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PLANKTONIC FORAMINIFERA OF LATE EOCENE AGE FROM MAYABUNDER, MIDDLE ANDAMAN

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ABSTRACT

A thick sequence of alternating sandstone and siltstone is exposed in the northern part of Middle Andaman, around Mayabunder. Samples studied from a section yielded ten species of planktonic foraminifera. Based on the stratigraphic ranges of the species a Late Eocene age has been assigned to the rock-sequence examined.

INTRODUCTION

Mayabunder is located in the northernmost part of Middle Andaman Island, Bay of Bengal. The areas around Mayabunder form low hills and expose rocks along the coast and at road-cuttings. The exposures along the coast occur as very low cliffs.

The marine sediments of Andaman-Nicobar were first classified into Port Blair Series (Paleogene) and Archipelago Series (Neogene) by Oldham (1885). Srinivasan (1978) proposed a new chronostratigraphic classification for the Andaman-Nicobar sequence based on planktonic foraminiferal events. He introduced the term Nicobar Series for the Pliocene-Pleistocene retaining the Archipelago Series of Oldham (1885) for the Miocene.

Several investigators in the last hundred years carried out geological and palaeontological work on these islands. For a general review of these investigations readers are referred to Srinivasan and Azmi (1976) and Srinivasan (1980). The following lines deal with the work carried out on Middle Andaman Island.

Gee (1927) identified several small outcrops of grey limestone in the stream beds in the northern part of Middle Andaman which contained *Nummulites* and fragments of *Lithothamnion* together with *Nodosaria, Globigerina* and echinoid spines. This limestone, which Gee (1927) encountered in the eastern part of the island as well, was considered by him to be Middle or Late Tertiary age purely on similarity with limestone in other islands.

Guha and Mohan (1965) reported the presence of Late Cretaceous and Paleocene sediments in the Middle Andaman based on planktonic and benthic foraminiferal evidence.

Chatterjee (1967), who divided the paleogene sediments into two lithostratigraphic units, viz., Baratang Formation and Port Blair Formation in ascending order, recognized presence of sediments belonging to the Baratang Formation in Middle Andaman. Chatterjee (1967) assigned a Late Cretaceous to Paleocene age on the basis of foraminifera and palynomorphs to the Baratang Formation.

Pandey (1972) examined the fauna of the Baratang Formation of Middle Andaman from Neali Nala and Chandbagh Nala. However, he did not mention the lithology of the fossil-bearing sediments. According to Pandey (1972) these two localities expose the upper and lower parts of the formation respectively. He observed an association of *Globotruncana* and other Cretaceous species with the Late Eocene *Nummulites fabianii* and considered the *Globotruncana* assemblage to be of reworked character.

Later, Pandey and Rao (1976), in presenting taxonomic notes on planktonic foraminifera from Baratang Formation from these localities (Neali Nala and Chandbagh Nala), considered foraminiferal assemblage to be of Maestrichtian age. However, they expressed the possibility of some of the forms being derived from the Campanian sediments.

Kumar and Soodan (1976) recorded Early Paleocene planktonic foraminifera from the Baratang Formation exposed in the northern part of the island.

LITHOLOGY AND SAMPLING

The rocks around Mayabunder form a thick sequence of fine to coarse sandstone interbedded with siltstone (Port Blair Series of Oldham, 1885). Sandstone is dominant and at places becomes the major rock-type. It shows much variation in colour from light brown, brownish-white to light greyish-green, and yellowish-brown when weathered. Unsorted nature of sandstone is clearly recognised at many localities. Hard concretions are not uncommon in many sandstone beds. Siltstone is greyish to greenish-grey and thin laminations of siltstone are common between the sandstone beds.

Good exposures occur along the western coast from the jetty southward and along the coast east of the Civil Hospital upto Aves Point (Fig. 1). The dip of the beds is quite variable. Near Aves Point, in the alternating sandstone and siltstone, the dip varies from W10°S to due S within a distance of 150 metres. Similar variations are found along the coast east of the Pumping Station.

