rediffmail.com

The present study incorporates the first reported occurrence of leaf sheaths of *Raniganjia bengalensis* (Rigby) Pant & Nautiyal for the first time from the Lower Permian (Barakar Formation) beds of South Karanpura Coalfields of Jharkhand, India. The earlier reports came from the Upper Permian beds of India and abroad.

Introduction

The rare genus *Raniganjia* Rigby, first reported as *Actinopteris bengalensis* from the Raniganj Coalfields of India and described as an "odd disc-like fossil" by Feistmantel (1876), was later studied by Zeiller (1902) and Arber (1905), and also reported from Brazil by Dolianiti (1953). Later, Rigby (1962a,b) changed the generic name *Actinopteris* to *Raniganjia*. Pant and Nautiyal (1967) included all the above forms under a single taxon and emended as *Raniganjia bengalensis*. Another species from New Castle in Australia, discovered by Etheridge (1895) and described by Arber (1905) as *Phyllothea etheridgei*, was renamed as *Raniganjia etheridgei* (Rigby, 1962b). *Raniganjia bengalensis* and *R. etheridgei* have also been reported by Chandra and Rigby (1981) from the Kamthi Formation in Handappa, Orissa, while Prasad et al. (1987) have recorded the occurrence of *R. bengalensis* from the Upper Permian of Pachwara Coalfield, Bihar.

So far, all the reports of the genus *Raniganjia* were from the Upper Permian beds of India and abroad. However, the present study records the occurrence of *R. bengalensis* from the Barakar Formation (Lower Permian) of south Karanpura Coalfield, Jharkhand.

Location and Geology

The leaf sheaths of *Raniganjia* were collected along with leaves of *Glossopteris* sp. from outcrops in the basal part of Barakar Formation in a fire-clay mine, north of the village Tilaiya and south of Hendegir Railway Station (23°42'N, 85°10'30"E) in the Western part of the northern limb of the South Karanpura Coalfield (Fig.1). The South

Karanpura Coalfield, covering an area of 194 square kilometres, is located in the western part of the Damodar Valley, situated between latitudes 23°38'N and 23°45'N and longitudes 85°05'E and 85°28'E in the Hazaribagh District of Jharkhand (GSI, 1987).

In the northern part, rocks of Talchir Formation, comprising conglomerates, medium to fine grained sandstone and green shales unconformably overlie the metamorphics. Barakar Formation, consisting of coarse grained sandstone, carbonaceous shale, shale and grey shale, claystone and coal seams conformably overlies the Talchir Formation.

Materials and Methods

Three leaf sheaths (discs) were found in detached condition, without having organic connection with the stem. The discs were not preserved as carbonized crusts, but were reddish-brown impressions on grey sandy shale, which had turned yellowish due to weathering.

No cuticles could be isolated from the specimen and hence the cuticular studies could not be made. The materials were studied using ordinary hand lens and also under the stereomicroscope, using incident light and photographed under the same. All the specimens are presently kept in the repository of Geological Survey of India, Kolkata.

Systematic Description

Class: Sphenopsida

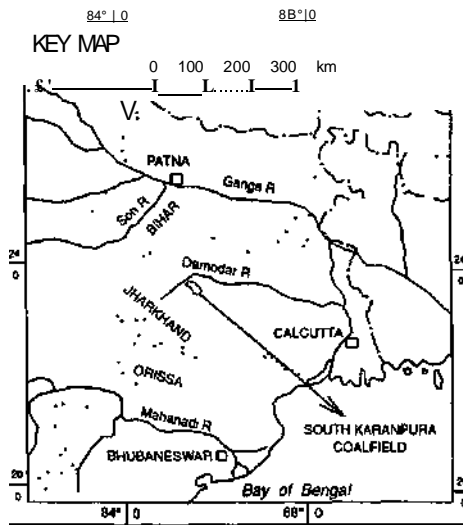
Order: Equisetales

Family: Equisetaceae

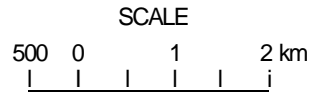
Genus: *Raniganjia* Rigby

Type Species: *Raniganjia bengalensis* (Rigby)
Pant & Nautiyal
(Figs.2a-e)

