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Palaeontological Studies of Palaeogene Sediments in and around Thoubal Area

K. Bigyapati Devi

Post Doctoral Fellow, Department of Earth Sciences, Manipur University, Canchipur, Manipur, India

R. A. S. Kushwah

Professor, Department of Earth Sciences, Manipur University, Canchipur, Manipur, India

Abstract:

Palaeogene sediments consists of Palaeocene, Eocene and Oligocene age these are very well outcrop in and around Thoubal area (Lat. 24° 39' 67" N and Long. 94° 00' 57" E) is cover by survey of India Toposheet No. 83 L/2. Fossil yielding horizons are only two in number namely light grey fine grained sandstone (1.0m) and dark brown siltstone (0.3m) in ascending order. The fossils are collected from the Kabrang Hills of Thoubal area. The present paper deals with molluscan fauna, their biozonation and correlation with the known molluscan zone. All together 33 genera and subgenera of molluscs i.e. 26 bivalves and 7 gastropods taxa are recorded belonging to the class bivalvia and gastropoda the checklist are Nuculana, Aphrodina, Corbula, Bicorbula, Glycymeris, Musculus, Undatimusculus, Corbicula, Crassinella, Mytilus, Septifer, Loph, Lucinoma, Lucina, Callista, Microcallista, Costacallista, Diplodonta, Venus, Eotrigonia, Pitar, Calpitaria, Meretrix, Tellina, Nucula and Lamellinucula (all are bivalves), Serratocerithium, Campanile, Seila, Mesalia, Turritella, Haustator and Telescopium (all are gastropods). Some of the assemblage is similar to that of the Pondung Sandstone and Yaw Stage of Myanmar which have been dated as Late Eocene (Eames, 1975). It is also confirmed by recorded fauna of upper age limit of Disang group in Manipur is late Eocene (Kachhara et al., 2000). On basis of molluscan fauna the light grey fine grained sandstone bed derived its possible palaeoecology was shallow, sub-littoral habitat perhaps from 10-15m deep with sandy substrate. Shore was very near and has luxurious vegetation as evident by the occurrence of wood fragments. And the dark brown siltstone bed is shallow water shelf environment with a water depth of between 10-30m having sandy substrate. Bottom has experienced feeble currents and temperature of around 20°-25°C. In the later phase, sea started regressing resulting into fluvio-marine conditions indicated by the presence of fossils plants in the form of leaves. Overall strata is of Palaeocene to Eocene in age.

Keyword: Bivalves, Gastropods, Kabrang, Molluscs, Palaeogene, Thoubal

1. Introduction

Manipur is one of the smallest states situated in the northeastern part of India bordering with the Union Socialist Republic of Myanmar (Burma). It lies approximately between 23°50' N-25° 41' N latitudes and 93° 02' E- 94° 41' E longitudes. It is bounded to the north by Nagaland, the east by Myanmar, to the south by Mizoram and Assam to the west. The state has total area of 22,327sq.km with total population of 23,88,634 (2001 census). It is divided into nine districts namely Imphal west, Imphal East, Ukhrul, Senapati, Bisnupur, Thoubal, Chandel, Churachandpur and Tamenglong districts. The present study area is Kabrang and Kaina Hill (Lat. 24° 39' 67" N and 94° 00' 57" E) in and around Thoubal area. Palaeogene (Palaeocene to Oligocene age) sediments are widely crop out in Thoubal district.

