

A NEW SPECIES OF *LITHOPHYLLUM* FROM OLIGOCENE OF SOUTH-WESTERN KUTCH

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ABSTRACT

The present paper reports the occurrence of fossil calcareous algae for the first time from the Oligocene rocks of south western Kutch. The described coralline alga *Lithophyllum bermotiensis* is a new species and is from the marly lens of *Eupatagus rostratus* Zone of Ber Moti Stage, Chattian in age.

INTRODUCTION

The term calcareous algae is used for those algae which have an ability of secreting or depositing calcium carbonate in inter tissue spaces and around the plant tissues. All the calcareous algae belong to green or red algae groups. The red algae have many lime secreting families amongst which Corallinaceae has its own importance. Most of the coralline algae attain greatest development in warm seas along with calcareous algae, foraminifers, ostracodes, echinoids, corals etc. which together build up huge calcareous masses known as 'Coral reefs.' The coralline algae are of great importance as main cementing organisms where lime takes the form of calcite. In addition, the occurrence of some dolomite has also been known from older thalli and dead parts.

The encrusting Corallinaceae started from Cretaceous and were widely distributed in Cenozoic contributing actively in the formation of limestone and reefs. A large number of these are present in the modern seas also. In India the coralline algae have been reported from various formations belonging to Cretaceous and Tertiary ages but their records, accounts and literature are comparatively limited. Therefore, in order to establish their role in palaeoecology and also in biostratigraphic correlation of the Tertiary rocks, it is essential to study these fossil forms systematically.

In the present paper a new species of genus *Lithophyllum* has been systematically described. This alga belongs to Chattian rocks exposed in a stream section near Ber Moti village (23°27'45" : 68°38'25") in Kutch district of Gujarat.

PREVIOUS RECORDS OF CORALLINACEAE IN INDIA

The earliest record of Corallinaceae goes as back as in 16th century when they were considered to be corals and were classified under hydrozoans or zoophytes. Ray in the early eighteenth century was first to call them algae and established the genus *Corallium* which later proved to be *Lithothamnion*. Since then lot of contributions have been made by the workers and many genera have been established under the family Corallinaceae.

In India, however, the earliest record of coralline algae is by Adye (1900, in Sripada Rao, 1939-40) when he for the first time reported *Lithothamnion* from the limestone of Porbandar and Navanagar. Later Hayden (1907, in Sripada Rao, 1939-40) noticed the occurrence of *Lithothamnion* from Maestrichtian limestone of Kampa System, Tibet. Das Gupta (1926, in Sripada Rao, 1939-40) described two new species viz. *Lithothamnium cherrapunjiensis* and *L. grandis* from the Eocene rocks of Assam. In the same year Gee reported *Lithothamnion* cf. *suganum* (Rothpletz) and *Archaeolithothamnion nummuliticum* from post Eocene Limestones of Middle Andman Island. Rama Rao (1931) for the first time recorded the occurrence of *Lithothamnion* from the Niniyur Stage of Trichinopoly and also from the Cretaceous rocks of Pondicherry area. He and Prasanna Kumar (1932) reported the occurrence of *Lithothamnion* from the pebbly limestone of Uttattur Stage of the Cullygoody area, S. India. Rama Rao and Pia (1936) gave detailed account of four species of *Archaeolithothamnion* from the uppermost Cretaceous beds of the Trichinopoly area. Narayan Rao (1941) described some new species of *Archaeolitho-*

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thamnion, *Lithophyllum* and *Mesophyllum* from Lockhart limestone (Ranikot Series) and in 1942 recorded *Lithothamnion* from Ranikot beds of Jhirak, Sind. Sripada Rao (1943) gave detailed description of 4 new species of *Archaeolithothamnium*, 4 species of *Lithothamnium* (which include 2 new species) and 9 new species of *Melobesia* from Eocene of Assam and also suggested the following synonymies for Das Gupta's forms :

Lithothamnion cherrapunjiensis as *Archaeolithothamnion cherrapunjiensis*, *L. grandis* as *Corallina grandis* and the foraminifer *Orthophragma radians* as *Mesophyllum* sp.

Singh (1950) reported *Archaeolithothamnion* from the Bagh beds, Madhya Pradesh. Varma (1952, 1953) described and reported *Archaeolithothamnium zonatum* sp. nov., *Mesophyllum lakiensis* sp. nov., *M. punjabensis* sp. nov., *Mesophyllum* (?) sp. indet. and *Lithophyllum wynnei* sp. nov. from the Laki beds of Nammal Gorge, Salt Range. Tewari (1957) reported *Archaeolithothamnion* from the Lower Miocene rocks of Kutch. Sastry, *et al.* (1963) gave an account of the occurrence of 12 species which included 4 new species from the Nerinea beds of Pondicherry, South India. Pal (1969) described *Lithoporella indica* sp. nov. from the Bagh beds of Madhya Pradesh.