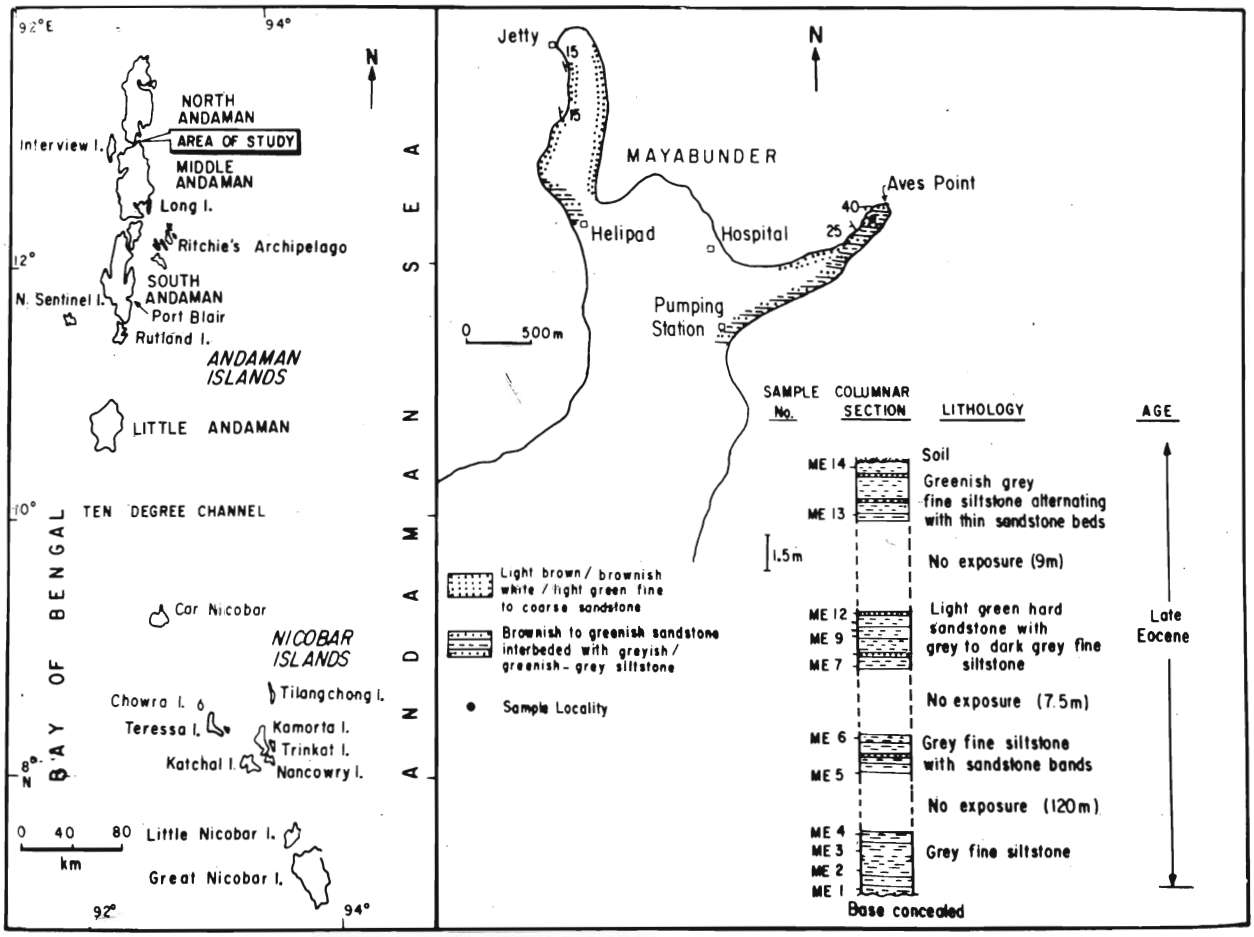

Fig. 1 Location map of the area and columnar section showing stratigraphic positions of samples in the studied section.

Samples were collected from several localities, but only those from along the coast east of the Civil Hospital, near Aves Point, yield foraminifera. At this locality, strata consisting of greenish-grey sandstone alternate with greyish siltstone. The sandstone beds are thicker, usually one metre in thickness, whereas siltstone beds hardly attain a thickness of 15 centimetres exceptionally they are one metre across. The foraminifera are recovered from siltstone only.

