Jour. Geological Society of India, Vol. 20, May 1979, pp. 234 to 239

Trace fossils and environment of deposition of Nimar Sandstone, Bagh Beds

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Abstract

The presence of *Thalassinoides* above the jasper conglomerate bed along with other marine fossils and sedimentary structures provide evidence for an almost uninterrupted deposition under marine environment for the upper part of the Nimar Sandstone. The discovery of upper Gondwana plant fossils in the lower horizon of Nimar is undisputed. A new trace fossil *Striatolites* gen. et. sp. nov. is described.

Introduction

The Nimar Sandstone, forming the lowermost horizon of the Bagh Beds in Madhya Pradesh, is a distinct lithostratigraphic unit and is distinguished both in lithology and fossil content from the overlying sequence (Table I). It rests unconformably over the metamorphics and shows mostly gradational contact with the overlying Nodular Limestone. The dominantly arenaceous Nimar is conglomeratic at the base and has few shales in the lower and middle part, whereas, it is argillo-arenaceous in the upper part.

TABLE I

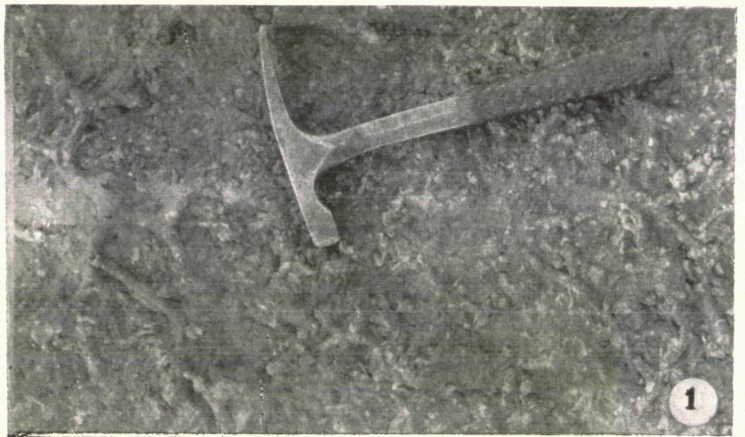
Bagh Beds	Upper	Coralline Limestone
		Deola Marl
		Nodular Limestone
	Lower	– Nimar Sandstone

Due to the absence of fossils, the earlier workers assigned fresh water to marine environment of deposition to the Nimars. Blanford (1869) and Bose (1884) considered them to be estuarine/freshwater deposits. Guha and Ghosh (1970) suggested marine environment of deposition on the basis of sedimentological studies, whereas Chiplonkar and Badve (1969, 1970 and 1972) on the evidence of *Astarte, Turritella,* Oyster beds and trace fossils suggested that the Nimars indicate fluvial depositional environment with three to four marine interruptions.

Based on the discovery of plant fossils *Ptilophyllum* spp. *Sphenopteris* sp. and pollen/ spores in a carbonaceous clay near the base of Nimar Sandstone at Umrali, Murthy *et al.*, (1963) suggested an upper Gondwana affinity indicating freshwater environment of deposition for the basal part of Nimar Sandstone.

EXPLANATION OF PLATE 1

1. *Thalassinoides* burrows showing polygonal network. Locality – Bagh.
2. *Thalassinoides* burrows on eroded surface of a sandstone showing exaggerated bosses. Locality – Sitapuri.
3. Crowded burrows of *Striatolites bariaensis* gen. et. sp. nov. on the lower surface of shale. Large Thalassinoides burrows are seen in contact with *Striatolites* burrows. Locality – Baria Nadi.
4. *Striatolites bariaensis* gen. et. sp. nov. burrows with striations on the surface. Locality – Baria Nadi.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3


4

Figure 1. *Striatolites bariaensis* gen. et. sp. nov. Burrows as seen in a weathered specimen. Surface view. Scale mark=1 cm.

Figure 2. *Striatolites bariaensis* gen. et. sp. nov. Burrows as seen in a weathered specimen. Side view. Scale mark=1 cm.

On the basis of sedimentological and facie variation studies, Raiverman (1975) suggested both freshwater and marine environment. Singh and Ghosh (1977) divided the Nimar Sandstone into a lower Member with a sequence of conglomerate, sandstone and carbonaceous clays with plant fossils, and an upper Member consisting of calcareous sandstone with marine fossils. with an unconformity between the two.

The present study of the Nimar Sandstone was made around Bagh (22°22′ : 74°47′), Sitapuri (22°17′ : 75°2′), Deora (22°16′30″ : 75°2′), Avalda (22°17′ : 75°1′30″), Zirabad (22°18′ : 75°1′30″) and Baria Nadi section between Avalda and Zirabad. The sandstone attains a maximum thickness of about 24 m in Bagh section.

Above the metamorphics, the Nimars start with a coarse sandstone with angular to subrounded pebbles followed by a distinct conglomerate bed which is characterised by the presence of jasper pebbles. The jasper conglomerate has not been observed in all the localities where there is a good development of Nimar Sandstone. Above the conglomerate bed, the sandstone varies from coarse to fine with thin shale bands, and shows good development of trace fossils. Bedding features have been completely destroyed in few shales and sandstones due to bioturbation. Besides burrows, large and small scale current bedding which is bimodal, lenticular and flaser bedding and small channels are also seen.

