

A SOLENOPOROID ALGA FROM MIOCENE OF ANDAMAN*

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ABSTRACT

The occurrence of a new solenoporoid alga from the Lower Neogene sediments of Little Andaman Island in the Bay of Bengal is recorded. The find is of stratigraphic significance in that it adds to the list of few known solenoporoid algae in the Tertiary rocks and also records the conceptacle like reproductive bodies in the solenoporoid alga. The occurrence of this new alga also corroborates the Middle Miocene or younger age of the sediments evidenced by the foraminiferal assemblage.

INTRODUCTION

In the course of the geological investigation of the marine Tertiary sediments of the Andaman Islands, for biostratigraphic correlation, during the Geological Survey of India Field-seasons 1972-73 and 1973-74, the author along with his colleague—Shri V. D. Mamgain, carried out systematic sampling of the Neogene sediments at the Hut Bay Limestone quarries, Little Andaman Island.

Examination of thin sections of the limestones revealed the presence of a rich algal flora belonging to Corallinaceae (red algae). Besides coralline algae in some of the thin sections a different type of red alga was observed, which apparently looked like coralline alga, but had relatively larger cells in vertical files, lacked distinct differentiation of thallus into hypothallus and perithallus, and was devoid of definite reproductive structures, so characteristic of the Corallines. Detailed study and comparison revealed this new alga to belong to Solenoporaceae and comparable to *Neosolenopora* Mastrorilli, known so far only from the Miocene of Italy and France.

Very little is known about fossil algae from Andaman Islands—that too from Little Andaman in particular. GEE (1926) recorded *Lithothamnion* fragments in white and cream coloured limestones from Hut Bay. CHATTERJI AND GURURAJA (1972) recorded *Amphiroa* cf. *prefragilissima* and *Amphiroa* sp. from Chitamale limestone (Miocene) of Little Andaman.

The fossil record of Solenoporaceae in India is so far known to range from Upper Permian to Lower Eocene. The present find of *Neosolenopora ramaraoi* sp. nov. from Miocene of Little Andaman, is significant for there are very few world reports of Tertiary Solenoporaceae and it is the first record of the family from Andaman as well as from Miocene of India.

MATERIAL

The material of the present study comes from the Miocene rocks of the Hut Bay (10°35': 92°31') limestone quarries situated on the south-eastern coast of the Little Andaman Island. Hut Bay is situated about 96 km by sea, south of Port Blair, the Capital

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of Andaman and Nicobar Islands. The samples in which this alga was observed are detailed below :

| <i>Sample No.</i> | <i>Lithology</i> |
|-------------------|---|
| MP 1/2 | Compact fawn-coloured biohermal limestone |
| MP 1/10 | " " " " |
| MP 1/11 | " " " " |
| MP 1/20 | White and crystalline limestone |

SYSTEMATIC DESCRIPTION

Class—RHODOPHYTA (Red algae)

