

SHORT COMMUNICATION

# FORAMINIFERA FROM THE BHUBAN FORMATION OF MIZORAM

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## ABSTRACT

This report includes results of a study of the fossiliferous calcareous sandstone band of a thick siliciclastic succession of nearshore deposits designated as the Upper Bhuban unit of the Bhuban Formation, Surma Group (early-middle Miocene age) in Mizoram. The calcareous horizon has yielded a foraminiferal fauna comprising planktic and benthic assemblages. The foraminiferal assemblage includes among others the age markers, e.g. *Globigerinoides trilobus* (Reuss), *Globigerinoides subquadratus* Bronnimann and *Miogypsina* suggesting equivalence with planktic foraminifera zones N5-N6, i.e. early Miocene.

**Keywords:** Foraminifera, Upper Bhuban Formation, Upper Bhuban unit, Miocene, Muthi, Mizoram

## INTRODUCTION

The Tertiary deposits of Mizoram have preserved a rich and diversified fossils invertebrate faunal assemblages of considerable stratigraphic significance in the geological history of northeastern India during the Neogene. Palaeontological publications usually deal with molluscan and echinoderm fauna (Das Gupta, 1977; Sinha *et al.*, 1982; Patil, 1990; Tiwari, 2001; Tiwari and Kachhara, 2000, 2003

and Tiwari and Mehrotra, 2000, Tiwari *et al.*, 1998 and Srivastava *et al.*, 2008). However, not much is published about foraminifera from Mizoram. Previous work includes reports of their occurrences by Dasgupta (1982), Sinha *et al.* (1982) and Jauhri *et al.* (2003) and taxonomic documentation by Lokho and Raju (2007). The present note records an assemblage of planktic and benthic foraminifera from the Upper Bhuban unit of the Bhuban Formation exposed at the village Muthi near Aizawl, Mizoram.

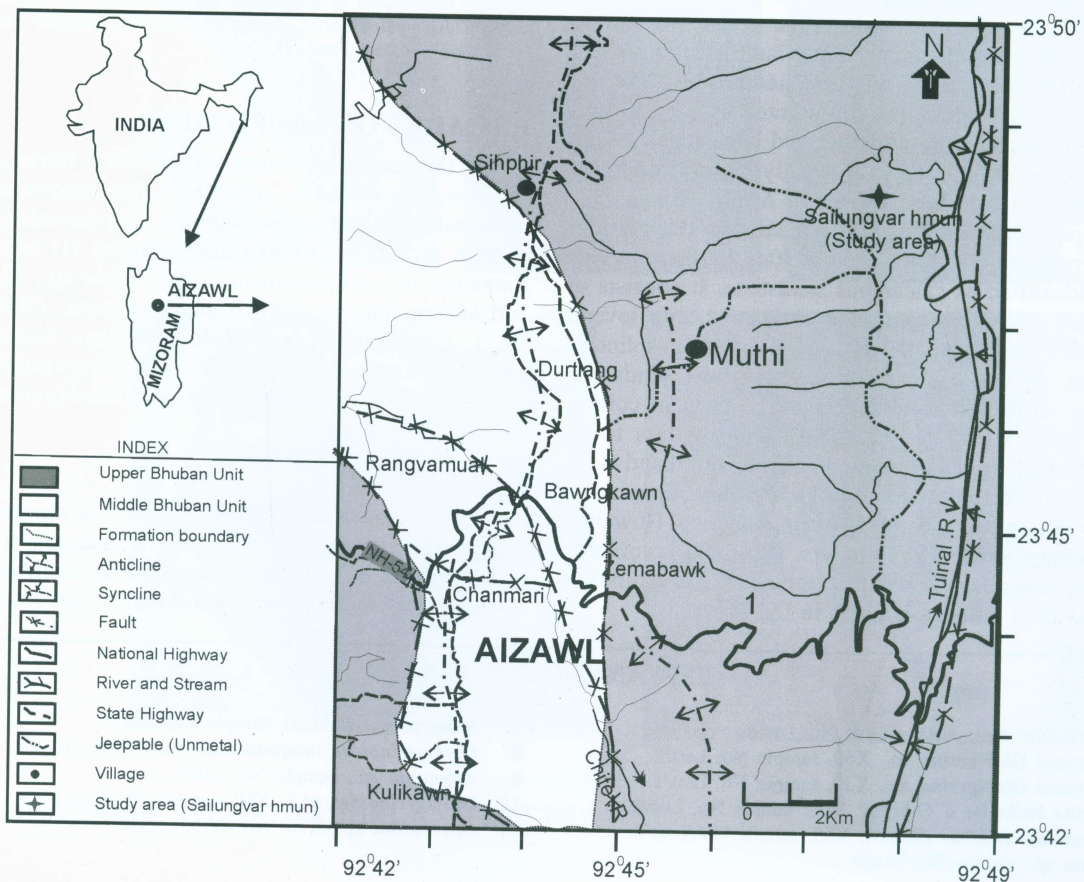


Fig. 1. Geological map of the study area.



