



CORALS AND FORAMINIFERA FROM THE MIOCENE (UPPER BHUBAN FORMATION) OF MIZORAM, INDIA

A. K. JAUHRI¹, B. D., MANDAOKAR², R. C. MEHROTRA², R. P. TIWARI¹ and A. P. SINGH¹

¹DEPARTMENT OF GEOLOGY, UNIVERSITY OF LUCKNOW, LUCKNOW¹

²BIRBAL SAHNI INSTITUTE OF PALAEOBOTANY, LUCKNOW²

³DEPARTMENT OF GEOLOGY, PACHHUNGA UNIVERSITY COLLEGE, MIZORAM UNIVERSITY, AIZAWL³

ABSTRACT

In this note, we report the results of a preliminary study on the invertebrate fossil assemblage occurring in a carbonate bed of early-middle Miocene age sandwiched in a thick siliciclastic sequence of coastal deposits referable to the Upper Bhuban Formation in Mizoram. The assemblage includes some rare elements of corals, echinoids and foraminifera not so far reported from the study area. Despite the limited number of specimens, these taxa are identifiable and significant in biostratigraphic and palaeoecologic interpretation of the sedimentary succession.

Key words: Corals, Foraminifera, Miocene, Upper Bhuban Formation, Mizoram.

INTRODUCTION

The Tertiary deposits of Mizoram contain a rich and diversified fossil invertebrate fauna which can throw light on the regional stratigraphic set up and the biogeographic history of the shallow marine fossil forms of the northeastern Indian region during the Neogene. Several papers dealing with palaeontological finds in the Tertiary sediments of Mizoram have been published (Das Gupta, 1977; Sinha, Chatterjee and Satsangi, 1982; Patil, 1990; Tiwari, 2001; Tiwari, Mishra and Lyngdoh, 1998; Tiwari and Kachhara, 2000; and Tiwari and Mehrotra, 2000). These works present a valuable information and indicate considerable scope of palaeontological investigation on the marine Tertiary sediments in Mizoram. This note reports a few corals, the associated spatangoid and some foraminifera from the Upper Bhuban Formation.

Geologically, Mizoram is a part of the Tripura-Mizoram miogeosynclinal basin characterised by the stratigraphic succession of the argillaceous and arenaceous sediments in alternation. The beds generally trend N-S, dipping at 20° to 50° either eastward or westward and comprise sandstones, siltstones, shales, mudstones with a few pockets of shell limestones, calcareous sandstones and intraformational conglomerates (Karunakaran, 1974; Ganju, 1975; Ganguli, 1983).

The Neogene deposits of Mizoram have been grouped under the Surma Group and the Tipam Group. The Surma Group is divisible into the lower Bhuban Subgroup and the upper Bokabil Subgroup. The Bhuban Subgroup is further divided into the Lower, Middle and Upper Bhuban formations with conformable contacts.

The studied specimens of corals, an echinoid and foraminifera come from a pocket of shell limestone in a sequence of calcareous sandstone, siltstone and mudstone of the Upper Bhuban Formation exposed in a section near Zemabawk, east of Aizawl on a road leading to Seling (fig. 1). The associated fauna indicates that the Upper Bhuban Formation represents a marine transgression of early-middle Miocene age (Tiwari and Kachhara, 2003, this volume).

REMARKS ON THE FOSSIL ASSEMBLAGE

So far, bivalves, gastropods and echinoids have been reported from the Upper Bhuban Formation of Mizoram. Here, we complement the list of faunal elements with two ahermatypic corals belonging respectively to the families Rhizangiidae d'Orbigny and Caryophyllidae Gray, with one representative of the echinoid family Hemiasteridae Clark, and with two porcelaneous foraminifers (visible in random thin section) representing respectively the families Soritidae Ehrenberg and Alveolinidae Ehrenberg. The latter are, to a certain extent, age-diagnostic.

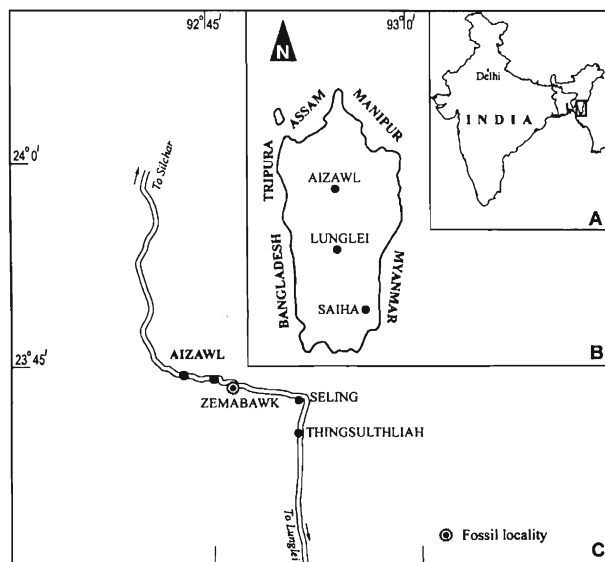


Fig. 1. Location map of the study area. A. Position of Mizoram in India (inset). B. Map of Mizoram showing location of its capital Aizawl and other relevant places. C. Position of the fossiliferous locality near Zemabawk, Aizawl.

Corals: The specimen belonging to the Rhizangiidae family is identified as *Septastrea* d'Orbigny (fig. 2a) which has a massive corallum with numerous small, thick-walled, polygonal to circular corallites ranging in diameter from 0.3 cm to 0.7 cm. It is comparable with *Septastrea forebesi* Milne-Edwards & Haime in its compact corallites and septa arranged like spokes in a wheel. It is originally known from the Pliocene of Maryland, U.S.A.