A number of trace fossils have been described by Chiplonkar and Badve (1969–1970) from the upper part of Nimar Sandstone. This paper records the occurrence of two additional trace fossils which are being reported for the first time from this unit. Ichnogenus *Thalassinoides* was seen in a number of beds in middle and upper part, and ichnogenus *Striatolites* gen. et. sp. nov. from the upper middle part of Nimar Sandstone.

SYSTEMATIC DESCRIPTION

Ichnogenus *Thalassinoides* Ehrenberg, 1944
(Plate I, figs. 1, 2)

Diagnosis

Burrows irregular, unornamented, branched in Y-shape, swollen at the bifurcations, usually of uniform thickness, wherever the branching is regular, polygonal network is observed in vertical or inclined sections.

At some places in the upper eroded surface the sandstone shows exaggerated bosses whereas the under surface shows hammocky hypo relief.

Remarks

Thalassinoides burrows are both large and small in size. The exaggerated bosses and hammocky structure in these forms have been described earlier by Bramley (in Frey, 1975).

Locality

Sitapuri, Baria Nadi section and Bagh, Madhya Pradesh.

Horizon-Upper Nimar Sandstone, Cretaceous
Ichnogenus-*Striatolites* ichnogen. nov.
Striatolites bariaensis ichno sp. nov.
(Plate I, Figs. 3, 4; Text Figs. 1, 2)

Diagnosis: Compact, sediment filled burrows with full or semi relief, parallel to sub parallel to the bedding plane with striations on the surface.

Description: The sediment filled burrows are very compact, touching each other

and at times running parallel for short distance. Burrows in general run parallel to the bedding, but some variations are also seen suggesting ascending or descending conditions. These are circular, elliptical or subquadrangular in cross section. Crowding and overlapping of burrows mask the general pattern, though at few places bifurcation is suggested. The surface of these burrows is ornamented with parallel to subparallel striations. Diameter of the burrows varies from 3 mm to 5 mm.

Remarks: The burrows are present in a 12-15 cm thick shale. The shale is thoroughly bioturbated and all bedding features have been destroyed. Some of the burrows are seen penetrating the overlying sandstone up to a height of about 10 cm and are lined with shaly matrix. The subquadrangular shape of the cross section is most probably due to the pressure exerted by the compact burrows against each other.

Ichnogenus *Striatolites* gen. et. sp. nov. resembles somewhat *Planolites* Nicholson, but differs in the presence of striations and associated vertical burrows. It closely resembles *Imbrichnus* Hallam in description, but again differs in surface markings. The presence of striations on the surface, and the presence of large *Thalassinoides* in the underlying sandstone suggests that the animal may be some arthropod, possibly smaller crustaceans.

Locality: Baria Nadi section, between Avalda and Zirabad villages, Madhya Pradesh.

Horizon: Shale bed in upper Nimar Sandstone, Cretaceous.

Repository: TR 57-59 Department of Geology, Lucknow University, Lucknow.

Conclusion

Thalassinoides belongs to Cruziana Assemblage and indicates shallow, sublittoral regions below wave base to slightly quieter offshore type conditions of moderate to relatively low energy (Frey *in* Frey, 1975). The presence of bimodal current bedding, lenticular and flaser bedding, and *Thalassinoides* burrows in a number of beds above the jasper conglomerate in the Nimar Sandstone points to a marine environment of deposition. The reported occurrence of *Turritella, Astarte* and Oyster beds near the top, and gradational contact with the overlying Nodular Limestone provides conclusive evidence in favour of marine deposition. The present study supports the division of Nimar Sandstone into an upper marine and a lower freshwater deposit as suggested by Singh and Ghosh (1977).

Acknowledgement: The authors are grateful to Dr. S. Kumar for useful discussions and to the Council of Scientific and Industrial Research for financial help. The authors are obliged to Dr. S. N. Singh, Head of the Department of Geology for a critical appraisal of the manuscript

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(Received: Sept. 26, 1977; Revised form accepted: July 1, 1978)

Jour. Geological Society of India, Vol. 20, May 1979, pp 239 to 243

Quadracythere tewarii sp. nov. from Rajahmundry Inter-trappean Beds, India

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Abstract

A new species of podocopid ostracode—*Quadracythere tewarii*—is described from the Early Eocene Inter-trappean beds of Rajahmundry area, Andhra Pradesh. The scanning electron study reveals the presence of numerous single pores of different shapes and sizes situated in the depressions produced by reticulating ornamental ridges on the lateral sides of the carapace. The associated microfauna indicates that *Q. tewarii* flourished in a near-shore, epineritic environment having open-sea connection.

Introduction

During the course of a micropaleontological study of the Inter-trappean beds of the Rajahmundry area, exposed near Pangadi (17°1′ : 81°39′02″), in the West Godavari district of Andhra Pradesh, a new species of the ostracode genus *Quadracythere* was found. Although, a prolific assemblage of foraminifera was described from these beds a decade ago by the author (Bhalla, 1967), no detailed study of their ostracode assemblage has yet been made. However, a few casual reports of ostracodes are available (Sastri, *vide* Rao, 1953; Sastri, 1961; Bhalla, 1965; Bhalla, 1967). Ostracodes are good indicators of depositional environment and age of the enclosing sediments and, therefore, it was considered desirable to describe the present new find.

The Rajahmundry Inter-trappen beds have attracted a good deal of attention due to their unique stratigraphic position, in between the early flows of the Deccan Trap and this is further enhanced by the presence of prolific fossil assemblage, especially of marine nature. A study of these rocks, therefore, helps in solving a variety of problems connected with the age of the Deccan Traps.