Journal of the Palaeontological Society of India
Volume 59(2), December 2014: 213-218

ISSN 0522-9630

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

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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^{0}36′10.0″ and E 94^{0}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 *at el*., 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 shales 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)

Noetia magnifica Eames, 1951 p. 332, pl. 9, figs. 19-20. Bhatia and Khosla, 1978, p.227, pl.I, fig.15. Bigyapati *et al*., 2010 p.271, pl. I, fig.9. 2010.

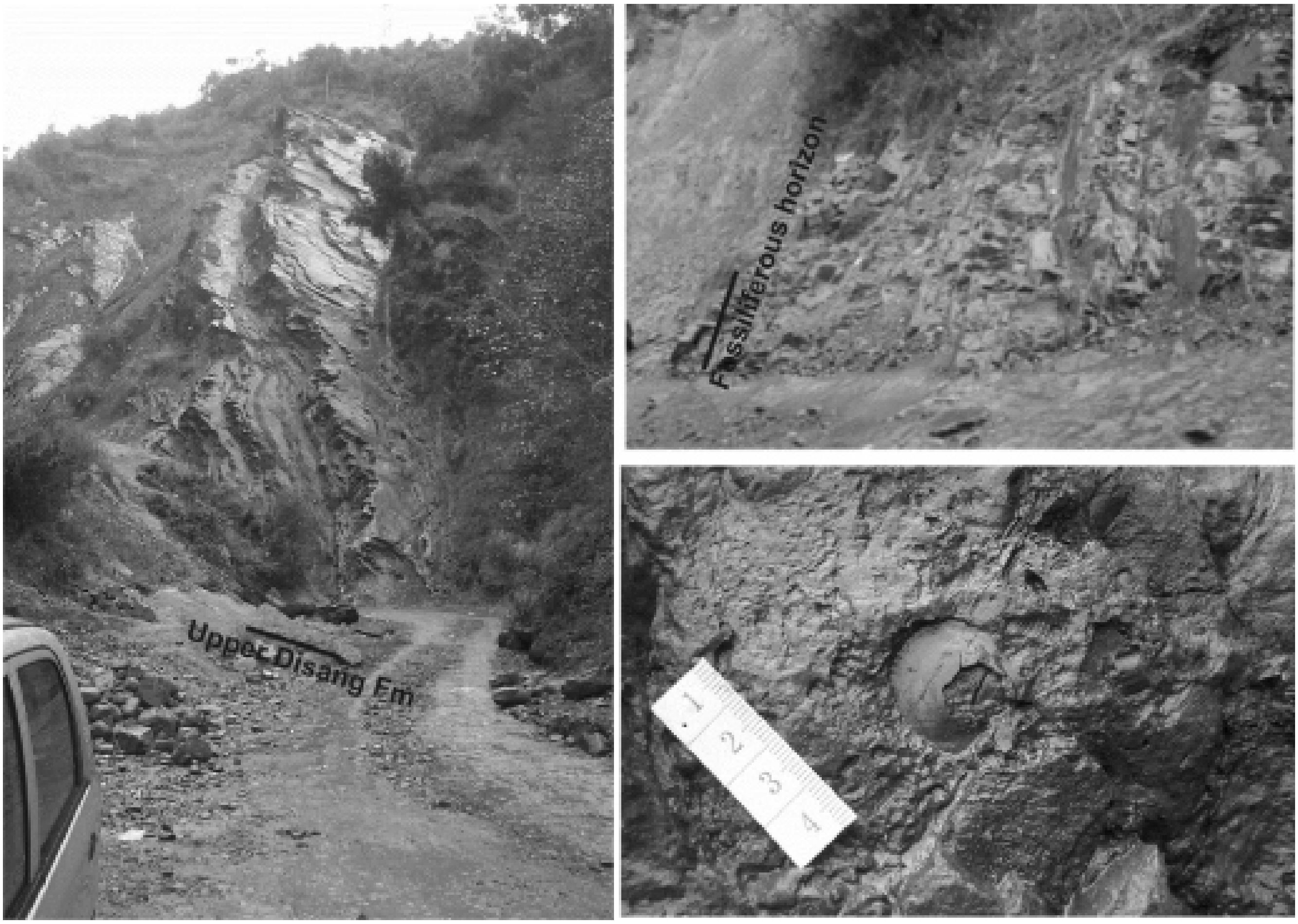


Fig. 1. Photographs showing *in situ* fossiliferous horizon of the sandstone bed in the study area (black bars represent fossiliferous horizon).

Material: Single right valve.

