

Stratigraphy of the Napeng-Namon Area, Northern Shan State

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Abstract

Napeng-Namon area is situated about 7 miles south-east of Kayukme, northern Shan State. This area lies between North Latitudes 22° 28' and 22° 31' and East Longitudes 97° 02' and 97° 12' and occupies parts of one-inch topographic map of 93 F/2 and 93 F/3. It covers about 36 square miles. The stratigraphic successions of the study area are Nwabangyi Dolomite Formation (?Late Permian-Middle Triassic), and Napeng Formation (Late Triassic, Rhaetic). The beds are trending generally NE-SW, dipping towards SE with the amounts of 30°- 40°. Nwabangyi Dolomite Formation consists of whitish grey to grey, medium- to thick-bedded, highly brecciated dolomite, dolomitic limestone, clastic limestone (calcareous and calcirudite), and locally developed oolitic limestones. Napeng Formation overlies on the Nwabangyi Dolomite Formation unconformably and contains yellow to buff siltstones, highly fossiliferous siltstones (pelecypods and gastropods) variegated clays, shales and arenaceous limestones, calcareous mudstones, argillaceous limestones intercalated with shales. Based on the lithologic characters, faunal contents and their stratigraphic positions, Nwabangyi Dolomite Formation is deposited in the slope apron to shallow marine with agitated water, Napeng Formation in tidal flat.

Introduction

Napeng-Namon area is situated about 7 miles south-east of Kayukme, northern Shan State. This area lies between North Latitudes 22° 28' and 22° 31' and East Longitudes 97° 02' and 97° 12' and occupies parts of one-inch topographic maps of 93-F/2 and 93-F/3. It is about 8 miles long in North-South direction and about 4.5 miles wide in East-West direction, covering approximately 36 square miles. The location of the study area is shown in Fig. (1).

Purpose and Method of Investigation

The purposes of this paper are: to distinguish and describe the stratigraphic units exposed in the area and to describe the petrographic features of clastic and carbonate rocks of the stratigraphic units in the area.

Stratigraphic studies and sampling were carried out in the study area. These samples were examined using a polarizing microscope, for the petrographic studies and mineralogical investigations. The Molluscan faunas in the siltstones and mudstones and the foraminiferal fossils in the limestones are made into thin sections and all the microfossils are studied thoroughly under the microscope.

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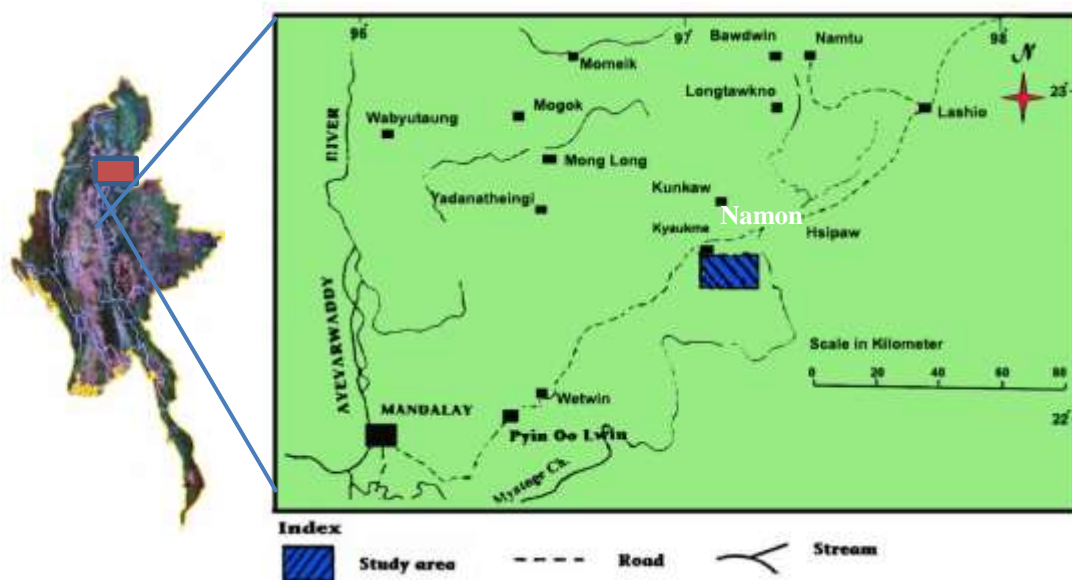


