

Trace fossils from Talchir Formation of Talchir Coalfield, Orissa

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Surface traces showing bilobed, elongated trails with a median ridge and transverse furrows are recorded from the Talchir Formation of Talchir Coalfield, Orissa, India. The traces possibly represent the locomotory behaviour of an arthropod and have been assigned to a new ichnogenus, *Talchirichnus*. Palaeoecological significance of the trace fossils is also discussed.

Key-words- Trace fossils, Talchir Formation, Early Permian, Talchir Coalfield.

INTRODUCTION

IN recent years, trace fossils from the Gondwana sequence of India have received considerable attention (Kar & Chaudhary 1981; Maulik & Chaudhary 1983; De 1990; Maheshwari & Bajpai 1991). Most of these records have come from the areas other than those of Talchir Coalfield. The present finding of a new ichnogenus is being reported for the first time from the Nandir Jhor nala section near the village Teheranpur of Talchir Coalfield (Map 1).

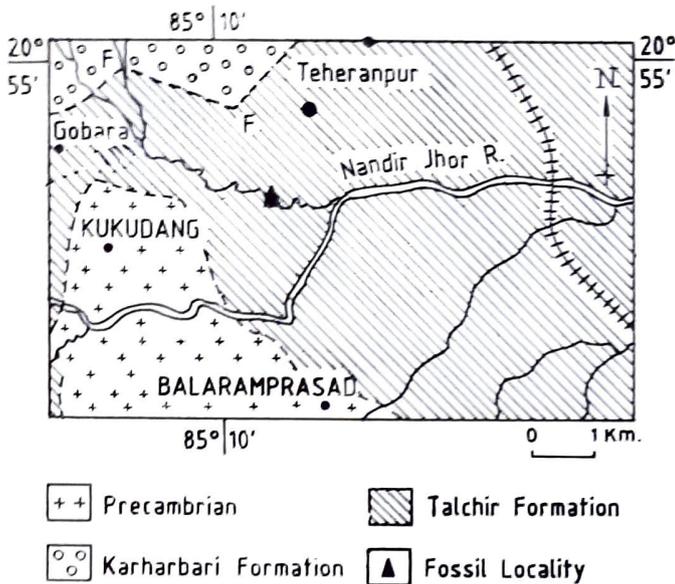
Talchir Coalfield is the type locality of Talchir Formation. Raja Rao (1982) proposed the following lithostratigraphic sequence :

During the course of field work several well preserved trace fossils were collected from shale bands exposed on the northern bank of a small tributary of Nandir Jhor near the village Teheranpur in Dhenkanal District, Orissa (Map-1). The fossils occur along the bedding plane as elongated horizontal grooves.

The paper records the morphological details of those traces to determine their taxonomic status and to discuss their palaeoecological significance during deposition of the Talchir Formation.

The morphological features of the specimens were examined under low power binocular using different shades of light. The type and figured specimens are preserved in the museum of Birbal Sahni Institute of Palaeobotany, Lucknow.

Age	Formation	Lithology
Recent		Alluvium
Upper Permian to Triassic	Kamthi	Fine to medium-grained sandstone, carbonaceous shale, coal bands with greenish sandstone, pink clays and pebbly sandstone at top (250 m +).
Lower Permian	Barakar	Medium to coarse-grained sandstone, shales, coal seams with oligomictite conglomerate at base (500 m +)
	Karharbari	Medium to coarse-grained sandstones, shales and coal seams (270 m).
	Talchir	Diamictite, fine to medium-grained-greenish sandstones shales, rhythmite, turbidite etc. (170 m +)
	—————Unconformity—————	
Precambrian		Granite gneiss, amphibolite, migmatite etc.



Map-1. Geological map of Talchir Coalfield showing fossil locality (after Raja Rao, 1982)

Talchirichnus Ichnogen. nov.

Type species-Talchirichnus gondwanensis Ichnogen. et Ichno sp. nov.

Generic diagnosis-Unbranched, straight to curved, bilobed tubular traces with a median ridge and transversely placed lateral grooves.

Talchirichnus gondwanensis Ichnogen. et

Ichnosp. nov.

Pl.1, Figs 1- 9

Specific Diagnosis – Elongate, unbranched, straight to gently curved, bilobed tubular traces; 3-4 mm wide; consisting of double furrows separated by a narrow median ridge; V-markings with fine lateral grooves running parallel to median ridge.

Holotype – Pl. 1, Fig. 1, BSIP Specimen no. 36645.