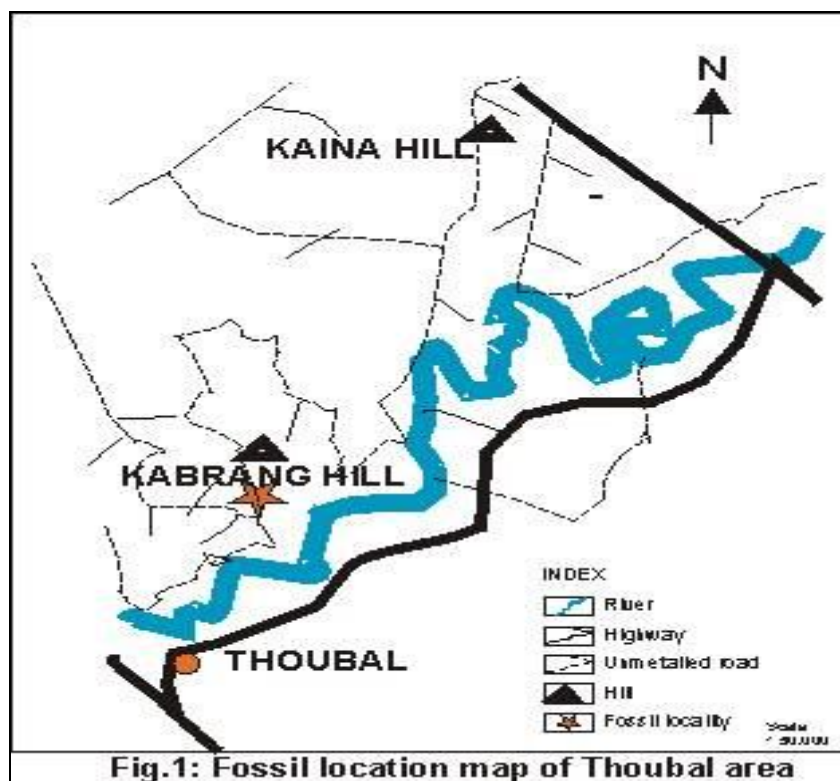


Figure 1

1.1. Fauna of Palaeogene Groups

Mishra (1985) opined that the NE-SW trending Disang sediments in Manipur East District are mainly dominated by mega invertebrate of Late Eocene age. Same view is extended by Mishra (1987) for Disang group of Chandel District. Mishra (1990) came out with a note on fauna of these two districts with proper taxonomic identification of the genera from Litan and Sugnu mainly of the Upper Disang. From Litan the recorded forms are:- *Loxocardium* sp., *Nuculana* sp., *Gaestrocorbula* sp., (bivalves), *Trochocyathus* sp., (coral), *Nummulites* sp., and *Alveolina* sp. (forams).

From Sugunu, the following taxa are recorded:

bivalve- *Cardiocardium* sp., *Ostrea* sp., *Vepricardium* sp., *Arctica* sp., *Barbatia* sp., and *Ebunopecten* sp.,

Gastropods- *Architectonica* sp., *Natica* sp., and *Turritella* sp.

Corals- *Tethocyathus* sp., and *Trochocyathus* sp.,

Foraminifers- *Assilina regularia*, *A. spira*, *Nummulites pengaronensis*, *N.fabianii* and ? *Alveolina* sp.

For the faunal assemblage from Litan Mishra (1990) has inferred the age as Eocene and for Sugnu as Middle Eocene. He reported the results of similar study in Ukhrul, Churachanpur and Bishnupur districts.

Kachhara et al. (2000) reported eight bivalve taxa from Thoubal upto specific level. The checklist are:- *Lucina yawensis* Cotter, *Tellina (Moerella) nanggulanensis* Cotter, *Meretrix agrestis* Cotter, *Yoldia silvesiris* (Cotter), *Noetia pondungensis* Cotter, *Venus pasokensis* Cotter, *Bicorbula subexarata* Cotter and external mould of *Septifer* sp. cf. *denticulatus* Lamarck.

Recently Umarani et al. (2011), six bivalve taxa are described systematically they are – *Chlamys wynnei*, *Chlamys* cf. *multisriata*, *Spondylus (Spondylus) rouaulti*, *Flemingostreahaydeni*, *Venericardia (Venericardia) hollandi* and *Nemocardium thetregyiensis* and thirteen species of bivalves and gastropods are simply reported from the Changamdabi area of Imphal East district.

1.2. Present Work

Thoubal town is in plain area about 18 km from Imphal on NH-39. It is a part of Imphal valley. The hilly terrain of Litan is continuing to the immediate north of Thoubal town with the difference that here the hills are comparatively low and scattered. Fossiliferous rocks are encountered in the sandstone quarries at Kabrang Hill (Fig.1) about 2km. NE of town near the north western bank of the Thoubal River. Its lithology consist of light grey sandstones, dark brown sandstones and shales, light brown sandstone and siltstones with a total thickness of 4.4 km. (Fig.2). There are two fossiliferous horizons i.e. light grey fine-grained sandstone (1.0m) and dark brown siltstone (0.29m) in ascending order.