Fig. (1) Location map of the study area

General Statement

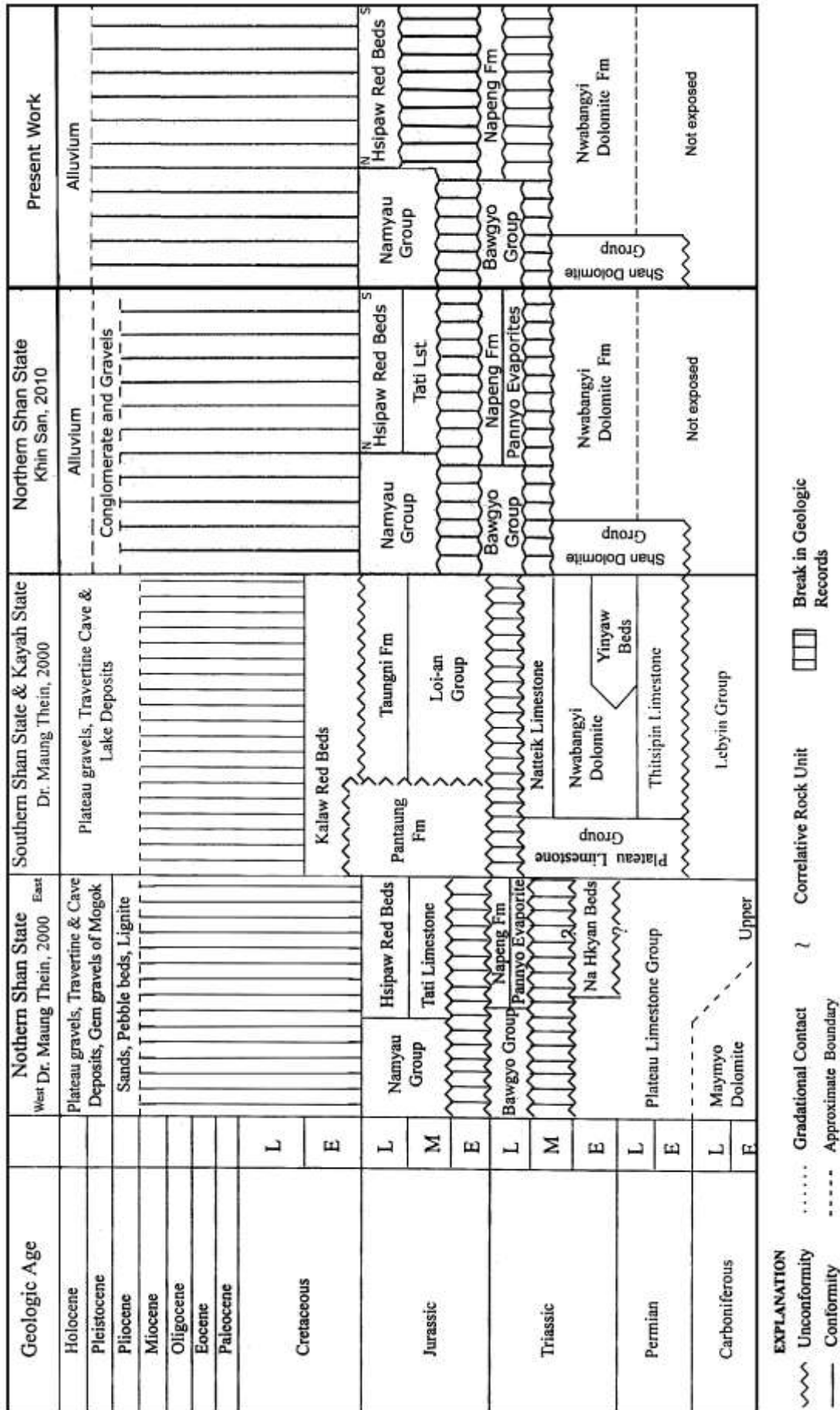
Depending upon the lithology, stratigraphic relationship and faunal content, a total of three rock units of formational rank are recognized. The stratigraphic succession of the Napeng – Namon area, in ascending order, are: 2. Napeng Formation (Late Triassic, Rhaetic) and 1. Nwabangyi Dolomite Formation (? Late Permian – Middle Triassic). The stratigraphic correlation of the study area and its environs is also illustrated in Table (1).

