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Indication of the presence of metazoan fossils from the neo-proterozoics of indravati basin

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Abstract

Abstract: This is the first report on the occurrence of the metazoan fossils from the NEO-PROTEROZOIC INDRAVATI GROUP of rocks in the Bastar District of Chhattisgarh State in central India. These Metazoan Fossils are of tubular morphology and occur as reef builders in the lime stones of Kanger Formation. Prior to this report, cyanobacterial life forms represented by stromatolytes were the only known fossil occurrence within the Indravati Basin. The occurrence of Metazoan fossils indicate that the condition existed for the evolution of higher life forms during the later part of the Proterozoic in the region.

Keywords: Neoproterozoic, Metazoa, Indravati, Group, Chattisgarh, Palaeontology

1. Introduction

This is the first report on the occurrence of the metazoan fossils from the NEO-PROTEROZOIC INDRAVATI GROUP of rocks in the Bastar District of Chhattisgarh State in central India. These Metazoan Fossils are of tubular morphology and occur as reef builders in the lime stones of Kanger Formation. Prior to this report, cyanobacterial life forms represented by stromatolytes were the only known fossil occurrence within the Indravati Basin. The occurrence of Metazoan fossils indicates that the condition existed for the evolution of higher life forms during the later part of the Proterozoic in the region. We speculate that the newly discovered fossils are from taxon coelenterate. Further study is in progress. Indravati Group occurs almost at the centre of an ensemble of Meso-to Neoproterozoic (1.8 to 0.5 Ga) platformal basins in the Peninsular India. Most of these intracratonic basins preserve multiple cycles of sedimentation of ortho quartzite, shale and carbonate suite of rocks, which have been slowly deposited in the shallow shelf environments over periods of millions of years. Vertical block movements along faulted margins guided configuration of individual basins of deposition. Indravati Basin derives its name from the River Indravati flowing east to west through this group of rocks, most of which occur in the Bastar District in the southern Chhattisgarh and Koraput District in south western Orissa. We are not aware of any radiometric age from the sediments of the Indravati Basin. Ramakrishnan assumes conjecturally that Tirathgarh Formation at the base of Indravati Basin would date about 1400 Ma. Following Ramakrishnan's assumption, Mainkar assumes that the Tokapal kimberlite eruption event between the periods of deposition of Kanger and Jagdalpur Formation, would age about 1050Ma. Stromatolyte reef complexes have been reported from the Jagdalpur Formation. Species of stromatolytes described include *Gymnosolen*, *conophyton*, *Colonella*, *Tongussida* (*Baicalia*, *Anabaria*) and *Kussiellida*. These stromatolytes probably represent an Upper Riphean assemblage (1100 – 700 Ma). Geological Survey of India (personal discussion with GSI geologists) commonly prefers to correlate the entire package of Indravati Group of rocks with the Upper Chhattisgarh Group of rocks in the adjoining Chhattisgarh Basin (figure 1a). Glauconitic sand stones at the base of Chhattisgarh Basin have returned K-Ar dates of 700-750 Ma (personal communication, GSI). The Stromatolyte assemblage found in the Raipur Formation of Upper Chhattisgarh Group of rocks is however known to represent Upper Riphean assemblage. Outcrops of fossiliferous lime stones were discovered by our team in the kanger valley 30 km south of Jagdalpur at latitude 18 49 N and longitude 82 02 E in the southern part of Indravati Basin. These outcrops show extensive occurrence of reef forming tubular fossils. Patchy outcrops of these fossiliferous lime stone having a bedding thickness of 5 or more , have been observed

to extend up to a couple of kilometers.

Material and method:

We have done detailed geological mapping of the Kanger valley region and made several visits to collect in situ samples and consulted with several geologists.

Result and discussion:

These newly discovered fossils occur as clustered assemblages of hollow tubes, with diameters ranging from a few mm to 1.5 cm. Hollow tubes have layers of walls of silicified carbonate each wall is few mm in thickness. Mostly, the tubes occur in either single or in clusters. Another distinct feature of this fossil is the growth of concentric elliptical sheaths compressed at one end whereas marked gap in the other end. The inner most hollow tube generally has a circular cross section, but the sheaths surrounding the inner most tube could be elliptical. In cross sectional view the differential weathering can be seen as concentric ridges of siliceous carbonate tube alternating with depressed calcite filled intra-tubular space indicating that there may be presence of soft and hard parts of the specimen.