## GEOLOGICAL SETTING

Mizoram, geologically, is a part of Tripura - Mizoram depositional basin and it has been considered as the southern extension of Surma Valley. The entire sedimentary column of the area is a repetitive succession of arenaceous and argillaceous rocks. This succession forms N-E trending longitudinally plunging anticlines and synclines affected by numerous faults and thrusts. The generally N-S trending beds dip at 20° to 50° either eastward or westward. The exposed sequences comprise sandstones, siltstones, shales, mudstones with pockets of shell limestones, calcareous sandstones and intraformational conglomerates (Karunakaran, 1974; Ganju, 1975; Ganguli, 1983; Tiwari and Kumar, 1996).

The sediments in Mizoram have been grouped under the Surma Group and the Tipam Group. The Surma Group is divided into the lower Bhuban Formation and the upper Bokabil Formation. The Bhuban Formation is further subdivided into the Lower, Middle and Upper Bhuban units with conformable contacts. Table 1 presents the generalized succession of the Bhuban Formation. The Upper Bhuban unit is extensively developed in Mizoram (Tiwari, 2001; Tiwari and Kachhara, 2003).

## STUDY AREA

Muthi village (Lat. 23° 46' 20" N; 92° 45' 50" E in the Survey of India Topo Sheet No. 84A/13), is located nearly 15km northeast of Aizawl city in Mizoram (Fig. 1). The rock succession in the vicinity of Muthi village constitutes a part of the Upper Bhuban unit of the Bhuban Formation, Surma Group (lower to middle Miocene). This unit is represented by a repetitive succession of shales, siltstones and sandstones and their admixture in various proportions and constitutes an eastern limb of the Aizawl anticline. The shales are grey to dark grey and brownish in colour, thinly laminated, crumpled and are splintery in nature. The siltstones are also grey to brown in colour. The sandstones represented by grey to buff facies are hard, compact, bioturbated and occasionally silty. A calcareous band is exposed in a locality called Sailungvar hmun that lies about 5km north-east of Muthi village. The band occurs as a lensoid body with a maximum thickness of 20.1m and a maximum length of nearly 80m. In the field, this unit can be identified as calcareous sandstone. It consists of decimeter-thick calcareous sandstone alternating with several centimetre-thick mud layers. It occurs between 82.5m splintery shale horizon (below) and 5m thick loose buff sandstone (above). The calcareous sandstone band is grey in colour, hard and siliceous (12.7% - 22.52%) and appears to be composed of shell fragments. Samples from this band were disaggregated for micropalaeontological study. They have yielded only incomplete specimens of *Ammonia* sp. However, thin sections have yielded foraminifers, algae and bryozoans. The shell fragments usually comprise bivalves and echinoids. The lithocolumn of the area is given in fig. 2.