The specimens (preserved as moulds) referable to the family Caryophyllidae are representative of a caryophylline genus, possibly? *Platyrochus* Milne-Edwards (fig 2b). It is a solitary form possibly having a conical corallum with circular to ellipsoidal calyx and exsert, laminar septa, with a diameter ranging from 2.3 cm to 4.5 cm.

Echinoids: A single well-preserved specimen is a spatangoid which belongs to the family Hemiasteridae Clark.

Foraminifera: The family Soritidae is represented by *Pseudotaberina malabarica* (Carter, 1853) which shows planispirally coiled involute chambers followed by progressively evolute hemispherical chambers in the adult. Chambers have pillars producing discontinuous but equal-spaced

subdivisions of the chambers. In megalospheric forms, the embryo has proloculus and possibly a flexostyle canal (fig. 2c) (see Hottinger, 2001).

The family Alveolinidae Ehrenberg has a lone representative in the present material. It is an incomplete, obliquely cut form seen in one of the random thin sections. It is comparable with *Borelis pygmaeus* Hanzawa.

DISCUSSION

Though the present megafossils from the Upper Bhuban Formation are not good age indicators, the associated foraminifera are age-diagnostic and provide a stage-level correlation of the fossil-yielding bed. Of the two species, *Pseudotaberina malabarica* (Carter) is more useful stratigraphically than the form showing affinity with *Borelis pygmaeus* Hanzawa. Geographically, *P. malabarica* is a widely distributed species in much of the Tethys and the Indo-Pacific region. Stratigraphically, it is characteristic of Tf 1 stage of the East Indies Letter Classification, corresponding to the planktic zones N6-N9 (upper Burdigalian to Langhian, i.e. latest early to earliest middle Miocene (Banner and Highton, 1989; Adams, 1984). This biostratigraphic information indicates that the fossil-yielding carbonate horizon occurring in the calcareous sandstone of the Upper Bhuban Formation corresponds to the Tf 1 interval of the East Indies Letter Classification.

Although the material on hand is limited, the individual mega- and microfossils can be considered in terms of ecological preferences which can throw light on the depositional conditions. Both coral genera reported here are ahermatypic and colonise marine environments. *Septastrea* is a colonial member of the family Rhizangiidae and lives on rock bottoms in the littoral and shallow sublittoral environments (Wells, 1967). The solitary caryophylline genus, possibly *Platyrochus* prefers sandy or silty bottoms below wave base (Wells, 1967). The foraminifera present in the study material are representative of the calcareous porcelaneous families Soritidae and Alveolinidae characteristic of shallow sheltered areas of back-reef or shallow pools on reef flats in modern seas (Haak, 1955 cited in Wagner, 1964). In the

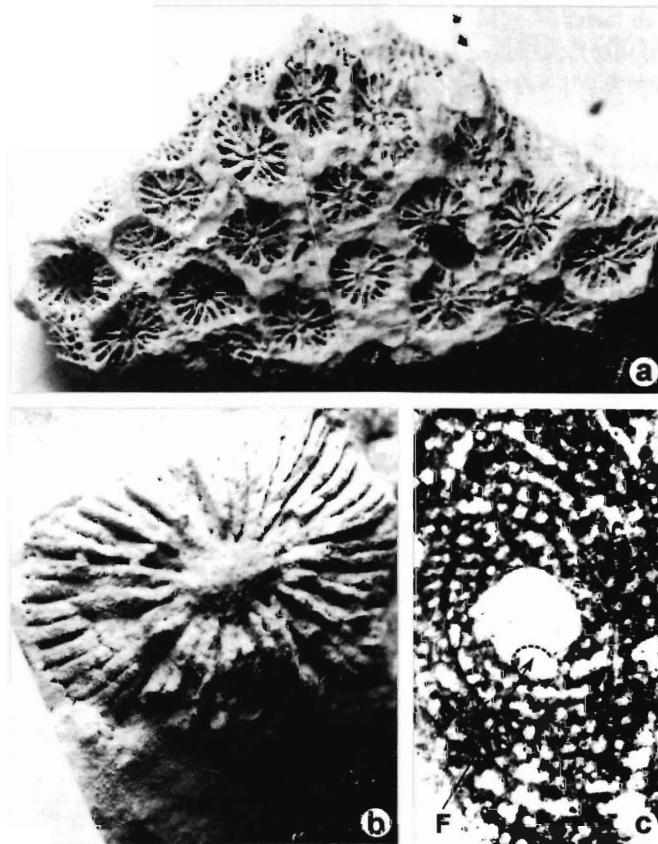


Fig. 2. a. *Septastrea* sp., Upper surface of a fragment of the colonial corallum showing polygonal to circular, ceriod corallites with numerous septa extending to unite in the centre, x2. b. Caryophylline genus, possibly *Platytrochus* sp., a calyx showing costae with their thickened ends, intercostal grooves and columella, x2. c. *Pseudotaberina malabarica* (Carter), an oblique section of a megalospheric form showing an embryo with proloculus and flexostyle canal (F), x40.

geological record, members of such foraminiferal groups have been found in association with back-reef shoal facies which represent calcareous muds and sands derived from reef erosion and accumulate in shallow marine, warm, clear water poor in carbon dioxide (Henson, 1950). The examination of the representative rock sample shows that the fossil-yielding horizon is a mud-supported limestone with bioclasts represented by bivalves, gastropods, corals, echinoids, etc. and with occasional clastic material indicating some influx of terrigenous material. Overall, the palaeontological and lithological indications are that the carbonate bed was deposited in a lagoonal environment which was shoreward in position and marked by low-energy conditions. The detailed version of this note will be published later.

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