

known from the Dingi Hill Member in Patcham Island³, there is no report till date on the occurrence of fossil bones of dinosaurs from the Jurassic of Kutch.

The purpose of the present communication is to record and also report the occurrence of a rich vertebrate fossil assemblage from the Middle Jurassic of Kutch. The 'material' comprises several vertebrae and limb elements (Figure 1 c, d). More than twelve vertebrae and many other bone pieces are found. Some of them are still embedded in the sandstone and some are scattered over the outcrops, covering an area of about 200 m². The length and the diameter of these bones range from 10 to 15 cm and 9 to 10 cm, respectively. A few pieces of bones have been collected from the area and their longitudinal and transverse sections reveal a definite cell structure made up of calcium carbonate (Figure 1 e).

The presence of a large number of well-preserved bones and tree trunks

from the Middle Jurassic rocks of Kuar Bet and their close comparison with published literature⁴ strongly suggest the presence of a dinosaur skeleton at this site. Although there are records of the presence of dinosaur eggs from the Intertrappean beds of Late Cretaceous age from the nearby Anjar area, there is no record of skeleton or part of skeleton of dinosaurs from Kutch—especially from Jurassic strata. Thus, this communication records the first occurrence of oldest fossil dinosaur from the earliest Middle Jurassic of Kutch. A systematic excavation of the site is required by professionals to reconstruct the full skeleton of what could possibly be a Middle Jurassic dinosaur—the oldest record of these giant reptiles from Kutch.

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Record of a nesting burrow from the Badhaura Formation (Permian), Rajasthan

Fossiliferous sedimentary rocks found to occur in association with the Bap Boulder Bed in the Jodhpur district, Rajasthan were designated as the Badhaura Formation¹. The fossil fauna recovered from these rocks, dominated by brachiopods and bivalves, indicates a Permian age and a marine origin^{1–4}. Although the body fossils were studied to some extent, trace fossils from the Badhaura Formation did not receive any attention. There is only a passing reference to the presence of 'abundant worm burrows in the basal sandstones' of the Badhaura Formation⁴.

We report here a fossil nesting burrow, a brood structure, from the Badhaura Formation. Seen in negative semirelief, it is preserved within the buff-coloured, calcareous sandstone, exposed at a spot (27°21'36"N : 72°16'45"E), 3 km south of Bhimji ka Gaon (Figure 1).

The biogenic structure is a vertical, unbranched, long-necked, flask-shaped burrow consisting of a shaft with a pear-shaped, bulb-like structure at its base. The upper portion of the shaft is broken

off. Preserved height of the shaft is 58 mm. The shaft measures 6 mm in width which is uniform throughout its length. The bulb measures 32 mm at its maximum width and is 53 mm in height. Therefore, total height of this nesting burrow must have been more than 111 mm. A well-defined outline of the burrow is suggestive of the presence of a lining which, however, is not preserved. The inner surface of the bulb exhibits fine scratch marks. Two petaloid, pad-like structures are seen inside the cavity of the bulb at its base (Figures 2 and 3). Also seen are parts of two vertical, cylindrical burrows penetrating the bulb, evidently emplaced subsequent to the formation of this nesting burrow. Obviously these are not integral parts of the nesting burrow.

Following the architecture of the trace fossil, the entire burrow can be reconstructed (Figure 4). It would then reveal the presence of at least two or three more of the petaloid pads, hinting that they were four to five in all. They probably served as cushions to support and protect the eggs.

Two ichnofossils recorded from younger sediments are closely comparable to the present form, one of them has been attributed to insects⁵, while the other to callianassids⁶. The callianassid brood structure from the Pleistocene of North Carolina⁶ differs from the present specimen in having a number of tubes