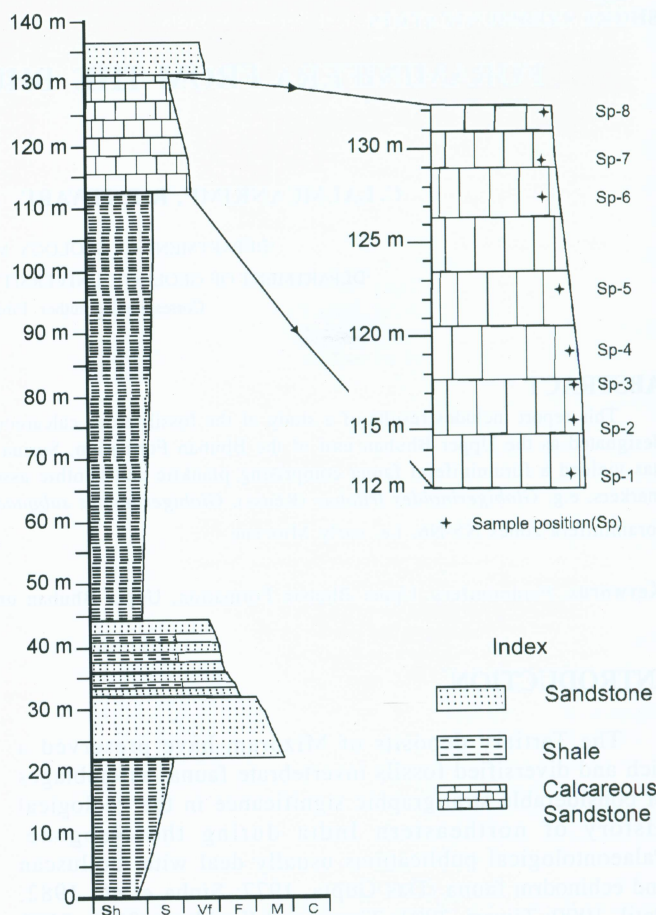


Fig. 2. Lithocolumn of Sailungvar hmun hillock, 5km northeast of Muthi Village, Aizawal District, Mizoram, showing sample position in the calcareous sandstone band.

## REMARKS ON MICROFAUNA

In this paper, we report foraminiferal forms occurring in random thin sections as well as that recovered from the macerated residue of the samples. The assemblage observed in thin section is diverse and includes (i) benthic forms: *Ammonia beccari* (Linnaeus), *Operculina* sp., *Elphidium* sp. and *Miogypsina* sp. and (ii) planktic forms: *Globigerinoides* sp. 1, *Globigerinoides trilobus* (Reuss), *Globigerinoides subquadratus* Bronnimann, *Globigerinoides* sp. 2, recrystallized *Globigerina* spp. and *Globigerina bulloides* d'Orbigny.