Nwabangyi Dolomite Formation

Lithology

In the present study area, this formation can be divided into three units on the basis of lithologic character and stratigraphic succession. These are: **Unit 3**. Light gray to dark gray, fine-grained limestone; **Unit 2**. Dolomitic limestone and Dolomite; and **Unit 1**. Dolomitized Turbidite.

Table (1) Stratigraphic correlation of the present area with some upper Paleozoic and Mesozoic units in the northern and southern Shan State.



Dolomitized turbidites unit

This unit consists mainly of whitish grey to light gray, medium-thick bedded or massive, fine- to medium- grained, softness, clastic limestone (dolomitic calcarenites) and highly brecciated clastic limestone (calcirudite) (Fig. 2). The maximum size of clasts is 4 cm, minimum size of clasts is 0.3 cm and common size of clasts are 1-2 cm.



Fig. (2) Highly brecciated clastic limestone (calcirudite) in the lower part of the Nwabangyi Dolomite Formation

Dolomitic limestone and dolomite unit

This unit mainly consists of whitish grey to grey, medium- to thick- bedded, fine-grained, hard and compact, highly brecciated dolomite and dolomitic limestones (Fig. 3. A). They show intensely dolomitization and crisscross pattern (Fig. 3. B). In some places, thinning upward sequences are observed in this dolomitic limestone and laminated limestone.



Fig. (3) A. Highly brecciated dolomitic limestones in the middle part of the Nwabangyi Dolomite Formation: B. Crisscross joint patterns in the middle part of the Nwabangyi Dolomite Formation

Light gray to dark gray, fine-grained limestone unit

This unit consists mainly of light gray-dark grey, medium to thick bedded or massive fine-grained limestone (Fig. 4. A) containing numerous foraminiferas, echinoid fragments and other bioclasts found in some beds of this unit. At the east and northeast of Hpa-lung village, especially the Hpa- lung range, this unit is marked by prominent scarp (Fig. 4. B). In this range, light grey-dark grey, well bedded, highly jointed micritic limestone is observed.



Fig. (4) A. Light gray-dark grey, medium to thick bedded limestone: B. Prominent scarp in dolomitic limestone of the Nwabangyi Dolomite Formation

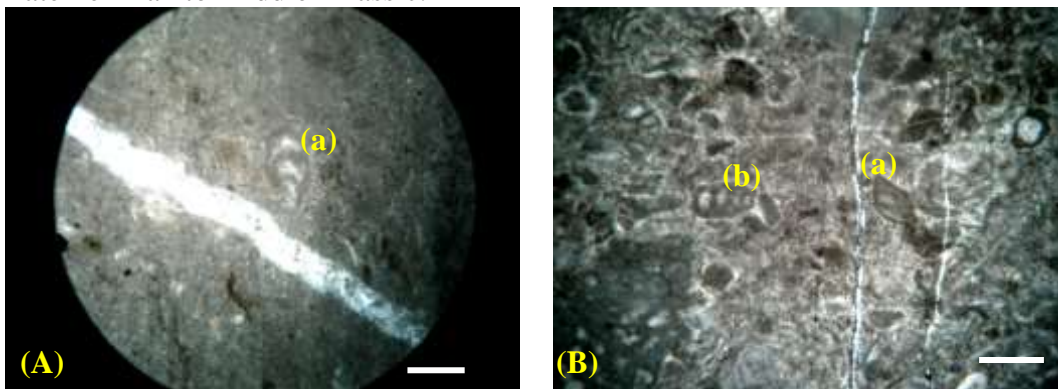
Distribution

The Nwabangyi dolomite Formation is fairly widely distributed in the areas of the north-western, western parts, especially car-road between Kyaukme and Napeng. The general trend of the strata is NE-SW direction with an average dip of 20°. It is also well-exposed at the west of Napong, the north of Nawngleng, the south of Loi-hsa and the east of Hpa-Lung. This formation also crops out in the east of Loi-kaw village and in the vicinity of grid (709247) and grid (704251).