PLANKTONIC FORAMINIFERA

Of the fourteen samples collected from the Aves Point (Fig. 1) only a few yielded foraminifera. Tests of foraminifera are generally partly or completely silicified. The following planktonic foraminifera are recorded:

Globigerina angiporoides Hornibrook
G. officinalis Subbotina
G. praebulloides occlusa Blow and Banner
Turborotalia gemma (Jenkins)
T. nana (Bolli)
T. cf. *postcretacea* (Myatliuk)
Turborotalia sp.
Globorotaloides suteri Bolli
Subbotina linaperta (Finlay)
S. yeguaensis (Weinzierl and Applin).

Remarks on the distribution and stratigraphic range of the species are presented below.

SYSTEMATIC DESCRIPTION

Genus Globigerina D' ORBIGNY

Globigerina angiporoides HORNIBROOK

(Pl. 1—9, 10)

1965 *Globigerina angiporoides* Hornibrook *N.Z. Joun. Geol. Geophys. 8, no. 5* p. 835, figs. 1 a-i, 2

Srinivasan (1968) gave the range of this species from Runangan to Whaingaraon stages (Late Eocene to Early Oligocene). Blow (1969) and Berggren (1978) reported its occurrence ranging from Zone P 15 to within Zone P 19 and from Early Oligocene respectively.

Srinivasan (1969) described and illustrated *Subbotina linaperta Globigerina angiporoides* lineage and the present specimens of *G. angiporoides*, according to Srinivasan (Pers. comm.) belong to the earlier part of the lineage.

Globigerina officinalis SUBBOTINA
(Pl. I—16, 18)

1953 *Globigerina officinalis* Subbotina, (Part), *Trudi, VNIGRI, new ser.*, no. 76, pl. 11, fig. 1 (Holotype) and figs. 2, 6.

Srinivasan (1968) observed occurrence of this species in the Upper Eocoene of New Zealand. Blow (1969) gave its range from Late Middle Eocene to Late Oligocene and Berggren (1978) recorded it from Early Oligocene.

Globigerina praebulloides occlusa BLOW AND BANNER
(Pl. I—7)

1962 *Globigerina praebulloides occlusa* Blow and Banner. Cambridge. Univ. Press. pt. 2, pl. 9, u-w, fig. 14 (i-ii)

It is a long ranging species. Blow (1969) recorded this species ranging from Zone P 13 to Zone N 19.

Genus Turborotalia CUSHMAN AND BERMUDEZ

Turborotalia gema (JENKINS)
(Pl. I—1, 2)

1965 *Globorotalia gemma* Jenkins. *N.Z. Jour. Geol. and Geophys.* 8, no. 6, p. 115, fig. 11, nos. 97-103.

Blow and Banner (1962) recorded it from the Oligocene of Lindi, East Africa and Srinivasan (1968) from the Late Eocene to Early Oligocene of New Zealand. According to Blow (1969) this species ranges from Zone P 16 to within the earlier part of Zone N 1.

In the studies sequence it occurs in most of the samples.

Turborotalia nana (BOLLI)
(Pl. I—15, 17)

1957 *Globorotalia nana* Bolli. *U.S. Nat. Mus. Bull.* No. 215 p. 118, pl. 28, fig. 3

Bolli (1957) originally described it from the Cipero Formation of Trinidad with a range from the *Globigerina ampliapertura* Zone to *Globigerina ciperoensis ciperoensis* Zone.

Srinivasan (1968) observed this species ranging from the Late Eocene to Early Oligocene of New Zealand. Blow (1969) recorded the range of *T. nana* from within Zone P 15 to within the earlier part of Zone N 3.

Turborotalia cf. *postcretacea* (MYATLIUK)
(Pl. I—3, 4)

1950 *Globigerina postcretacea* Myatliuk. *Mikrofauna.* SSSR. S. 10 p. 280, pl. 4, figs. 3a-b

A few poorly preserved specimens which resemble *T. postcretacea* are observed in the samples.

Turborotalia sp.
(Pl. I—5, 6)

This species is characterised by medium to large test, globular chambers which are radially appressed, increasing rapidly as added, five and half chambers in the last whorl, gently curved and depressed sutures on dorsal side and more or less straight sutures on umbilical side, with a narrow, umbilical-extraumbilical aperture having a rim and extending upto the periphery.