GEOLOGY OF THE AREA

Tandon (1974) has classified the Oligocene rocks (Lakhpat Series) exposed near Ber Moti village which has been summarised in a tabular form below :

	Lower Miocene		<i>Serpula</i> zone
----- UNCONFORMITY -----			
O	Chattian	Ber Moti Stage	<i>Eupatagus rostratus</i> Zone
L		<i>Nummulites subclipeus</i> Zone
I	Rupelian	Ber Nani Stage	<i>Lepidocyclina (Eulepidina)</i> Zone
G		Coral Subzone
O		
G	Lattorfian	Maniara Stage	<i>Nummulites fichteli</i> Zone. <i>Heterostegina kohlii</i> Subzone
E		<i>Nummulites intermedius</i> Subzone.
N		
E		
----- UNCONFORMITY -----			
	Middle Eocene		<i>Nummulites maculatus</i> Zone

The present material is from a marly lens present within the *Eupatagus rostratus* Zone of Ber Moti Stage which is about 2.5 m in thickness and consists of limestone and marl. The age of this stage is Chattian and is unconformably overlain by the *Serpula* Zone of Lower

Miocene age. The unconformity is marked by the presence of a gritty band. The algal species described here is associated with *Schizaster* sp. A, *Schizaster* sp. B, *Eupatagus rostratus*, *Eupatagus affinis*, *Hemiaster* sp. etc.

The coral reef building activity actually started from Coral Subzone of Lattorfian, became more prominent during Rupelian and ceased during the Chattian time.

SYSTEMATIC DESCRIPTION

Class	Rhodophyceae
Family	Corallinaceae
Subfamily	Melobesiae
Genus	<i>Lithophyllum</i> Philippi, 1837

According to Lemoine (1939, in Johnson, 1965) the distinguishing characters of the genus are: Structures characterised by concentric arrangement of cells which may be partial or complete. Basilar hypothallium of crust shows a concentric arrangement or more rarely a single row of horizontal cells. Medullary tissue of the branches formed of concentric rows ; perithallium of the branch and crust formed of cells arranged in files or concentric rows. Conceptacles (with sporangia) provided with a single aperture.

Lithophyllum bermotiensis sp. nov.

(Pl. I)

Description : The thallus is highly encrusting and branched. The branches developing from a basal crust are slender, 2-4 cm in length and oval to subcircular in transverse section with diameter varying from 1.5 to 2.5 mm. The hypothallus and perithallus are quite distinct. In a vertical section the tissue shows a well developed medullary hypothallus and thin perithallus. The hypothallus consists of thin arched zones which contain 3-12 rows of cells. Some of them show growth layers. The cells are rectangular in shape and are arranged in longitudinal and transverse rows and decrease in size from centre towards margin of the zone. The height of the cell rows also decreases from base upwards. The cells of hypothallus measure from 0.0125 mm to 0.025 mm in length and from 0.006 mm to 0.012 mm in width. Bordering the arched layers of hypothallus is a comparatively thin perithallus which does not show zonation. The perithallial cells are square to rectangular and are arranged in rows divided with vertical and horizontal partitions. The length and width of the perithallial cells vary from 0.0125 mm to 0.019 mm and from 0.006 mm to 0.018 mm respectively.

The conceptacles are good in number, large, well developed and scattered in hypothallus. In vertical section they are somewhat bean shaped with acutely rounded corners. In most of the conceptacles the roof

has more pronounced convexity as compared to the concavity of the base excepting a few where the base is, however, flat or highly concave. It has a single opening with a well defined straight, elongated and tapering neck. In a few conceptacles the neck at the opening slightly broadens. The conceptacles measure from 0.212 mm to 0.275 mm in height while the width (diameter) is in between 0.575 mm and 0.78 mm. The length of neck has been noticed to vary from 0.27 mm to 0.38 mm and its diameter from 0.075 mm to 0.1 mm.

