TRACE FOSSILS FROM THE PERMIAN GONDWANA OF RAJMAHAL HILLS

HARI K. MAHESHWARI & USHA BAJPAI

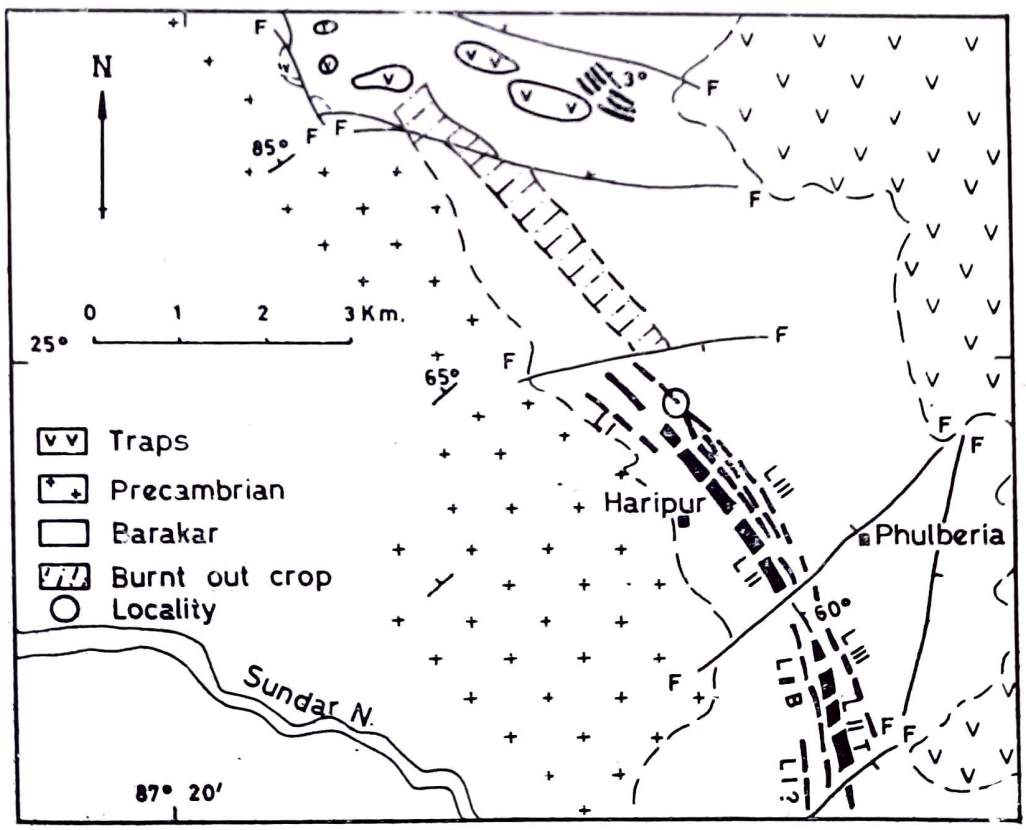
Birbal Sahni Institute of Palaeobotany, 53 University Road, GPO Box 106, Lucknow 226 001, India

Abstract

Trace fossils are recorded from a thin silty layer intercalated in a shale/flaggy sandstone sequence overlying the II (Lalmatia) bottom coalseam in the Hura Coalfield, Rajmahal Basin. The trace fossils probably represent feeding burrows of some arthropod or worm.

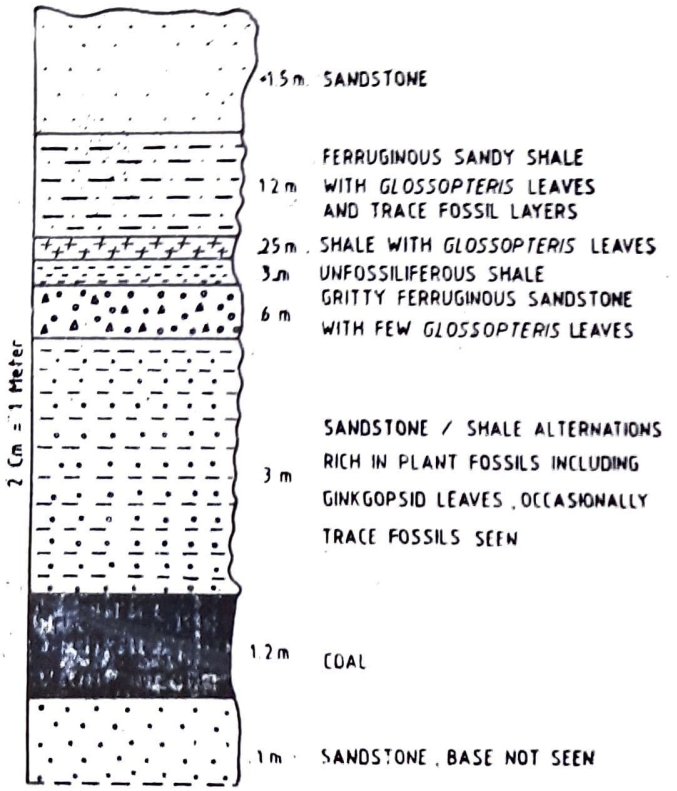
Introduction

The Lalmatia coalseam is the major productive horizon in the Hura Coalfield, the northernmost outlier of coal-bearing strata in the Rajmahal Hills, Bihar (Raja Rao, 1987). Besides the large-scale open-cast mining project, the coal is being intermittently taken out by the local villagers from shallow pits, particularly in the vicinity of Hura, Haripur and Hahajor villages (Text-fig. 1). One such pit, now abandoned, yielded remains of a diversified flora comprising species of the genera *Glossopteris*, *Vertebraria*, *Ginkgoites*, *Rhipidopsis*, *Psygmophyllum*, *Saportaea*, *Veekaysinghia*, *Birbalsahnia*, *Rhabdotaenia*, *Sphenophyllum*, *Lelstotheca*, *Phyllotheca*, and a number of fern taxa (Maheshwari &