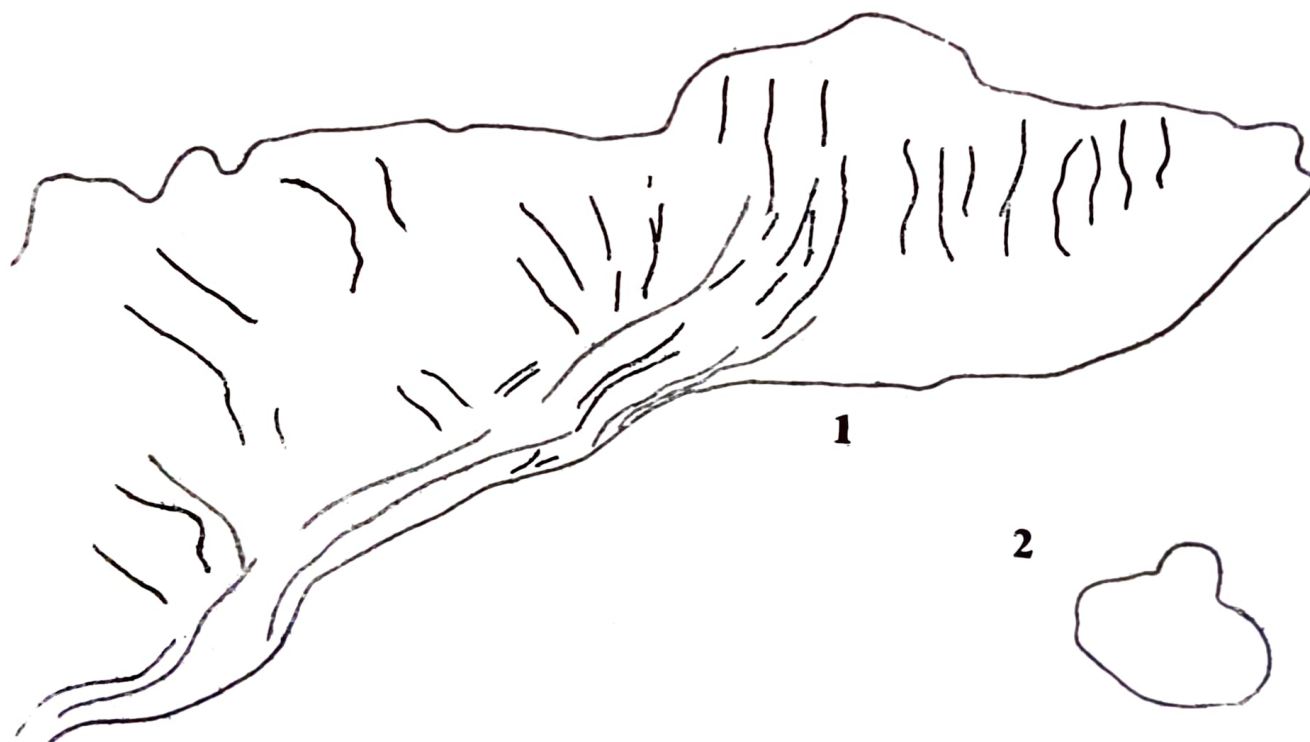
Family—SOLENOPORACEAE, Pia

Genus—**Neosolenopora**, Mastrorilli

Neosolenopora ramaraoi sp. nov.

(Pl. 1, Figs. 1-4 ; Text-figs. 1 & 2)

Description—The thalli are crustose or nodular. The crustose type undulate, grow over and occur interlaminated with larger foraminifera and coralline algae. The thickness generally ranges from 2 mm to 9 mm. One nodular type observed, measured 12 mm in maximum diameter. Hypothallus is rudimentary with basal layers curving up. In vertical section, bulk of the tissue is perithallus occurring as vertical files or tubules of rectangular cells, with prominent vertical walls. The cells show tendency to become flattened domes in upper levels of the thallus. In transverse section, cells are polygonal or rounded. The cells show a great variety in size and shape. Some of the perithallial cells measured range in size from about 0.08 to 0.16 mm in diameter and 0.052 to 0.104 mm in height. Conceptacle like structures, oval and rounded in shape are present. One such



Neosolenopora ramaraoi sp. nov.

Text-fig. 1. Basal Section of the crust showing rudimentary hypothallus $\times 32$.

Text-fig. 2. Conceptacle structure with single aperture $\times 24$.

structure showing a tendency of single aperture of lithophyllid type measured about 264 by 396 microns.

Remarks—The genus *Neosolenopora* was erected by MASTRORILLI (1955) for the form originally described as *Lithophyllum vinassai* from Miocene (Helvetian) of Italy, by PATRINI (1932-1933). MASTRORILLI while erecting the new genus observed great deal of resemblance with Solenoporaceae, and transferred it into a new species *Neosolenopora patrinii*, after PATRINI who originally described this form. Since then, this species was recorded by ELLIOTT (1965) from Miocene (Vindobonian) fauna of West France, where it was earlier described as Bryozoa (CANU & LECOINTRE, 1934).

ELLIOTT (1973) described another species *N. armoricana* from Miocene (Vindobonian) of France, and included under this *N. patrinii* described by him (ELLIOTT, 1965) from the same horizon. *N. armoricana* is most exceptional is showing clear reproductive bodies similar to Corollinaceae.

The present form, *N. ramaraoi*, compares with *N. patrinii* and *N. armoricana* in general appearance and nature of the tissue. But in cell measurements the present form shows difference from the Italian and French species, though it is much closer to the latter species.

Measurement of ordinary cells in mm

| | | | | | |
|--------------------------------|----|----|----|-------------|--------------|
| <i>N. patrinii</i> Mastrorilli | .. | .. | .. | 0.24 —0.30 | by 0.06—0.10 |
| <i>N. armoricana</i> Elliott | .. | .. | .. | 0.05 —0.20 | by 0.08—0.11 |
| <i>N. ramaraoi</i> sp. nov. | .. | .. | .. | 0.052—0.104 | by 0.08—0.16 |

Cells in *N. ramaraoi* sp. nov. are shorter and wider than those in *N. armoricana*. Further in the present form the supposed reproductive bodies resembling sporangia of *Archaeolithothanidium* type seen in genotype are not observed. However conceptacle like structures are observed in this species. One such structure showed tendency of single aperture of Lithophyllid-type.

The new species is named after late Prof. L. Rama Rao, a pioneer in algal studies in India.