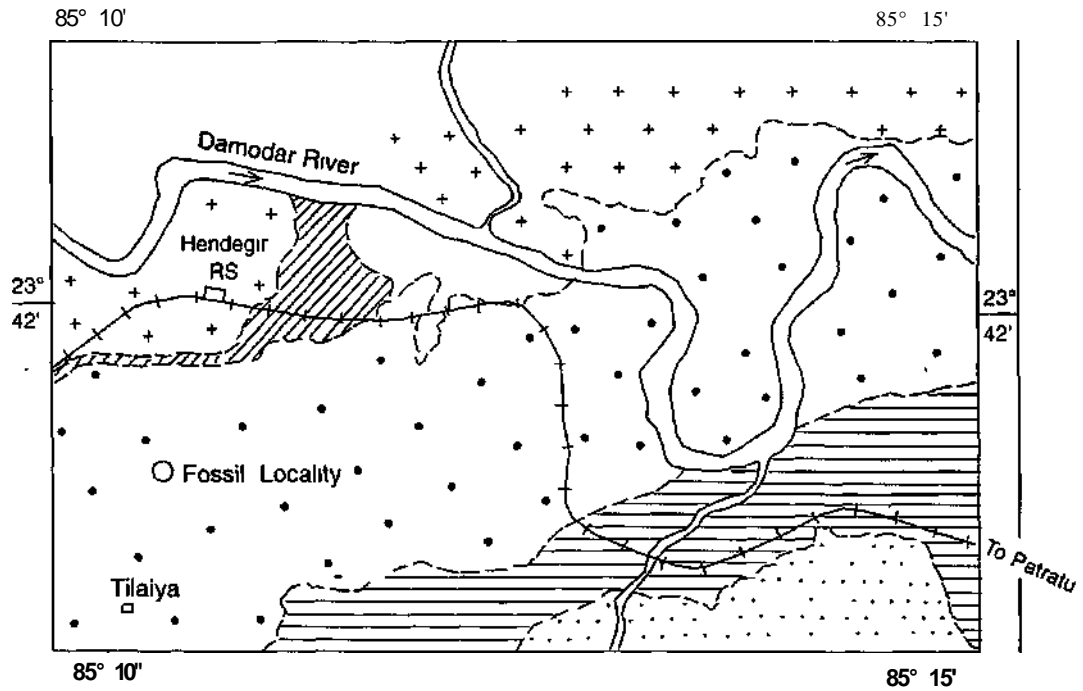
Description: Leaves usually united for most of their length to form an almost flat or open saucer-like horizontal whorl. Only apices of leaves are free, but sometimes,



GEOLOGICAL MAP
OF
A PART OF SOUTH
KARANPURA COALFIELDS,
JHARKHAND
(after G S I.)



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- BARREN MEASURES FORMATION
- BARAKAR FORMATION
- TALCHIR FORMATION
- + + + + PRECAMBRIAN METAMORPHICS