The tubes and clusters of tubes appear to have grown generally upwards in different directions. Lower portion of the specimen is occupied by numerous small tubular bodies oriented in different directions. Preliminary observations suggest that these fossils are primitive sessile metazoans. Their well preserved simple, hollow tubular morphology suggests that they had firm skeletal support, which was calcified during early diagenesis. It appears that these sessile organisms grew in a tidal flat environment where rapid early carbonate cementation facilitated exceptionally good fossilization. The preliminary observation leads to the following speculations:

1) The circular to elliptical concentric sheaths around the bigger tubes appear to be fossilized exoskeleton of Cnidarians (Coelentrata).

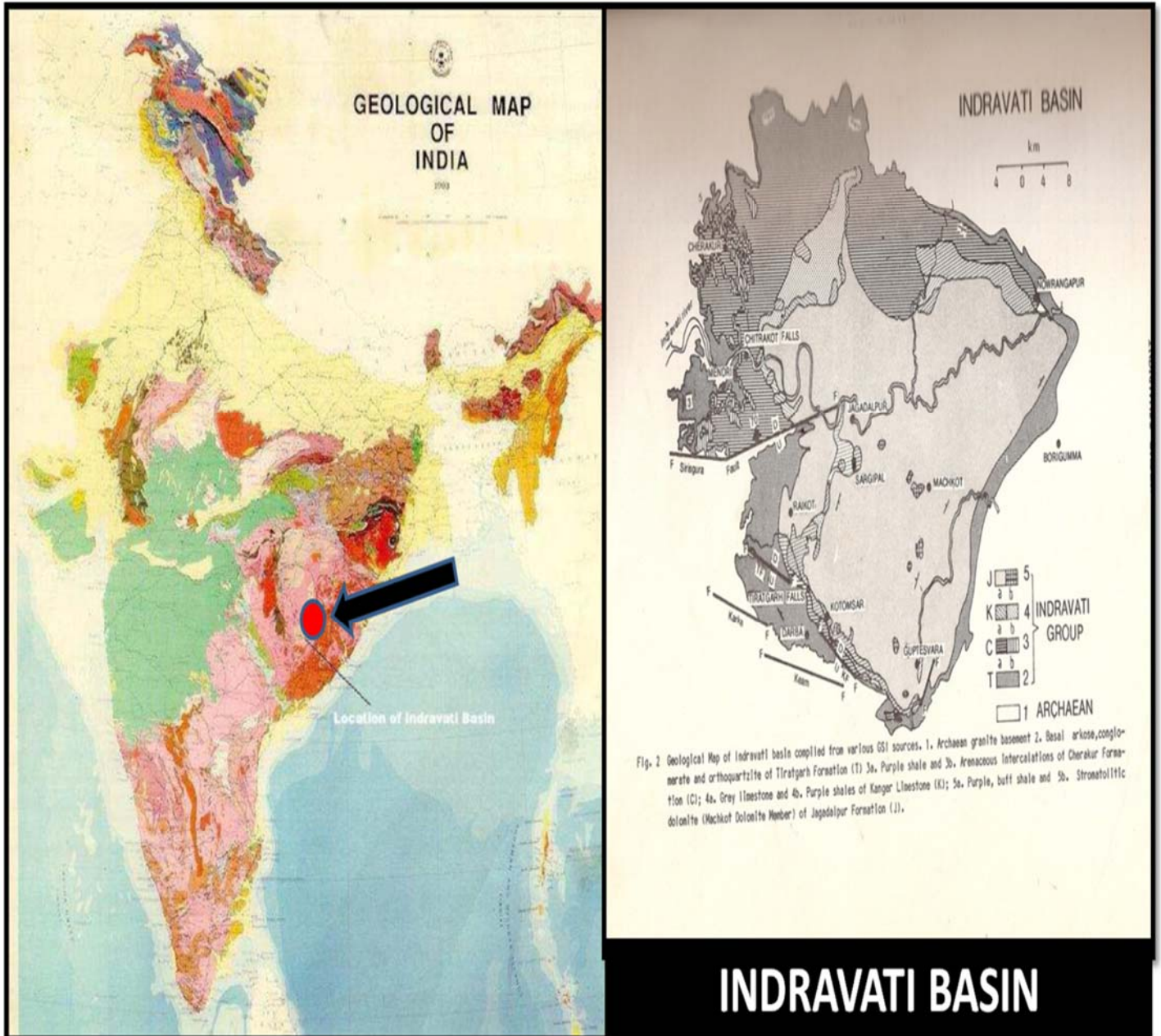
2) The simple tubular body and the multi-tubular organization suggest that these fossils could be primitive coral and sponges of taxon Porifera.