Type Locality & Horizon – Tributary of Nandir Jhor, 0.5 km South of Teheranpur Village; Talchir Formation, Early Permian, Talchir Coalfield, India.

Description – The collection consists of the holotype and 26 other specimens, most of which are preserved as

part and counterpart. These trails are unbranched but interpenetration and crossing over are common. In the same bed specimens occur both as a convex hyporelief and more poorly defined convex or concave epirelief. They are straight to gently curved and their length varies considerably. While some extend only a few centimetre before fading out others are much larger. The largest trail sometimes shows serpentine orientation and has a length of 8-10 cms. The width of the trails is 3-4 mm and remains constant throughout the preserved portion. Some of the trails are preserved as disconnected fragment. Each trail possesses a double furrow and a 1 mm wide median ridge. The lateral surface of the furrows bears a series of closely spaced fine grooves oriented parallel to median ridge.

Comparison - Trace fossils are rarely known in the Gondwana sequence of India. The available records from Raniganj Coalfield (Kar & Chaudhary 1981), Pranhita - Godavari Valley (Maulik & Chaudhary 1983) and Hazaribagh area (De 1990) are distinct from the present specimens in their vertical underground burrows and faecal pellets. The recently discovered traces from the plant bearing beds of Rajmahal Hills are also different in having dichotomously branched radiating ridges (Maheshwari & Bajpai 1991).

The trails are comparable with crawling or burrowing traces of brachiopods, gastropods, pelecypods or worms described under different genera viz., *Aulichnites* Fenton & Fenton, *Beaconichnus* Gevers, *Crossopoda* Mc Coy (= *Crossochorda* Schimper), *Calimachnites* Logan, *Scolicia* De Quatrefages, *Gyrochorte* Heer, *Psamichnites* Torell and *Palaeophycus* Hall. *Talchirichnus* differs from all of them in having narrower width and closely placed obliquely oriented transverse striae. *Cruziana* d. Orbigny, a closely comparable form is distinct in having groups of V-marking in definite sets with a variable angle.

In the absence of animal fossils, it is difficult to correlate the affinity of the present trace fossils; however, discoveries of lamellibranch and mussel bands in the Gondwana deposits of Damodar Valley Coalfield (Chandra 1969, 1970) are suggestive of its probable relationship. But the trace fossil cannot be definitely

Plate 1

1. *Talchirichnus gondwanensis* Ichnogen et Ichnosp. nov. Holotype in hyporelief showing tubular trail with a median ridge and lateral surface. x 2. BSIP Specimen no. 36645,
2. Counterpart of the holotype preserved as epirelief. x 2. BSIP Specimen no. 36646,
- 3-4. Part and counterpart of holotype enlarged to show the transverse striae of lateral furrows. x 4,
5. Another specimen showing deep median ridge. x 2 BSIP Specimen no. 36647,
6. Specimen of Figure 5 enlarged to show details of trails x 4,
7. Figure shows the interpenetration of fossil trail. x 2. BSIP Specimen no. 36648,
8. Long trail showing serpentine nature. x 2. BSIP Specimen no. 36649,
9. Trail preserved as disconnected fragment. x 2. BSIP Specimen no. 36650.