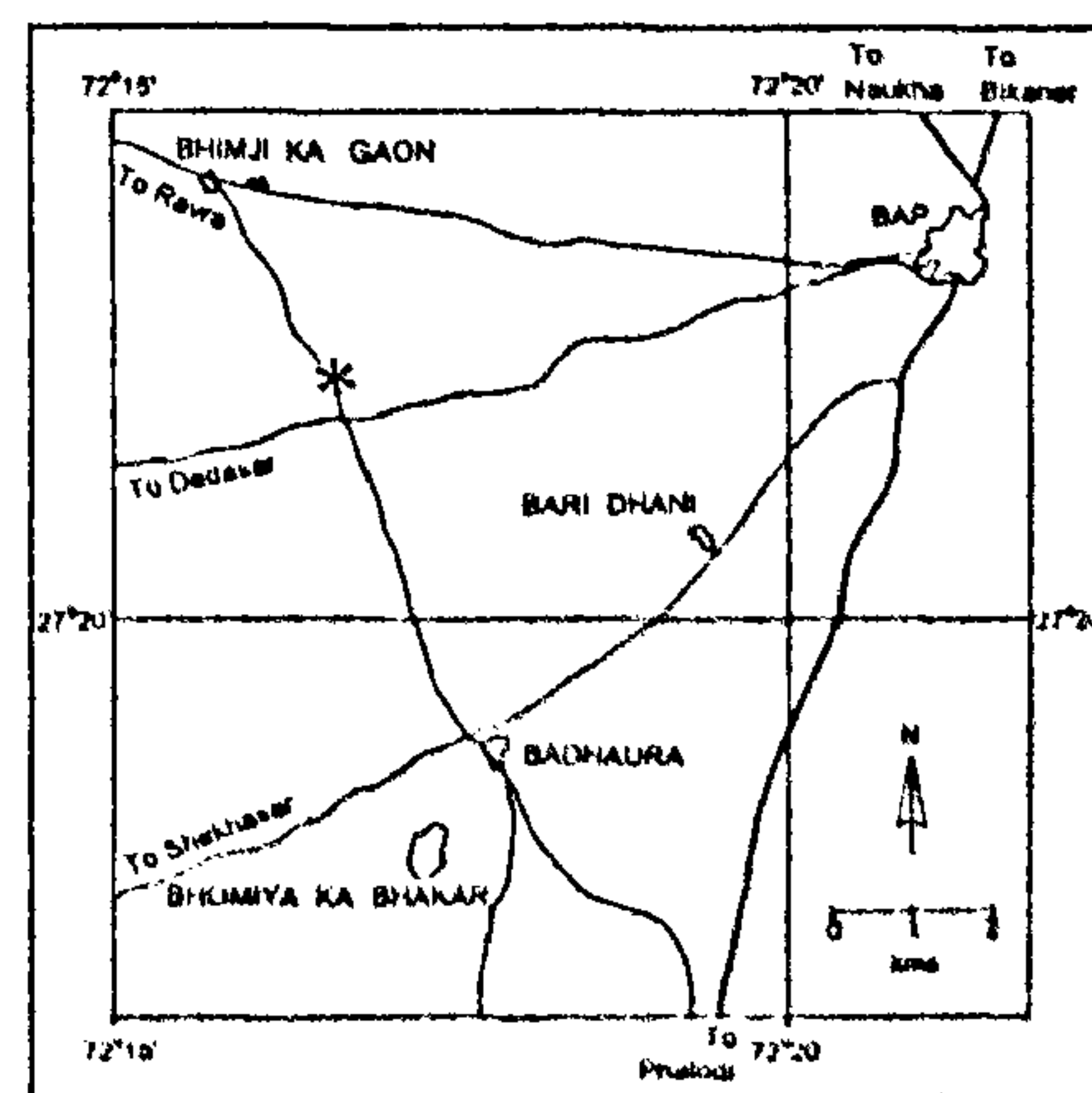


Figure 1. Locality map. Fossil locality is indicated by an asterisk.



Figure 2. Nesting burrow from the Badhaura Formation, $\times 0.66$ (Type specimen No. MACS G 4355).

connecting to the bulbous nesting chamber. Moreover, its bulb is nearly spherical in shape. The insect brood structure from the estuarine tidal flat of Georgia⁵ is, however, a better analogy to the present fossil in having an overall flask-like structure. It differs from the Badhaura specimen in its smaller size and absence of petaloid pads.

Such structures could have been produced by stomatopodiids (*sensu lato*) since the present day stomatopodiid crustaceans are known to construct brood structures for egg laying and hatching. The female, for a long period after laying eggs, takes sufficient care initially of the eggs and then of the young larvae till the time the larvae are set free to be on their own. During this period the female remains in the nesting burrow, going out only temporarily for food⁷.