Fig.1. Location map

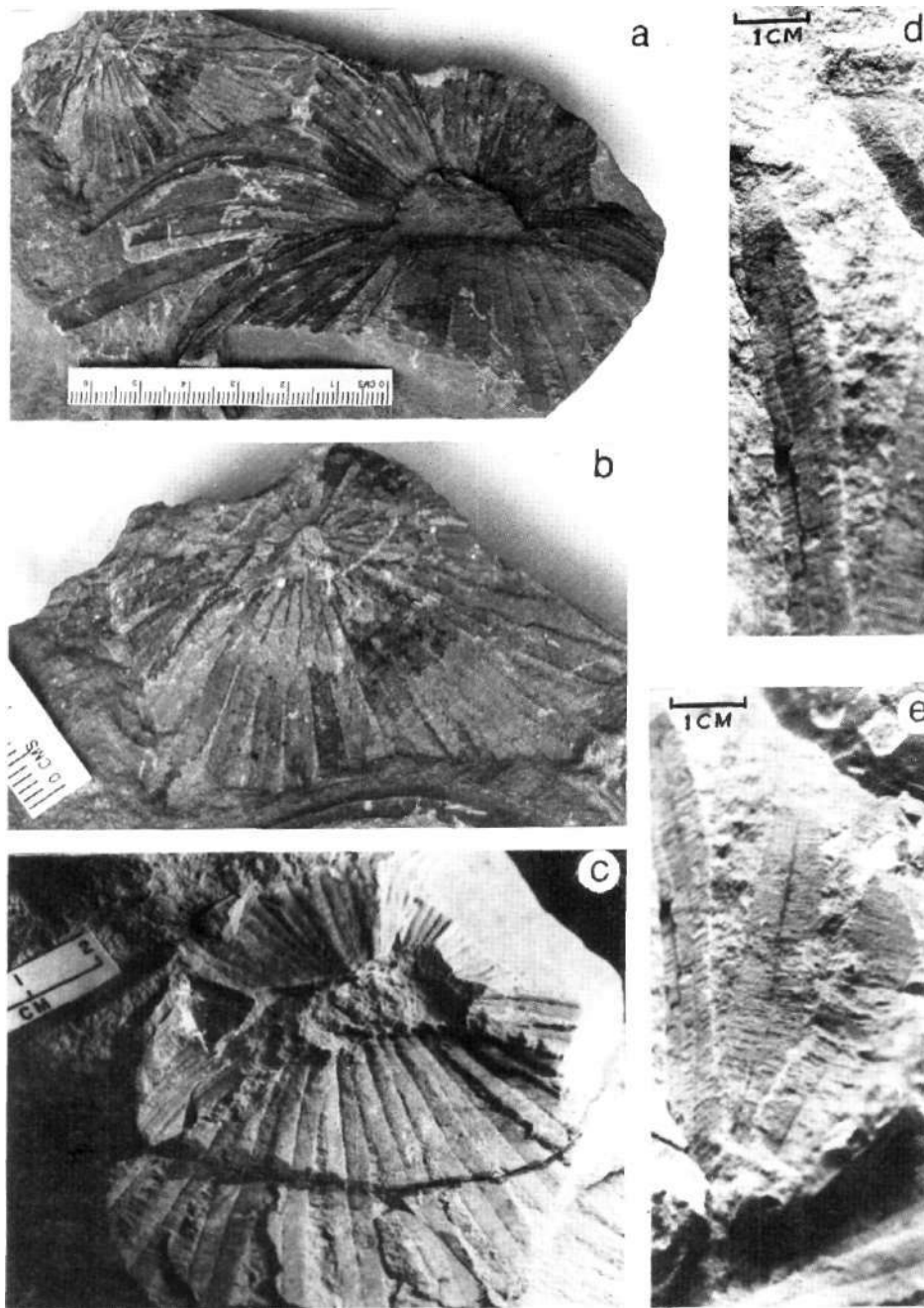


Fig. 2. Leaf sheaths of *Raniganjia bengalensis* (Rigby) Pant & Nautiyal specimen nos. K60/723, K60/724, K60/725. (a-c) Complete leaf sheaths, (d) Acute leaf apices, (e) Transverse striations on two sides of the midrib.

segments torn deeply along commissures. Each leaf traversed by a midrib extending from base to end of a free apex; leaf lamina showing marks or remains of an anastomosing network of transversely placed internal fibre-like structures.

Leaf sheath is 8-17 cm in diameter, consisting of 34-38 segments, fused portions of segments with almost parallel sides, free portions gradually tapering towards apex, width

of free parts 1.5-3.5 mm at base, apices bluntly acute or rounded, midrib extending right upto apex and beyond to give rise to a mucronate tip, margins of free portions of leaves reflexed, fused margins of leaves (commissures) slightly inflexed.

Locality: North of the village Talaiya and South of Hende gir Railway Station, South Karanpura Coalfield, Jharkhand, India.

Horizon Lower Permian (Barakar Formation)

Specimen Nos K 60/723, K 60/724, K 60/725, Central Fossil Repository Division, GSI, Kolkata

Discussion and Conclusion

Earlier reports of the rare Equisetalean member *Ramganjia bengalensis* were from the Upper Permian beds (Ramganj, Kamthi and Pachwara Formations) of Indian

Gondwana, and equivalent Formations in Australia and Brazil. But the present study reports its occurrence from the Barakai Formation of Lower Permian in India, indicating the fact that these plants had evolved much earlier than was previously thought. The present specimens also display comparatively larger size than previously reported ones along with other variations, thus throwing light on their possible morphometric diversification in the past.

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(Received 9 August 2002, Revised form accepted 16 September 2002)