A NEW RECORD OF INVERTEBRATE FOSSILS FROM THE UPPER DISANG FORMATION (EOCENE), PHESSAMA REGION OF NAGALAND, INDIA

Y. RAGHUMANI SINGH1,*, K. BIGYAPATI DEVI1, UMARANI SIJAGURUMAYUM*,
H. RINABAI DEVI1 and NANJEST THONGBAM2

1 DEPARTMENT OF EARTH SCIENCES, MANIPUR UNIVERSITY, IMPHAL-795003(INDIA)
2 DEPARTMENT OF GEOGRAPHY, MANIPUR COLLEGE, IMPHAL

*Corresponding author; e-mail: yengmani@gmail.com

ABSTRACT
Detailed account of molluscan fossils from the Upper Disang Formation (Eocene) of the the Phesama region is presented for the first time. Altogether, six molluscan fossils representing three each of bivalves and gastropods are described and illustrated.

Keywords: Mezi River, Phesama, Upper Disang Formation, molluscs, Inner Palaeogene fold belt

INTRODUCTION
The inner Palaeogene fold belt is occupied by two synclinoria, i.e. the Kohima synclinorium to the south and Patkai synclinorium to the north. The Disang and Barail Groups of rocks along with well-developed transitional sequences, i.e. DBT (Disang-Barail Transition) are the major rock units with subordinate Surma succession that occupies the core of Kohima synclinorium. The western limit of this belt is defined by Disang-Haflong thrust, while the ophiolite belt defines the eastern limit. The study area that forms a part of the inner Palaeogene fold belt, exposes the well-developed Upper Disang and DBT sequence that are in part fossiliferous. The fossil specimens for the present study were collected from the Upper Disang Formation exposed along Mezi river near Phesama village along NH 2, formerly known as NH-39 (GPS: N25°36′10.0″ E 94°06′40.5″) (Fig.1).

The early geological accounts of the Naga hills are available from the reports of the geological traverses made by Mallet (1876), Oldham (1883), Pascoe (1912), Evans (1932, 64), Mathur and Evans (1964), Brunnschweiler (1966), Bhandari et al. (1973) and Das Gupta (1977). Foraminifera were recorded from the Upper Disang sediments in Nagaland (Mishra, 1990; Lokho et al., 2004). Palynomorphs were also recorded from the Upper Disang – Lower Barail Groups around Kohima, Nagaland (Ranga Rao, 1983, Mandal, 1996; Dutta et al., 1998). Mishra (1990) and Gaur and Chakradhar (1985) reported invertebrate fossils as well as larger foraminifers and trace fossils from the Disang and Barail transitional areas. It is thus evident that the contribution to palaeontology in this region is meagre. The Disang and Barail rocks and coeval horizons in the neighbouring state of Manipur have been worked out for their fauna, among others, by Biswas (1962), Mitra et al. (1986), Mishra (1990), Kachhara et al. (2000), Singh et al. (2010, 2014), GSI (2014) Sijagumayum et al. (2011, 2014). A systematic collection from the fossiliferous beds has been made. Among the fifteen collected forms, six molluscan taxa are described and illustrated in this paper and remaining nine forms are left out because specific identifications are not possible presently. All the six forms are systematically recorded here for the first time from the transition rocks of the Disang and Barail Groups.

STRATIGRAPHY
The Disang and the Barail Groups of the rocks are the main lithostratigraphic units in the Inner fold belt of Nagaland. A large spread of the Disang rocks with isolated covers of Barail and a well-developed Disang-Barail transition sequence (Srivastava et al., 2004) characterize the study area and its neighbourhood. The Disang Group was first described by Mallet (1876) from the type section of Disang river, wherein the lower part of the sequence consisting of grey, khaki grey, black, splintery sandstone with sandy and silty interbands, whereas flaggy sandstone of variable thickness occur higher up in the sequence. The Barail Group of the rocks is undifferentiated in the inner Palaeogene fold belt.

MOLLUSCAN FAUNA
Detailed study of molluscan fauna has led to the identification of three species each of bivalves and gastropods. These are Noetia magnifica, Pitar (Calpitaria) carteri, Corbula (Bicorbula) rakhiensis, Turritella sp., Turbinella premekranica and Lyria samanaensis.

The classification of Bivalvia as suggested by Newell (in Moore et al., 1969-71 and Davies, 1975) has been adopted in the present work. Fossils are mostly in the form of moulds and casts. Identification of the genera and species is based mainly on the external features.