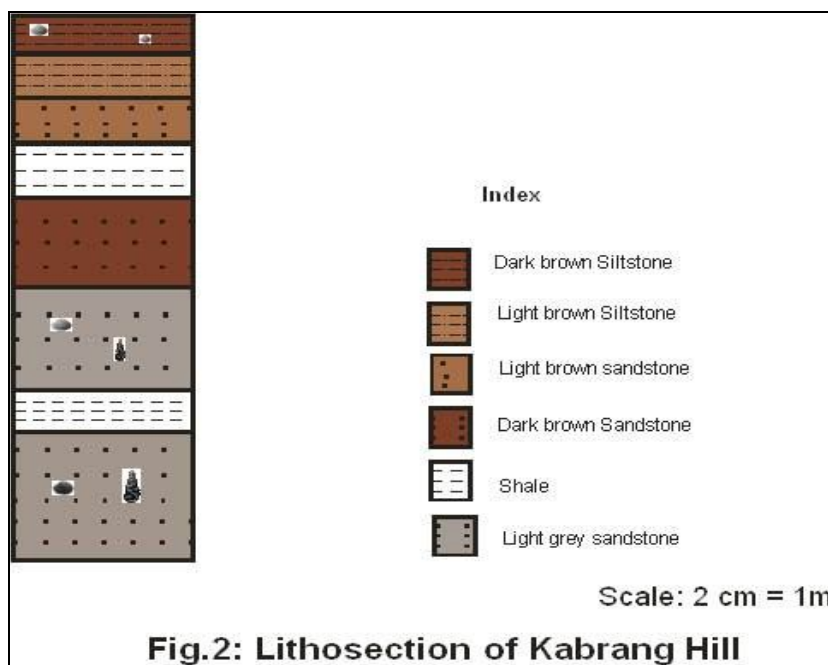


Figure 2

1.3. Light Grey Fine-Grained Sandstone

The fine-grained light grey sandstone bed overlies both the lowermost light grey compact sandstone (1.3m.) and succeeding thinly laminated shale bed (0.2m.). The two underlying beds are unfossiliferous.

This lower fossiliferous horizon yields eight specifically identified taxa belonging to ten genera (subgenera) of bivalves and two gastropods. The checklist is given below:

Bivalves: *Nuculana*, *Aphrodina*, *Corbula*, *Bicorbula*, *Glycymeris*, *Musculus*, *Undatimusculus*, *Corbicula*, *Crassinella* and *Mytilus*.
 Gastropods: *Serratocerithium* and *Campanile*.

The fossils are poorly preserved and mainly occur in form of external moulds. The overall inferred age from this assemblage is Palaeocene to Lower Eocene.

1.4. Dark Brown Siltstone

The topmost fossiliferous horizon is separated from the lower one by a succession of sandstone, shale and siltstone lithic units with a combined thickness of about 1.5m. this bed is much more fossiliferous than the lower one and consists of dark brown siltstone (0.3m.). there are 20 bivalves and six gastropods belonging to the following genera (subgenera):

Bivalves: *Septifer*, *Lopha*, *Lucinoma*, *Lucina*, *Callista*, *Microcallista*, *Costacallista*, *Diplodonta*, *Venus*, *Eotrigonia*, *Pitar*, *Calpitarina*, *Meretrix*, *Glycymeris*, *Corbula*, *Mytilus*, *Musculus*, *Tellina*, *Nucula* and *Lamellinucula*.

Gastropods: *Campanile*, *Seila*, *Mesalia*, *Turritella*, *Haustator* and *Telescopium*.

23 taxa are specifically identified from this bed. Of these 13 are exclusively of Upper Eocene and four are of Middle Eocene giving an age of Middle and Upper Eocene for this lithic unit.

Therefore, it seems that the overall age of these two bed in Thoubal area is Palaeocene to Eocene.

| Sl. No. | Name of the Species | Locality- Thoubal | |
|---------|--|-------------------|--------|
| | | Zone A | Zone B |
| 1 | <i>Nucula (Lamellinucula) pakistanica</i> Eames | | + |
| 2 | <i>Glycymeris plumstediensis</i> (Sowerby) | | + |
| 3 | <i>Mytilus nummuliticus</i> d'Archiac and Haime | | + |
| 4 | <i>Septifer</i> cf. <i>denticulatus</i> Lamarck | | + |
| 5 | <i>Musculus</i> aff. <i>mathuri</i> Batra | | + |
| 6 | <i>Musculus (Undatimusculus)</i> cf. <i>rakhiensis</i> Eames | + | |
| 7 | <i>Lopha newtoni</i> (Dalton) | | + |
| 8 | <i>Lopha</i> aff. <i>melania</i> d'Orbigny | | + |
| 9 | <i>Lopha</i> sp. | | + |
| 10 | <i>Eotrigonia</i> sp. | | + |
| 11 | <i>Lucina Yawensis</i> Cotter | | + |
| 12 | <i>Lucinoma</i> sp. | | + |