Measurements in mm:

Specimen No.	Length	Height	Inflation
P8	12.00	11.00 (91.66%)	07.00(58.3%)

Remarks : The specimen exhibits all the characters of *Noetia magnifica* Eames (1951), e.g. dimensional ratio, sub-quadrate 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 sulcataria*** Deshayes, 1825; OD. Eocene, Europe-W.N. America-SE Asia)

Pitar (*Calpitaria*) *carteri* d' Archiac & Haime, 1951
(Pl. I, figs.2, 3)

Cypricardia carteri d Archiac and Haime, 1854, p.261, 367, pl. XX, fig.14a

Pitar (*Calpitaria*) *carteri* (d' Archiac & Haime), Eames, 1951 p.423, pl. XVI, fig. 117,

Material: Four right valves and four left valves.

Measurements in mm:

Specimen No.	Length	Height	Inflation
P20 LV	10.00	09.00(90.00%)	06.40 (64.00%)

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).

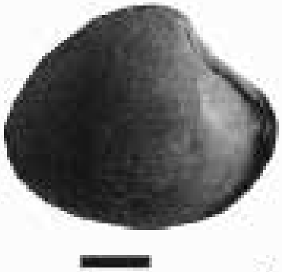
EXPLANATION OF PLATE I

(Scale bar represents 5mm)

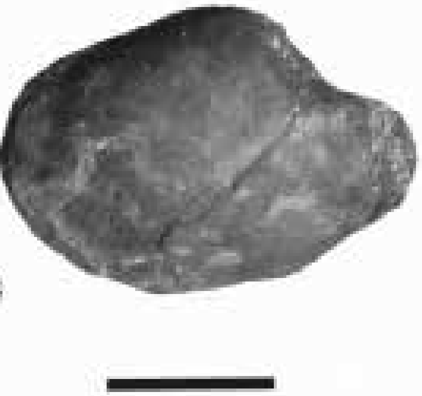
1. ***Noetia magnifica*** Eames x2. 2, 3. ***Pitar*** **(*Calpitaria*)** ***carteri*** d' Archiac & Haime x4. 4. ***Corbula*** **(*Bicorbula*)** ***rakhiensis*** Eames x 4.5. 5. ***Turritella*** sp.x6. 6. ***Turbinella premekranica*** Vredenburg x3. 7. ***Turbinella premekranica*** Vredenburg x1.5 8. ***Lyria samanaensis*** Cox x3.5.

Plate I


1


2


3


4


5


7


6


8

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

Order **Myoida** Stoliczka, 1870
Suborder **Myina** Stoliczka, 1870
Superfamily **Myacea** Lamarck, 1809
Family **Corbulidae** Lamarck, 1818
Subfamily **Corbulinae** Gray, 1823
Genus ***Corbula*** Bruguiere, 1797
Subgenus ***Bicorbula*** Fischer, 1887

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

Corbula (*Bicorbula*) *rakhiensis* Eames, 1951.
(Pl. I, fig.4)

Corbula rakhiensis Eames, 1951, p.436, pl. XIV fig. 87.-Bhatia and Singh, p.118, fig. 3b.

Material: two right valves.
Measurements in mm:

Specimen No.	Length	Height	Inflation
P11	07.00	06.50 (92.85)	02.20 (31.42)

Remarks: The specimens are almost similar in umbonal position and outline shape of the figure illustrated by Eames (1951).

Horizon: Upper Disang Formation
Locality: Mezi River, Phesama

Gastropods

SYSTEMATIC DESCRIPTION

Class **Gastropoda** Cuvier, 1797
Subclass **Prosobranchia** Milne Edwards, 1848
Order **Caenogastropode** Cox, 1959
Superfamily **Cerithiacea** Fleming, 1822
Family **Turritellidae** Woodward, 1851
Genus ***Turritella*** Lamarck, 1799

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

Material: two broken external cast.
Measurements in mm:

Specimen No.	Diameter	Height
P7	03.50	10.11

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 ***Turbinella*** **Lamarck, 1799**

Turbinella premekranica Vredenburg, 1932
(Pl. I, figs.6, 7)

Turbinella premekranica Vredenburg, 1932, p.174, pl. XI, figs. 1-5.

Material: two incomplete external mould.
Measurements in mm:

Specimen No.	Diameter	Height
P6	16.00	21.00

Remarks: On comparison with the figure given by Vredenburg (1923) of *Turbinella premekranica* except the small size. The present specimen is similar to the overall preservation and outline; hence it is identified as *Turbinella premekranica.*

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

Superfamily **Volutacea Rafinesque, 1815**
Family **Volutidae Rafinesque, 1815**
Subfamily **Lyriinae Pilsbury and olsson, 1954**
Genus ***Lyria*** **Gray, 1847**

Lyria samanaensis Cox, 1930
(Pl.1. fig.8)

Lyria samanaensis Cox, 1930, p. 201, pl.XX1, figs. 9, a b

Material: one incomplete external cast
Measurements in mm:

Specimen No.	Diameter	Height
P32	04.00	08.00

*Remarks***:** In spite of small size and poor preservation, present specimen can be assigned to *Lyria samanaensis* on account of its acute spire and height of the body whorl being five-six of the height of the shell.

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.

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Manuscript Accepted June 2014