Horizon—Limestone of Hut Bay Formation (Middle Miocene).

Locality—Limestone quarry (main) about 3 km, S. W. of Hut Bay, Little Andaman.

Figured specimen—G. S. I. Holotype No. 19149.

Repository—Central Palaeontological Laboratories, G.S.I., Calcutta.

DISCUSSION AND REMARKS

Solenoporaceae are an extinct group of marine red algae occurring as encrusting or nodular masses, few millimetres to several centimetres thick. They are related to, in fact considered to be ancestral to, coralline algae. Doubt is cast upon many reports of supposed reproductive bodies in Solenoporaceae. WOOD (1944) has summarised several world reports and classified such supposed reproductive bodies of Solenoporaceae from Palaeozoic and Mesozoic horizons. He doubts their being reproductive bodies except in a few cases. Similarly, ELLIOTT (1965) has summarised and compared such reports of reproductive bodies of Tertiary Solenoporaceae.

Solenopoid algae were important and world wide during Palaeozoic and subordinate in Mesozoic. JOHNSON (1961) while discussing the geological history of the family Solenoporaceae comments (p. 73) that “we find Solenoporaceae rapidly decreasing in numbers and importance during later part of Cretaceous. A few forms survived into the Paleocene, but most of them became extinct by the end of Cretaceous and all of them were gone by

Eocene". ELLIOTT (1965) while reviewing the literature on reproductive bodies and evolution of Tertiary Solenoporaceae, comments (p. 696) that "in the warm seas of Tethys, however they survived into the early and mid. Tertiary and although limited in genera and species, they occur locally in great abundance". The present find of *Neosolenopora ramaroi* sp. nov. in Miocene of Andaman corroborates ELLIOTT's view.

The fossil record of Solenoporaceae in India is known so far from Upper Permian to Lower Eocene. OAKLEY (1941) recorded *Solenopora (Parachaetetes) hookeri* from Upper Permian of north Sikkim and discussed the affinities of the family Solenoporaceae. MITTAL AND CHATURVEDI (1965) recorded a doubtful form of Solenoporaceae from Permo-Trias of Uttar Pradesh. NARAYANA RAO (1946) described two new species; *Solenopora jurassica* and *S. coramondalensis* from Culygoody Limestone, Trichinopoly, Tamil Nadu and assigned a Jurassic age to the rocks containing them. RAMA RAO AND SAMBE GOWDA (1954) described two new species, *Solenopora sahnii* and *S. tiruchiensis* from the Cretaceous of Trichinopoly, Tamil Nadu. PIA AND RAMA RAO (1936) described a new species *Parachaetetes asvapatti* from the Niniyur (U. Cretaceous) Group of Trichinopoly, Tamil Nadu. NARAYANA RAO AND VARMA (1953) described a new species *Solenomeris (?) douvillei* from the Lower Eocene (Laki) rocks of Nammal Gorge, Salt Range, and showed definite evidences of conceptacles in them and considered the form to belong to coralline algae. Thus the record of Solenoporaceae in India is known up to Lower Eocene.

GEE (1926) while describing the geology of Andaman and Nicobar Islands, mentioned the presence of *Lithothamnion* in cream coloured and white limestone near Hut Bay. He did not give any definite evidence of the horizon to which the limestone belonged, but referred it as Middle or Late Tertiary in age. CHATTERJI (1964) on foraminiferal evidences assigned a Lower Miocene (Aquitania) age to the cream coloured limestones of Chitamale Coast from which CHATTERJI AND GURURAJA (1972) recorded a rich algal flora belonging to Corallinaceae. SRINIVASAN (1969) recorded a rich foraminiferal (Planktonic & Benthonic) assemblage from the Mudstone Formation off Hut Bay and assigned a Middle Miocene (Tortonian) age to the Mudstone. The limestone of Hut Bay quarry containing the solenoporoid algae overlie the Mudstone Formation.

The genus *Neosolenopora* is known so far only from Middle Miocene. Thus it is suggested that the family Solenoporaceae lingered till Middle Miocene in Andaman area.

The occurrence of Solenoporaceae and associated coralline algae suggests that the Hut Bay limestones were deposited in a shallow marine environment. Their abundance in some sections also point to their importance as local limestone builders.

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EXPLANATION OF PLATE 1

Neosolenopora ramaraoi sp. nov.

1. Section of a crust showing nature of the tissue $\times 6$. G. S. I. Holotype No. 19149.
2. Part of the Crust enlarged to show the details $\times 48$.
3. Vertical section of basal crust showing horizontal layers of hypothallial cells gradually creeping up rudimentary hypothallus $\times 25$.
4. Conceptacle structure with single aperture $\times 48$.