Bivalves

SYSTEMATIC DESCRIPTION
Phylum Mollusca
Class Bivalvia Linne’, 1758
Subclass Pteriomorphia Beurlen, 1944
Order Arcoida Stoliczka, 1871
Superfamily Arcacea Lamarck, 1809
Family Noetiidae Stewart, 1930
Subfamily Noetinae Stewart, 1930
Genus Noetia Gray, 1857
(Type species: Arca reversa Sowerby, 1833; OD, Recent, Panama)

Noetia magnifica Eames, 1951
(Pl. I, fig.1)

Material: Single right valve.

Measurements in mm:

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Length</th>
<th>Height</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P8</td>
<td>12.00</td>
<td>11.00 (91.66%)</td>
<td>07.00 (58.3%)</td>
</tr>
</tbody>
</table>

Remarks: The specimen exhibits all the characters of *Noetia magnifica* Eames (1951), e.g. dimensional ratio, sub-square outline, narrow and salient umbo, straight hinge slightly less than the length of the valve, steeply oblique posterior margin, prominent posterior carina and closely spaced radial ribs; hence, the specimen is assigned to this species.

Horizon: Upper Disang Formation (Eocene).
Locality: Mezi River, Phesama.

Subclass *Heterodonta* Neumayr, 1884
Order *Veneroida* Adams and Adams, 1856
Superfamily *Veneracea* Rafinesque, 1815
Family *Veneridae* Rafinesque, 1815
Subfamily *Pitarinea* Stewart, 1930
Genus *Pitar* Romer, 1857
Subgenus *Calpitaria* Jukes Browne, 1908

(Type species: *Cytherea sulcata* Deshayes, 1825; OD. Eocene, Europe-W.N. America-SE Asia)

*Pitar (Calpitaria) carteri* d’ Archiac & Haime, 1951
(Pl. I, figs. 2, 3)
*Cypriocardia carteri* d’ Archiac and Haime, 1854, p.261, 367, pl. XX, fig.14a

Material: Four right valves and four left valves.

Measurements in mm:

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Length</th>
<th>Height</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P20 LV</td>
<td>10.00</td>
<td>09.00 (90.00%)</td>
<td>06.40 (64.00%)</td>
</tr>
</tbody>
</table>

Remarks: The specimen at hand matches well with the one described by Eames (1951) under the name *Pitar (Calpitaria) carteri* (d’ Archiac & Haime) as both exhibit subterminal umbo, long and gently inclined postero–dorsal margin with variable outline like elongate, subtriangular to elongate subelliptical. In addition, this is closely comparable with the fig.117 (Eames, 1951).

---

EXPLANATION OF PLATE I

(Scale bar represents 5mm)

Horizon: Upper Disang Formation.
Locality: Mezi River, Phesama.

**Order** Myoida Stoliczka, 1870

**Suborder** Myina Stoliczka, 1870

**Superfamily** Myaceae Lamarck, 1809

**Family** Corbulidae Lamarck, 1818

**Subfamily** Corbulinae Gray, 1823

**Genus** Corbula Bruguieres, 1797

**Subgenus** Bicorbula Fischer, 1887

(Type species: *Corbula sulcata* Lamarck, 1801, SD Schmidt, 1818. Recent, Senegal)

**Genus** Turbinella Vredenburg (1923) of Senegal

**Superfamily** Turritellacea Rafinesque, 1815

**Family** Turritellidae Woodward, 1851

**Genus** Turritella Lamarck, 1799

*Turritella* sp. (Pl. I, fig.5)

Material: two broken external cast.
Measurements in mm:

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Diameter</th>
<th>Height</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P7</td>
<td>03.50</td>
<td>10.11</td>
<td></td>
</tr>
</tbody>
</table>

Remarks: The specimen is very small with broken aperture; as a result, it is not possible to identify it at specific level. Hence, for the time being it is described as *Turritella* sp.

Horizon: Upper Disang Formation.
Locality: Mezi River, Phesama.

**Genus Lyria Gray, 1847**

**Genus Lyria samanaensis** Cox, 1930

(Pl.I, fig.8)

Horizon: Upper Disang Formation.
Locality: Mezi River, Phesama.

**REPOSITORY**

All the specimens described and illustrated here are housed in the Palaeontology Museum, Department of Earth Sciences, Manipur University, Canchipur-795003, Manipur.

**ACKNOWLEDGEMENTS**

We are thankful to Prof. G.T. Thong, Department of Geology, Nagaland University for suggestions in the preparation of this manuscript. One of the authors (YRS) is grateful to DST, New Delhi for financial assistance (Project No.SR/S4/ES-577/2011 dated 09/03/2012). The authors thank Dr. R.P. Tiwari for his constructive comments and suggestions.

**REFERENCES**


Manuscript Accepted June 2014