Very rare specimens of this species occur in the samples.

Genus Globorotaloides BOLLI

Globorotaloides suteri BOLLI
(Pl. I—3, 4)

1957 *Globorotaloides suteri* Bolli. *U.S. Nat. Mus. Bull.* no. 215, pl. 27, figs. 9-13 (not fig. 14)

Bolli (1957), who originally described this species from the Cipero Formation, Trinidad, gave its range from the Oligocene to Early Miocene (*globigerina ampliapertura* Zone to *Globigerinatella insueta* Zone). Srinivasan (1968) reported its occurrence throughout the studied sequence at New Zealand ranging from Late Eocene to Early Oligocene. Blow (1969) recorded the range of this species from the base of Zone P 13 to within Zone N 8. Banerjee (1976) noted its occurrence in the Early Oligocene rocks of Cauvery basin.

Genus Subbotina BROTZEN AND POZARYSKA

Subbotina linaperta (FINLAY)
(Pl. I—8)

1939 *Globigerina linaperta* Finlay. *Trans. Roy. Soc. N.Z.*, 69, pt. I. p. 125, pl. 13, figs. 54-57.

1968 *Subbotina linaperta* Srinivasan, p. 149, pl. 16. *Cushman Found. Foram. Res.*, 19, pt. 4.

This species has been widely reported by various

workers—Middle to Late Eocene in Japan (Asano, 1962; Saito, 1962), Late Eocene of New Zealand (Srinivasan, 1968), Early and Middle Eocene in India (Tiwari, Bhargava and Khanna, 1968; Samanta, 1970; Jauhari and Vimal, 1976; Banerjee, 1976), and Upper Lutetian of Paris (Bignot and Calvez, 1969).

Benjamini (1980) placed *S. linaperta* in the synonymy of *S. yeguaensis* (Weinzierl and Applin). Here *linaperta* is distinguished from *yeguaensis* in being larger and with a less prominent apertural lip.

Subbotina yeguaensis (WEINZIERL AND APPLIN)
(Pl. I—11, 12)

1929 *Globigerina yeguaensis* Weinzierl and Applin. Joun. Paleont. 3, p. 408, pl. 43, fig. 2

1968 *Subbotina yeguaensis*, Srinivasan. *Cushman Found. Foram. Res*, 19 pt. 4. 49 pl. 16, figs. 1-4.

Srinivasan (1968) reported its occurrence in New Zealand from Late Eocene to Early Oligocene. Todd (1970) observed its presence in the Late Eocene sediments of Tonga. It is also observed in the Late Eocene rocks of Western India (Raju, Guha, Bedi, Kumar and Bhatt, 1970), and Lutetian sediments of western Kutch (Jauhari and Vimal, 1976).

Benjamini (1980) while studying the Avedat Group (Eocene) in Israel observed that three-chambered forms of the species range from the middle Early Eocene to Middle Eocene while four-chambered forms make their appearance in late Early Eocene and range upto Middle Eocene.

AGE OF THE FAUNAL ASSEMBLAGE

The foraminiferal assemblage examined contains many of the species described by Bolli (1957) from Trinidad, and Blow and Banner (1962) from East Africa. Blow (1969) discussed the stratigraphic ranges of many of the species while dealing with the Early Teritary foraminiferal biostratigraphy. The extinction of *S. linaperta* marks the Eocene-Oligocene boundary and is an important datum marker (Srinivasan, 1965, 1968). The presence in the assemblage of *Subbotina linaperta, Turborotalia gemma* and early forms of *Globigerina angiporoides* suggests that the faunal assemblage is referable to Late Eocene, that is, within the Zone P 17 of Blow (1969).