Fauna, Age and Correlation

The index fossils have not been found in the study area yet, but some microfossils such as foraminiferas (*Pseudotrictix* sp., *Pachyphloia* sp.?, *Paleotextularia* sp.) and foraminiferal limestone have been found in this unit under thin section (Fig. 5) According to Garson et al., (1976) the fauna of miliolid foraminifera are very similar to those found recently by Mitchell at Khlong Pha Saeng in the Thai Peninsula, Thailand, where they are again associated with *Pachyphloia* (Upper Permian). From east of Kyaukme, Amos (1975 & 62) noted the Middle Triassic *Glomospirella irregularis* (Wolfart et al. 1984).

This formation can be correlated with the Nwabangyi Dolomite Formation of southern Shan State (Garson et al., 1976) and upper Plateau Limestone of La Touche (1913). Therefore, the age of Nwabangyi Dolomite Formation of the study area can be assigned as Late Permian to Middle Triassic.



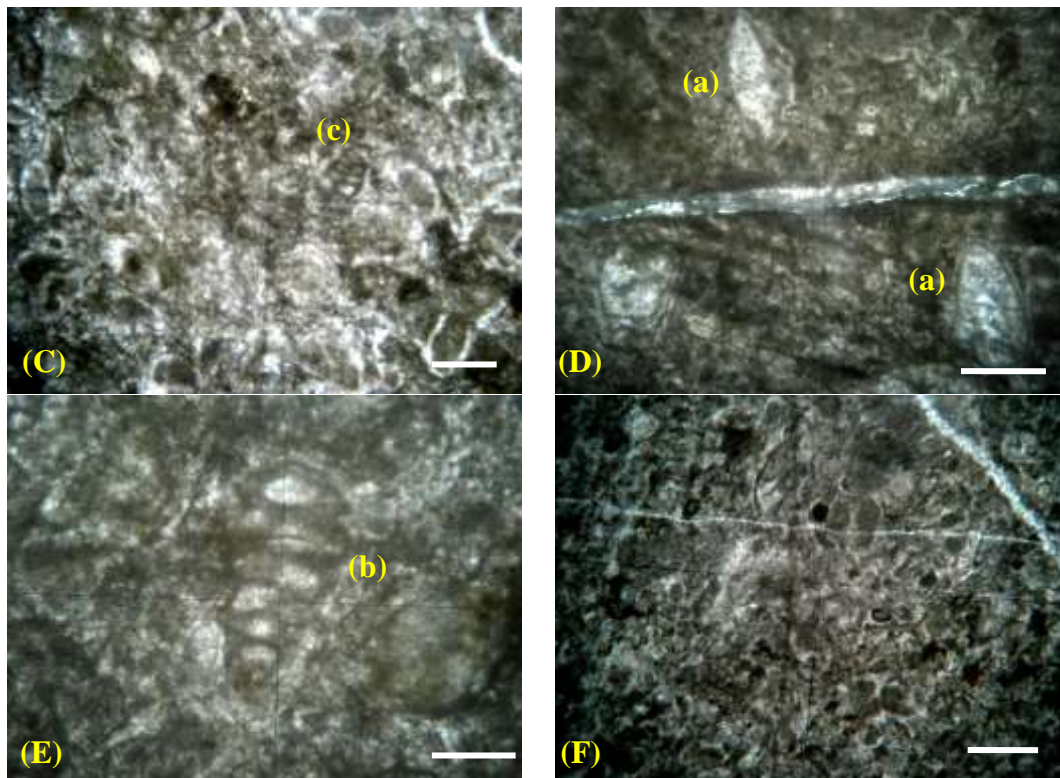


Fig. (5) Some foraminiferas collected from Nwabangyi Dolomite Formation:
 (A) – (E) (a) *Pachyphloia* spp., (b) *Pseudotrictix* spp., (c) *Paleotextularia* sp., and
 (F) Foraminiferal limestone. Scale bar is 0.1 mm.