| | | | |
|----|---|---|---|
| 13 | <i>Diplodonta cf. pakistanica</i> Eames | | + |
| 14 | <i>Crassinella blandfordi</i> Cossmann and Pissarro | + | |
| 15 | <i>Tellina tazuvensis</i> Cotter | + | |
| 16 | <i>Tellina</i> sp. | | + |
| 17 | <i>Corbicula haydeni</i> (Cossmann and Pissarro) | + | |
| 18 | <i>Venus (Venus) pasokensis</i> Cotter | | + |
| 19 | <i>Meretrix agrestis</i> Cotter | | + |
| 20 | <i>Pitar (Calpitaria) pseudosubcyrenoides</i> Eames | | + |
| 21 | <i>Aphrodina (Aphrodina) thoubalensis</i> Jayajit | + | |
| 22 | <i>Callista (Costacallista) punjabensis</i> Eames | | + |
| 23 | <i>Callista (Costacallista) yawensis</i> Cotter | | + |
| 24 | <i>Callista (Macrocallista) sp.</i> | | + |
| 25 | <i>Callista (Callista) sp.</i> | | + |
| 26 | <i>Corbula paukensis</i> Cotter | | + |
| 27 | <i>Corbula (Bicorbula) subexarata</i> d'Archiac and Haime var. <i>lituus</i> Cotter | + | |

Table 1: Checklist of recorded Bivalves, their zone wise distributions

1.5. Biozonation and Correlation

In studied section of Kabrang Hill author has established two fossiliferous Zones A and B respectively in ascending order namely -

Zone A- *Corbicula haydeni*- *Musculus (Undatimusculus) rakhensis*

This Zone has been assigned to Palaeocene –Lower Eocene.

Zone B- *Septifer cf. denticulatus* – *Meretrix agrestis*

This Zone has been assigned to Middle – Upper Eocene.

These two biozones are correlated with other known section India, Pakistan and Myanmar.

| Sl.No. | Name of the Species | Locality- Thoubal | |
|--------|---|-------------------|--------|
| | | Zone A | Zone B |
| 1 | <i>Turritella (Haustator) punjabensis</i> Eames | | + |
| 2 | <i>Turritella (Stiracolpus) harnaiensis</i> Eames | | + |
| 3 | <i>Turritella aff. hollandi</i> Cossmann and Pissarro | | + |
| 4 | <i>Mesalia pagoda</i> Cox | | + |
| 5 | <i>Telescopium</i> sp. | | + |
| 6 | <i>Campanile brookmani</i> Cox | + | |
| 7 | <i>Campanile</i> sp. | | + |
| 8 | <i>Serratocerithium serratum</i> (Bruguiere) | + | |
| 9 | <i>Seila stracheyi</i> d'Archiac and Haime | | + |
| 10 | <i>Siphonalia (Kelletia) iravadica</i> Vredenburg | + | |
| 11 | <i>Volutospina augustae</i> Vredenburg | + | |

Table 2: Checklist of recorded Gastropods, their zone wise distributions

| Thoubal area (Bigyapati, 2015) | Shimla Hill (Mathur, 1975) | Rakhi Nala and Zinda Pir, Pakistan, (Eames, 1951-52) | Myanmar (Cotter, 1923; Vredenburg, 1923) |
|--------------------------------|----------------------------|--|--|
| | | Zone 10-15 | Yawn Stage |
| Zone B | Zone 6-8 in part | Zone 6-9 | Pondaung Stage |
| | Zone 3-5 | Zone 2-5 | |
| Zone A | Zone 1 | Zone 1 | |

Table 3: Correlation of Studied area with Other Section

1.6. Palaeoecology of the Study Area

On basis of molluscan fauna the light grey fine grained sandstone bed derived its possible palaeoecology was shallow, sub-littoral habitat perhaps from 10-15m deep with sandy substrate. Shore was very near and has luxuriant vegetation as evident by the occurrence of wood fragments. And the dark brown siltstone bed is shallow water shelf environment with a water depth of between 10-30m having sandy substrate. Bottom has experienced feeble currents and temperature of around 20⁰-25⁰C. In the later phase, sea started regressing resulting into fluvio-marine conditions indicated by the presence of fossil plants in the form of leaves. Overall strata is of Palaeocene to Eocene in age.

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