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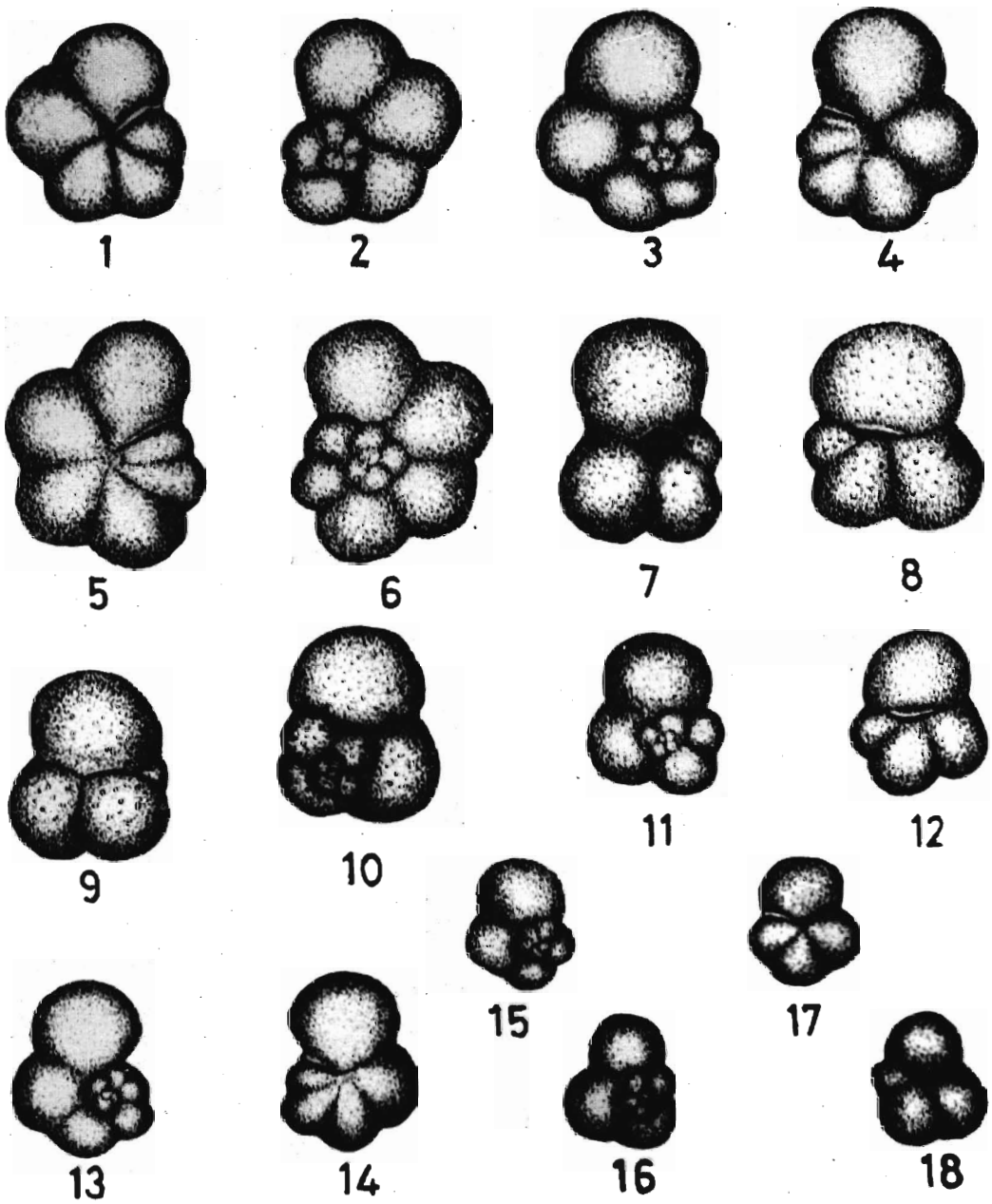
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EXPLANATION OF PLATE

PLATE I

1, 2 *Turborotalia gemma* (Jenkins)
ME 5, X 100

3, 4 *Globorotaloides suteri* Bolli
ME 3, X 110

5, 6 *Turborotalia* sp.
ME 3, X 110

7 *Globigerina praebulloides occlusa* Blow and Banner
ME 5, X 132

8 *Subbotina linaperta* (Finlay)
ME 5, X 170

9, 10 *Globigerina angiporoides* Hornibrook
ME 5, X 150

11, 12 *Subbotina yeguaensis* (Weinzierl and Applin)
ME 5, X 105

13, 14 *Turborotalia* cf. *postcretacea* (Myatliuk)
ME 5, X 95

15, 17 *Turborotalia nana* (Bolli)
ME 5, X 125

16, 18 *Globigerina officinalis* Subbotina
ME 5, X 110