Text-fig. 1. Geological map of a part of the Hura Coalfield showing general location of the abandoned pit from which the fossiliferous shale was collected.

Bajpai, in press; Bajpai & Maheshwari, in press). Thin silty layers intercalated in the fossiliferous shale/flaggy sandstone sequence (Text-fig. 2), in general flaggy in nature, show peculiar features that are being interpreted by us as trace fossils. The only report of trace fossils from the Permian coal-bearing sediments of India known to us is from the Barakar Formation of the Raniganj Coalfield (Kar & Chaudhuri, 1981).



Text-fig. 2. Litholog of the face of the pit showing the location of the trace fossil layers.

The traces

The traces are preserved along the bedding plane as horizontal grooves, that are seen as ridges on the counter-part (Pl. 1, figs 1-3). The ridges are dichotomously branched, once or twice, and radiate from a centre (Pl. 1, fig. 4). Many isolated and irregular ridges are also present. In a vertical cut, the ridges show a V-shaped profile. The ridges usually expand towards their distal ends. Some of the ginkgopsid leaves preserved as impressions in the same bed, too, show simple, linear ridges/grooves (Pl. 1, fig. 5).

The traces have a rather unusual appearance and seem to answer to circumscription of many an ichnogenus. For example, similar radiating ridges are known in the genus *Chondrites*, a marine form. The branching pattern in plan view has a superficial resemblance with that of *? Phycodes* sp. cf. *P. palmata* reported from the Buntsandstein of Wuerttemberg, Germany. The simple, linear structures on the leaves may represent mining activities of insects.

Remarks

Though the specimens apparently represent activities of some lower group of animals, there was a suggestion to examine the possibility of these being sedimentary features. To confirm the true nature and relationship of these structures, we therefore consulted specialists in the field. Dr. J. E. Pollard (personal communication) comments on branched radiating ridges: "I suspect that these structures are trace fossils; probably small horizontal feeding burrows. They appear to be too regular and horizontally directed for root moulds and too organised and localised for inorganic sedimentary structures." More or less similar views were expressed by some other specialists. Taking the evidence in toto, we are of the opinion that here we are dealing with traces of feeding burrows, either of arthropods or of worms, formed at the sediment surface. A part of the tracefossil-bearing layer, when pulverized in water, yielded two pupal cases of the Trichoptera-type. On the basis of contained plant fossils, and in the absence of any evidence to the contrary, the sediments are believed to have been laid down in fresh-water conditions. Broadly similar traces are known from sediments deposited in upper delta plains (Pollard, 1988).

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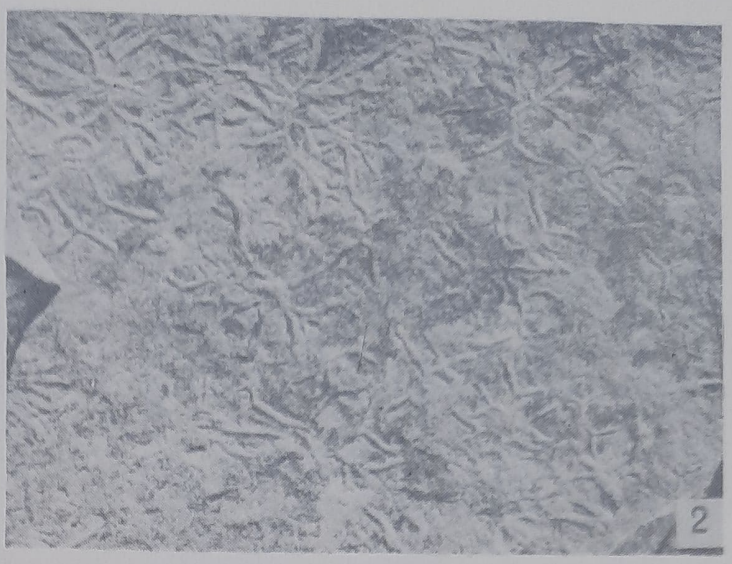

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Explanation of Plate

Plate 1

1. A group of trace fossils, each unit showing ridges radiating from central region. BSIP specimen no. 36596, ×1.
2. Another group of trace fossils; some units have isolated and irregular ridges. BSIP specimen no. 36597, ×1.
3. A group of trace fossils associated with plant fossils. BSIP specimen no. 36043, ×1.
4. A few units of traces in figure 3, enlarged to show details, ×2.
5. A small leaf of *Saportaea nervosa* Halle showing linear, simple structures presumably representing leaf-mining activities of some insect. BSIP specimen no. 36423, ×1.