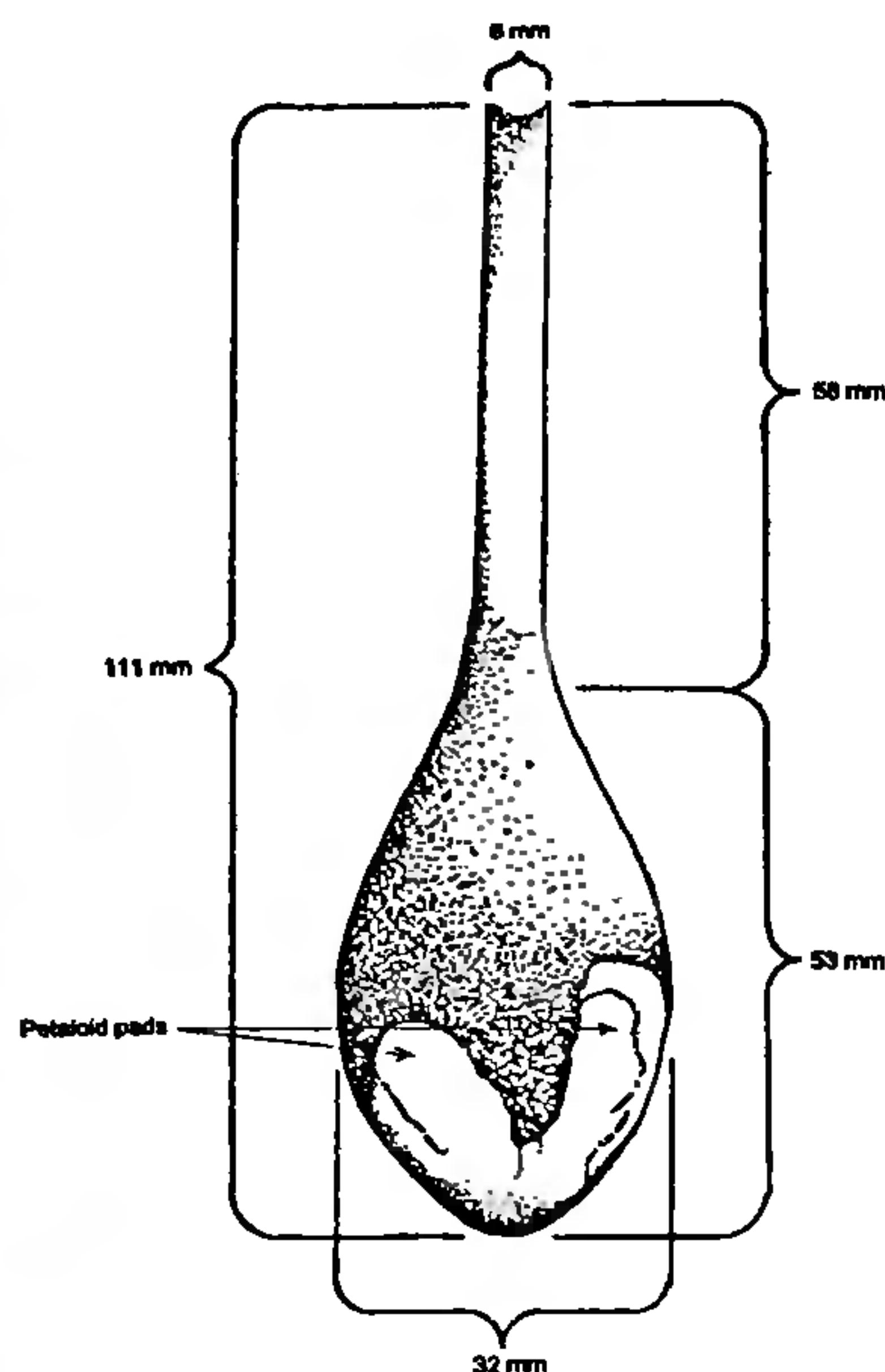


Figure 3. Line drawing of the nesting burrow, $\times 0.66$; bioturbation subsequent to the formation of this burrow is omitted.