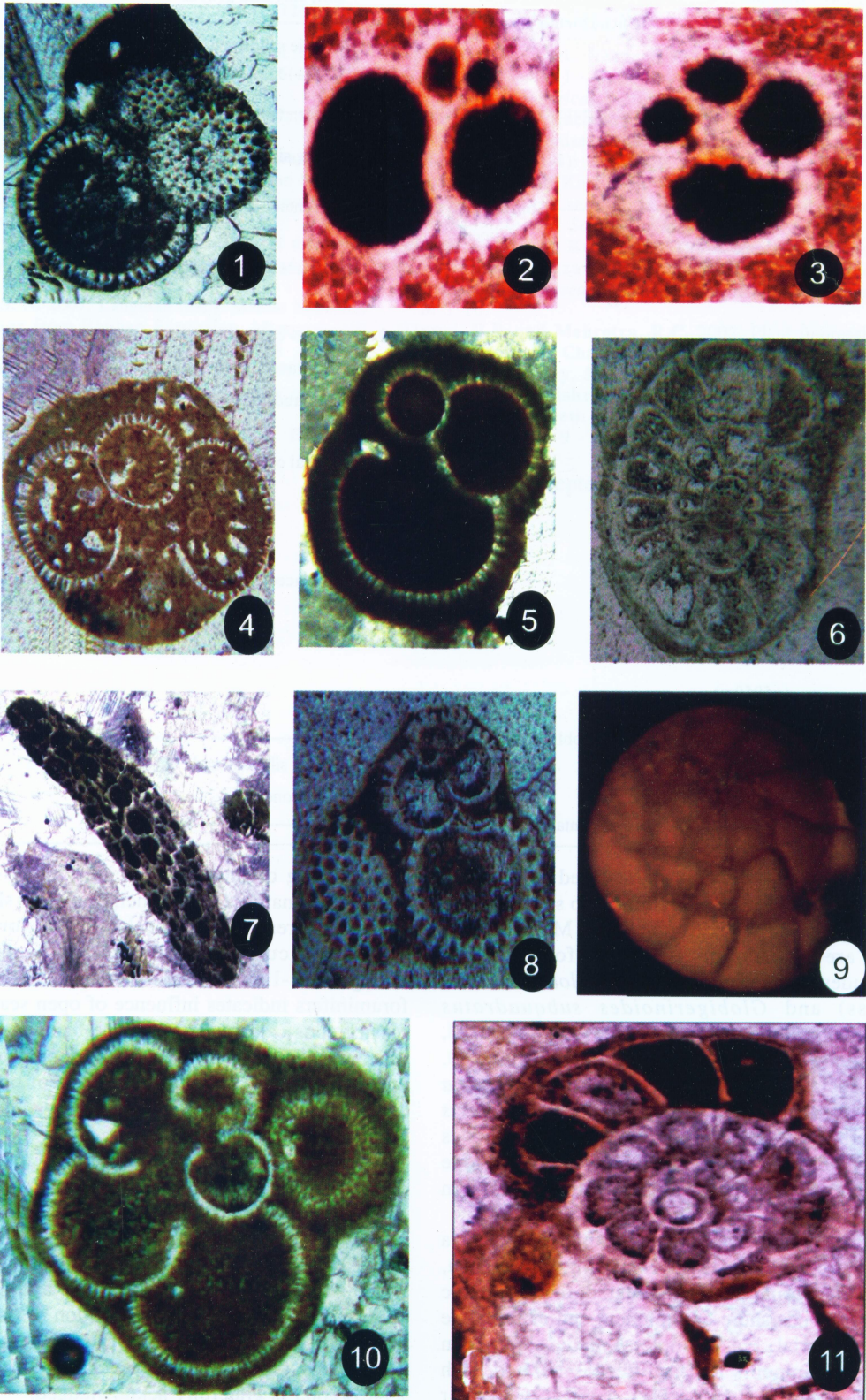
## DISCUSSION

The present study shows presence of eleven species, of which four are benthic in nature. Remaining seven are the planktic ones that also include two recrystallized species of *Globigerina*. Among the benthic forms, the stratigraphically

## EXPLANATION OF PLATE I

1. *Globigerinoides* sp.1, X60, sample No. Lsst/6.
2. Recrystallized *Globigerina* sp., X60, sample No. Lsst/2.
3. Recrystallized *Globigerina* sp., X30, sample No. Lsst/1.
4. *Globigerina bulloides* d'Orbigny, X60, sample No. Lsst/5.
5. *Globigerinoides trilobus* (Reuss), X55, sample No. Lsst/8.
6. *Elphidium* sp., sample No. Lsst/6.
7. *Miogypsina* sp., X20, sample No. Lsst/2.
8. *Globigerinoides subquadratus*, sample No. Lsst/7.
9. *Ammonia* sp., sample No. Lsst/1.
10. *Globigerinoides* sp.2, X80, sample No. Lsst/7.
11. *Operculina* sp., X70, sample No. Lsst/5.







**Table 1: Stratigraphic Succession of Mizoram (modified after Karunakaran, 1974 and Ganju, 1975).**

Age	Group	Formation	Unit	Generalized Lithology
Recent	Alluvium			<b>Silt, clay and gravel</b>
-----Unconformity-----				
Early Pliocene to Late Miocene	TIPAM (+900m)			Friable sandstone with occasional clay bands
-----Conformable and transitional contact-----				
Miocene	S	Bokabil (+950m)		Shale, siltstone and sandstone
----- Conformable and transitional contact -----				
			Upper	
	U		Bhuban (+1100m)	Arenaceous predominating with sandstone, shale and siltstone
		B		
---- Conformable and transitional contact ----				
to		H	Middle	Argillaceous predominating with shale, siltstone-shale alternations
	R		Bhuban	and sandstone
		U	(+3000m)	
---- Conformable and transitional contact ----				
Upper Oligocene	M		B	
		A	Lower Bhuban	Arenaceous predominating with sandstone and silty-shale
		N	(+900m)	
	A (+5950m)			
-----Unconformity obliterated by faults-----				
Oligocene	BARAIL (+3000m)			Shale, siltstone and sandstone
----- Lower contact not seen -----				

important species is *Miogyssina* sp. represented by an axial section which does not allow identification up to species level. Presence of this genus is indicative of early Miocene age. Other benthics are long ranging. Planktic foraminiferal assemblage includes two important species *Globigerinoides trilobus* (Reuss) and *Globigerinoides subquadratus* Bronnimann. *Globigerinoides trilobus* ranges from N5-N23, while *Globigerinoides subquadratus* extends from N6 to N13. However, the association of these species with *Miogyssina* suggests that they are referable to *Globigerinoides trilobus* zone (Postuma, 1971) which favours correlation with zones N5-N6, i.e. early Miocene age for the calcareous sandstone band of the Upper Bhuban unit of the Muthi section in Mizoram.

The present assemblage comprises benthic forms and a number of planktic foraminifers. *Ammonia*, *Elphidium*, *Operculina* and *Miogyssina* are representative of the benthic group. They occur in nearshore environment and can tolerate influx of clastic material. For example, *Ammonia* occurs in shallow water environments and is often associated with clastic material. *Miogyssina* prefers relatively deeper environment and can live in waters associated with clastic material. Associated with these forms are the clastic grains, e.g. quartz, feldspar. Authigenic glauconite and phosphorite grains are also present in small number. Fragments of carbonate

shell-bearing organisms, especially the oysters are common in a sparitic matrix. Several shell fragments show microborings. These features indicate mechanical reworking of shells by waves and currents, slow rate of deposition and some hardground-like characteristics. Presence of planktic foraminifers indicates influence of open sea. It seems that the fossiliferous calcareous sandstone band of the Upper Bhuban unit was deposited in the nearshore environment with high-energy conditions under the influence of open sea conditions.

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