Remarks : The present species differs from *Lithophyllum wynnei* Varma (1953) described from Lower Eocene (Laki) beds of Nammal Gorge, Salt Range, in having branched, elongated thallus, greater length and width of the perithallial and hypothallial cells (in *L. wynnei* the perithallial cells : 0.0065—0.0104 mm \times 0.0065—0.014 mm and hypothallial cells : 0.0078—0.013 mm 0.0052—0.0104 mm). Similarly the conceptacles in the present species are much larger and have a single opening with well defined neck as compared with those in the species described by Varma which measure 0.14—0.2 mm \times 0.22—0.37 mm.

Lithophyllum incaensum Johnson and Tafur (1952) described from Upper Eocene rocks of Peru differs from *L. bermotiensis* sp. nov. in being nodular and having a poorly developed hypothallus. *L. incaensum* Johnson and Tafur has smaller rectangular to circular conceptacles with unclear opening while the latter species has been shaped larger conceptacles with a clear opening.

The present species shows much resemblance with *Lithophyllum pseudoamphiroa* Johnson (1964) described from the Middle Eocene of Northern Iraq but differs in having conceptacles which have not been found in the species described by Johnson.

Lithophyllum? albanense Lemoine (1923) differs from the present species in having smaller conceptacles with highly rounded corners and short thick aperture.

The species *Lithophyllum johnsoni* Ishijima (1954) described from Kawaguchi formation of Japan is having smaller perithallial cells (0.008—0.01 mm \times 0.01—0.012 mm) and also differs in showing absence of conceptacles which are present in fairly good number in *L. bermotiensis* sp. nov.

Lithophyllum lockharti Narayan Rao (1941) described from Ranikot, Samana Range differs from *L. bermotiensis* sp. nov. in having unbranched thallus and much smaller perithallial (0.0086—0.0093 mm \times 0.0124—0.0155 mm) and hypothallial (0.0062—0.0068 mm \times 0.0124—0.0125 mm) cells. In *L. lockharti* Narayan Rao the hypothallus is thinner than the perithallus and the conceptacles are also smaller.

When compared with *Lithophyllum kuboensis* (Ishijima 1954) described from Miocene of Kawaguchi formation

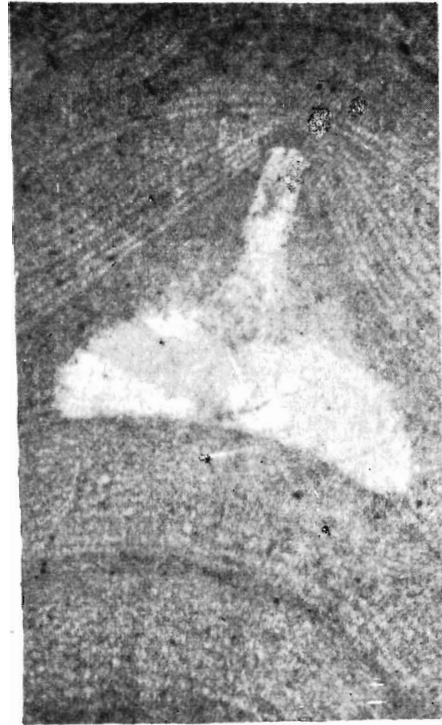
of Japan, *L. bermotiensis* sp. nov. differs in having narrower hypothallus with simple zoning whereas in Japan species it is thicker and highly zoned. Also, *L. kuboensis* (Ishijima) has comparatively smaller, closely occurring conceptacles with greater diameters.

The species has been named after the village Ber Moti from where the material has been collected.

Holotype slide No. KBM 101 and Paratype slide Nos. KBM 102 to 105 deposited in the Geology Department, Lucknow University, Lucknow.

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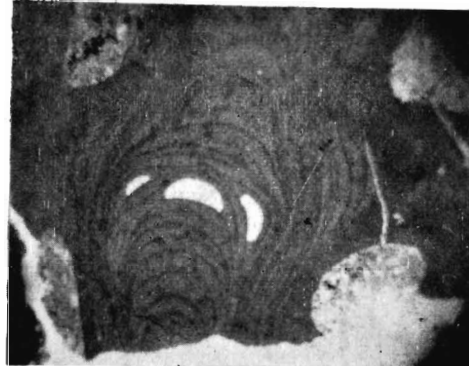


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EXPLANATION OF PLATE

PLATE I

Lithophyllum bermotiensis sp. nov.

- 1 Thallus showing encrusting and branched nature ($\times 0.75$ approx.).
- 2 Vertical section of thallus showing bean-shaped conceptacle with narrow tapering neck ($\times 60$ approx.).
- 3 Vertical section of thallus showing conceptacle ($\times 60$ approx.).
- 4 Vertical section of thallus showing perithallus, hypothallus and arrangement of conceptacles ($\times 15$ approx.).