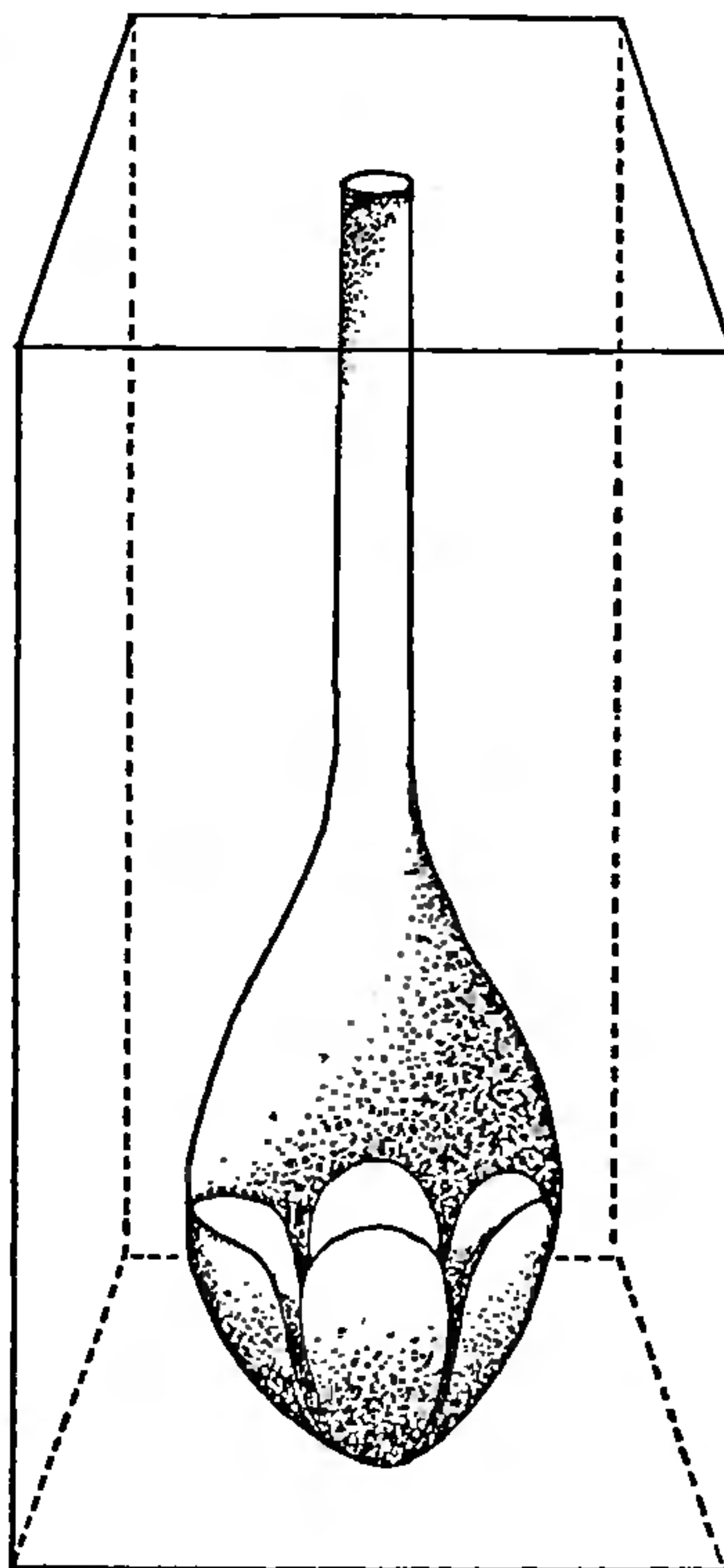


Figure 4. Reconstruction of the nesting burrow.

This burrow occurs in association with a variety of traces including those of arthropod origin, majority being dwelling burrows. The dominant ichnotaxa are *Arenicolites*, *Curvolithus*, *Cylindrichnus*, *Palaeophycus*, *Planolites*, *Monocraterion*, *Skolithos* and *Thalassinoides*. The detailed systematics will be published subsequently.

Considering the dominance of dwelling burrows and rarity of trails, the brood structure described here is assigned to the *Skolithos* ichnofacies. The calcareous sandstone containing these traces also hosts body fossils, mainly lingulids, eurydesmids and a couple of ill-preserved gastropods, all indicative of shallow water, near-shore conditions of deposition.

The Talchir Boulder Bed, an important coeval event in the stratigraphy of the Indian Peninsula, is associated with marine sedimentary rocks exposed at Umaria, Manendragarh and Rajhara³. In view of the occurrence of a rich and varied ichnofauna at Badhaura, it would be worthwhile investigating these localities also for trace fossils.

The specimen described herein is deposited in the palaeontological collection of the Agharkar Research Institute, Pune, under the registration No. MACS G 4355.

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