Small tube like structure visible (to the naked eye) between inter ridge portions around the hollow tube whether these features are internal transport system within organism is a topic of further study. Whether the concentric ring like layers surrounding the bigger tubes had helped in building up of the skeletal structure of the organism, and in between concentric calcareous sheaths was the tissue of the specimen.

Spicules of Porifera have been reported from as old as Mesoproterozoic rocks of eastern Siberia. Neoproterozoic Porifera have been described from different parts of the world, e.g. Grand Canyon in Arizona, central Africa, Britain and Himalaya. However, within the Precambrians, Cnidaria fossils apparently lacked mineralized skeleton needed to fossilize, and preservation was only in the form of impressions, unlike the fossils reported in this paper. Cnidarians with hard skeletons as in corals appear to proliferate only from the Cambrian age and younger. The reef built by these metazoan fossils in the Kanger Formation is also unique. The first metazoan reefs have only been described from the terminal Neoproterozoic (550 Ma), e.g. Nama Group of southern Namibia. The youngest speculated date from the Indravati Group is about 700 Ma!!

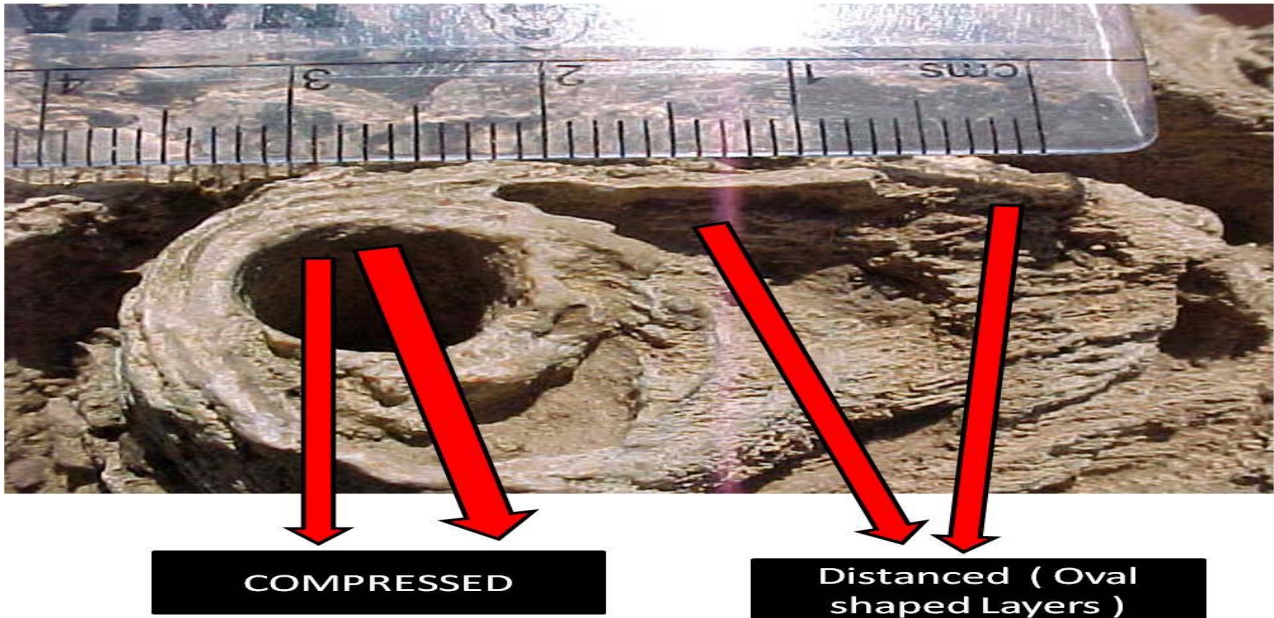
Proterozoic rocks preserve varieties of flora and fauna. Cyanophyta (stromatolytes) were the main life forms during Proterozoic. Evidences of more evolved organisms are also found in rocks even older than 900 million years. Metazoan fossils (Ediacarian biota) found as impressions in Ediacaria hills of south Australia are 600 million years old. Similar fossils from the same age have been found in England and Wales (the Charnian Biota), Africa, Russia and North America. A rich assemblage of the impressions of soft bodied Metazoans (multi cellular) was also discovered from the Late Precambrian rocks of south eastern Newfoundland, Canada.