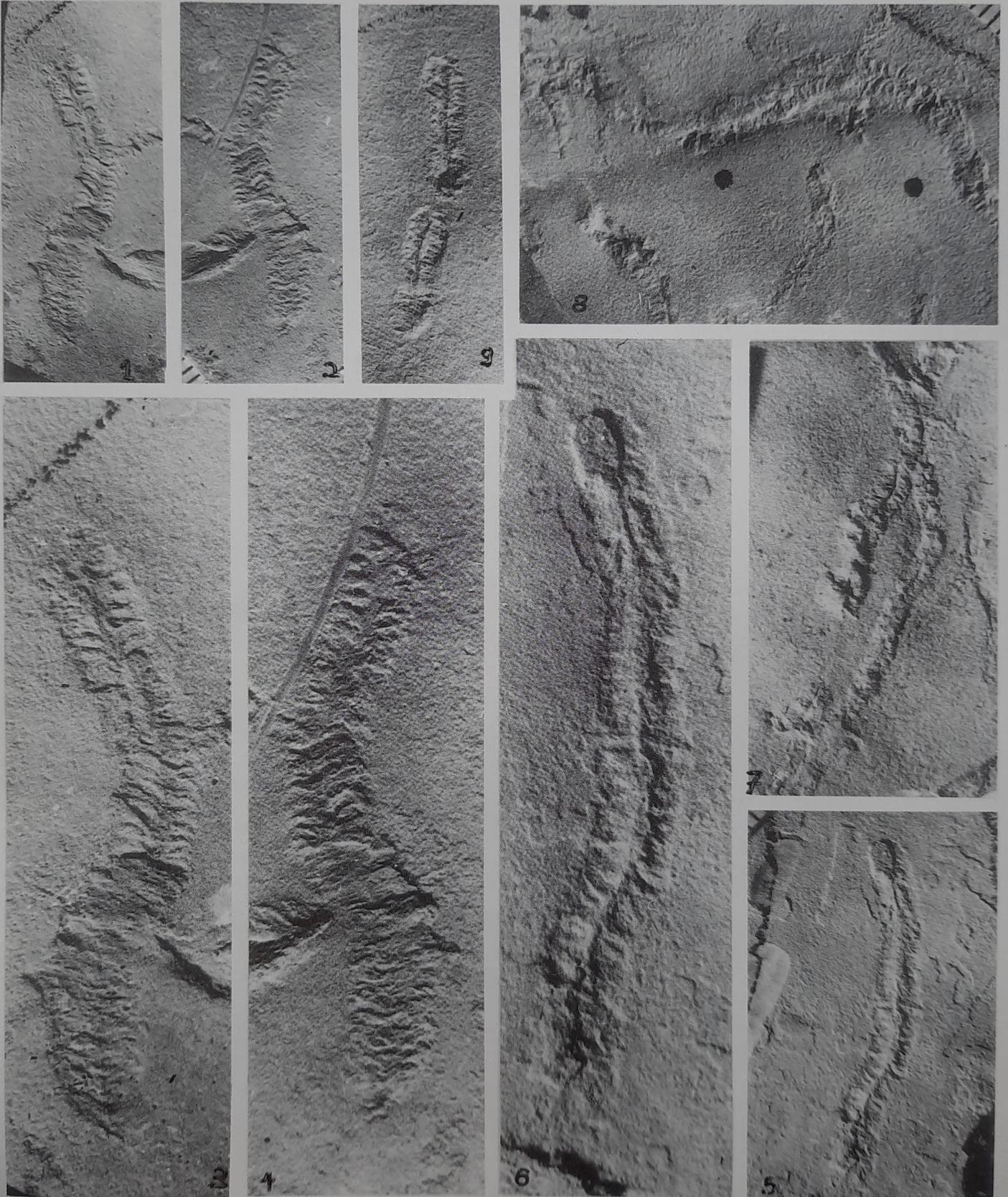


Plate 1

associated with a particular group because of the observation that many trails belonging to different genera might represent a single organism (Howard 1976).

DISCUSSION

Talchir beds are found in almost all the Gondwana areas of Peninsular India in faulted troughs and sometimes also as outliers in the gneisses of the neighbouring regions. It comprises a variety of rock types including diamictite (Tillite), conglomerate, sandstone, laminated varve like shale-siltstone and locally turbidite deposits. Diamictite commonly occurs in the basal part and has generally been considered glacial in origin. The rhythmic facies of shale and siltstone above the diamictite represent terrestrial zone (Casshyap 1979). The occurrence of plant fossils from this horizon (Surange & Lele 1956, Chandra & Srivastava 1982, Chandra *et al.* 1992) favours such contention.

Pandya (1990) has carried out lithofacies analysis and studied the depositional environment of Talchir Formation in Talchir Coalfield and has recognised three units, and eleven lithofacies. The present sample locality is correlated with the Unit A of siltstone and silt-shale facie - C. The absence of any other fossils in present sample site and the presence of fine grained silt-shale containing trace fossils demonstrate constant flow and slow rate of deposition at intermittent spells of time in a shallow lake facie (Pandya 1990).

The animals responsible for such traces, probably thrived on the bottom sediments but could not undergo burial due to low rate of deposition. It is quite likely that they became victims of large scale destruction by predators and scavengers. Bobde (1979) reached on the same conclusion about the absence of animal fossils in the Barakar Formation. The environment of deposition of the Talchir Formation (Early Permian) appears to be closely comparable with that of the known Permian deposits of eastern South Africa (Savage 1971, Anderson 1981) and Whetstone facies of Pennsylvanian deposits of North America (Archer & Maples 1984; Miller 1984) containing number of ichnofossils.

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