

FOSSIL ALGAE FROM FULRA LIMESTONE (MIDDLE EOCENE), KUTCH, GUJARAT*

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ABSTRACT

Fossil algae are being described for the first time from Fulra Limestone (Middle Eocene), exposed at Babia Hills, Kutch District, Gujarat. The algae have been studied in thin sections and obtained from cream and buff coloured massive, silty limestone which are very rich in Foraminifera. The assemblage comprises *Lithothamnium* sp. cf. *L. validum* Foslie, *Lithothamnium* sp. cf. *L. bofilli* Lemoine and *Lithophyllum* sp. This assemblage is comparable to the other known Middle Eocene assemblages.

INTRODUCTION

The Fulra Limestone is the uppermost lithological unit of Eocene rocks in Kutch. According to BISWAS AND RAJU (1971), this formation is about 75 ft thick and is well exposed on the southern side of Babia Hill. The whole formation is made up of limestones and rests conformably on the Harudi Formation. The upper contact is, however, not conformable and underlies the Maniyara Fort Formation. The stratigraphic position of Fulra Limestone, in the opinion of BISWAS AND RAJU (1971), is as follows :

Maniyara Fort Formation	Oligocene
Fulra Limestone	} Middle Eocene
Harudi Formation	
Naredi Formation	Lower Eocene
Matanomadh Formation	Palaeocene

The Fulra Limestone is very rich in animal fossils. Large sized conch shells like *Bolis* sp. and *Xancus* sp. are generally found in the lower part while echinoids like *Echinolampus* and *Eupatagus* sp. occur in the upper part. Larger as well as planktonic Foraminifera are also found in abundance. BISWAS AND RAJU (1971) think that the fauna indicates a Middle Eocene (Upper Lutetian) age.

The first record of fossil algae from Kutch goes to the credit of PAL AND GANGOPADHYAY (1970) who reported two species of *Acicularia* from the Jurassic (Upper Callovian) of Kutch. PAL AND GHOSH (1974) also reported *Aethesolithon* and other algal genera from the Lower Miocene of Waior area in Kutch.

While investigating for palynological fossils from the Fulra Limestone, the author also examined some thin limestone sections. No spores and pollen grains could be obtained from this formation but the following algae were found. The slides and negatives of the figured specimens have been deposited to the repository of the Birbal Sahni Institute of Palaeobotany, Lucknow.

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SYSTEMATIC DESCRIPTION

Phylum	RHODOPHYCOPHYTA Papenfuss, 1946
Class	RHODOPHYCEAE Ruprecht, 1851
Order	CRYPTONEMIALES Schmitz in Engler, 1892
Family	CORALLINACEAE (Lamouroux) Harvey, 1849
Subfamily	MELOBESIEAE Lemoine, 1939
Genus	Lithothamnium Philippi, 1837
Lectotype	<i>Lithothamnium ramulosum</i> Philippi, 1837.

Remarks—*Lithothamnium* is the most widely distributed genus of all the coralline algae. It is almost found from pole to pole but shows its maximum development in cold temperate and polar seas. This is in striking contrast with the fossil record because many species of *Lithothamnium* have been recorded from the tropical seas. According to JOHNSON (1962), the concentration of this genus in cold and temperate seas is a post-Miocene phenomenon and can be explained due to migration from tropical seas to avoid competition generally with other coralline algae and particularly with the genus *Lithophyllum*.

The earliest geological record of *Lithothamnium* is from Aptian-Albian and in Maestrichtian about nine species are known. In Tertiary, this genus is generally encountered in all the stages and specially very common in Eocene and Miocene.

According to RAO (1943), *Lithothamnium* is frequently found in Cherra Limestone of Assam while this is the first record of this genus in Kutch.

Lithothamnium sp. cf. **L. validum** Foslie, 1895

Pl. 1, Fig. 1

Description—Few thalli could be recovered, thalli entirely made up of perithallium. Perithallial cells squarish to rectangular measuring $7-9 \mu \times 8-11 \mu$. Longitudinal walls slightly thicker, continuous, transverse ones thinner, discontinuous. Conceptacles irregular in shape, often filled with irregular, cellular tissue.

Remarks—The present specimen resembles *Lithothamnium validum* Foslie described by JOHNSON AND STEWART (1953) from the Meganos Formation (Middle Eocene) of California, U.S.A. Since the specimen studied here is rather ill-preserved it has been compared with the former species only.

TAYLOR (1945) and DAWSON (1960) reported the occurrence of *Lithothamnium validum* Foslie from Mexico and Galapagos islands respectively. But JOHNSON (1962) believes that *L. validum* Foslie is absent in Pacific ocean of Mexico.

Lithothamnium sp. cf. **L. bofilli** Lemoine, 1939

Pl. 1, Fig. 2

Description—Hypothallium mostly absent in specimens studied here. Perithallial cells well preserved, form a regular lattice with thicker horizontal and thinner vertical cells. Cells squarish to rectangular in shape, varies from $6-10 \mu \times 8-12 \mu$ in size. Conceptacles, while present, irregular, filled with cellular tissue.

Remarks—*Lithothamnium bofilli* Lemoine (1939) according to RAO (1943) is characterized by a thin thallus and the hypothallial cells are bigger in size than perithallial ones. This species is known from the Eocene of Spain, Algeria and Assam. A detailed comparison with the living species is not possible as the fossil ones lack epithallial cells.

Lithophyllum sp.

Pl. 1, Fig. 3

Description—Fragmentary remains of *Lithophyllum* observed in many thin sections. Thalli characterized by presence of coaxial hypothallus and a layered perithallus. Cellular structures not well preserved.

Remarks—*Lithophyllum prelichenoides* Lemoine (1917) photographed by JOHNSON AND ADEY (1965) comes close to *Lithophyllum* sp. described here ; but the former is easily distinguished by its very well developed perithallial cells and marked transverse septa in the coaxial cells.

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EXPLANATION OF PLATE 1

(All photomicrographs are enlarged ca. \times 100)

1. *Lithothamnium* sp. cf. *L. validum* Foslie, Slide no. 5918/1
2. *Lithothamnium* sp. cf. *L. bofilli* Lemoine, Slide no. 5919/1
3. *Lithophyllum* sp. Slide no. 5920/1