Location Map

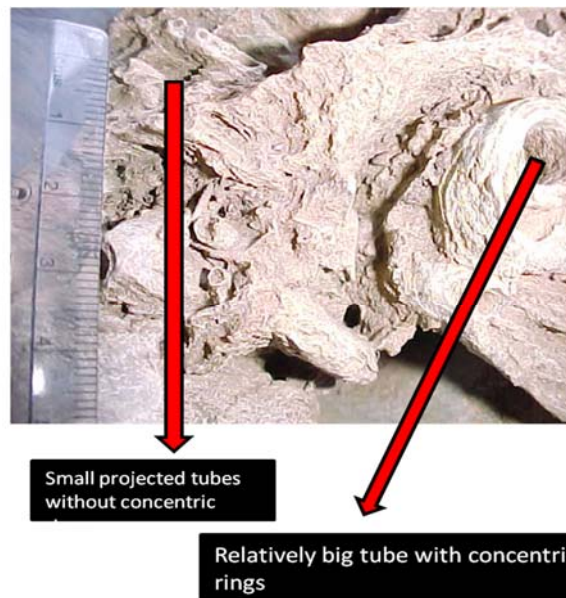
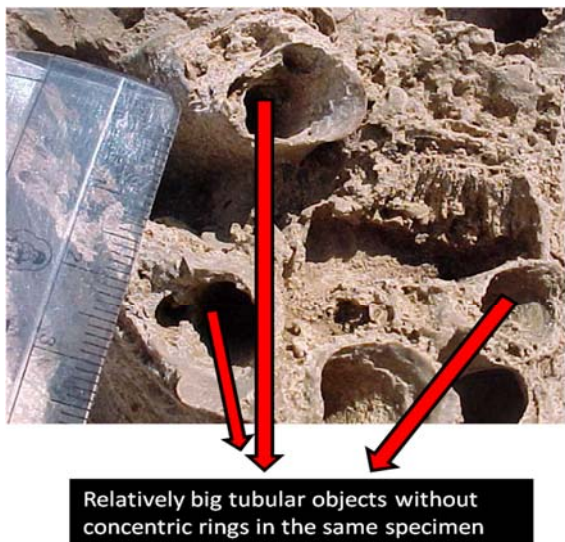


Samples Collected From the Site





Two tubes of different dimensions are adjacent with each other the first tube has inner diameter 0.5 centimeter. whereas the large tube has diameter of 1.5 centimeter.



Conclusion:

This is the first reported metazoan fossil from the Indravati basin. Trace fossils of dubious origins have been described from Semri Group of Vindhyan Super Group of rocks. Recently Stromatolites deposited by cyanobacterial life forms are, however, quite commonly found in the Proterozoic. This significant find of metazoan fossils in the Indravati Basin proves that the conditions suitable for the growth of higher life forms existed during the Neoproterozoic. The state of preservation of these fossils appears to be exceptionally good. Assigning a definite taxonomic group or phyla to these metazoan fossils would require further detailed study. The authors are also trying to understand the growth environment of these metazoans and their conditions of fossilization in the limestone reefs of Kanger Formation.

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