On the basis of stratigraphic succession and lithologic character, the Nwabangyi Dolomite formation of the study area may be unconformably overlain by the Napeng Formation.

Napeng Formation

Lithology

The Napeng Formation is dominantly clastic in nature. The Napeng Formation can be subdivided into three sub-units on the basis of lithological character that are collected from the measured section at Napeng-Nawngleng car road and Napeng-Napong car-road. These three sub units are the lower, thin bedded clastic unit, the middle, thin-medium bedded argillaceous limestone intercalated with shale unit and thick bedded limestone unit.

Thin-bedded Clastic Unit

The lower part of the Napeng Formation is thin-bedded clastic unit. The unit is composed mainly of yellow-buff siltstone, reddish brown or purple shale and whitish-grey or ash-white marl, carbonaceous shale, carbonaceous siltstone and highly fossiliferous siltstone

(Fig. 6).



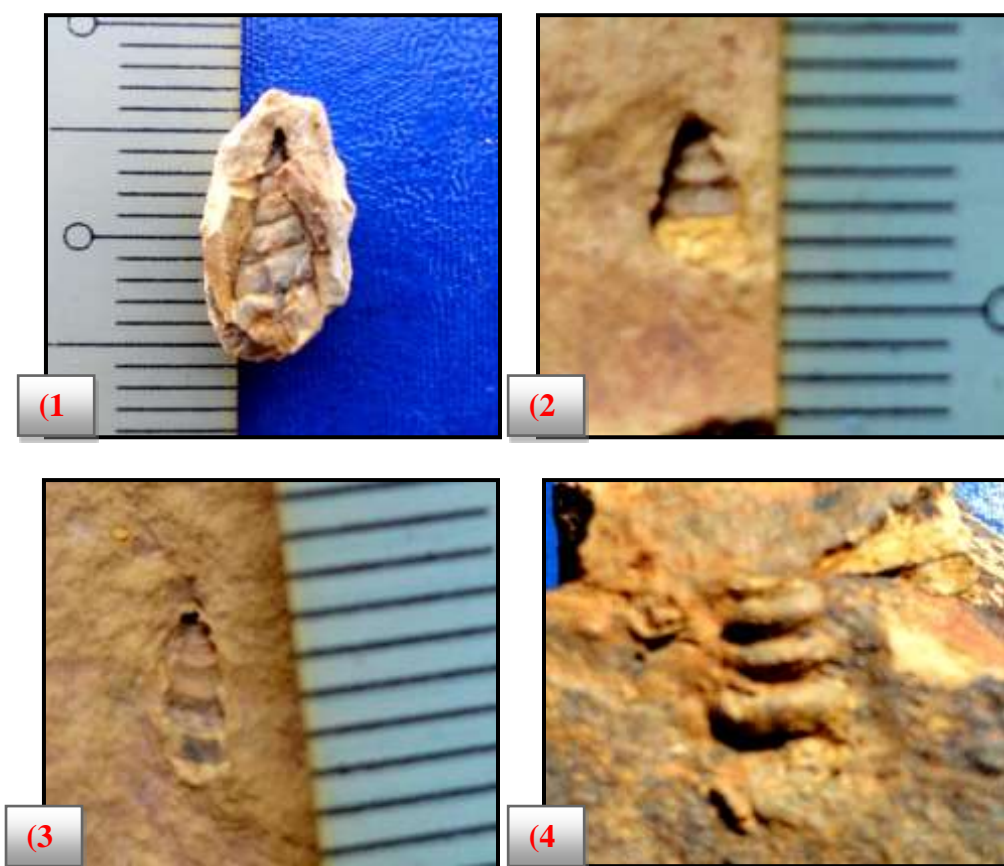
Fig. (6) Fossiliferous siltstone in the lower part of the Napeng Formation

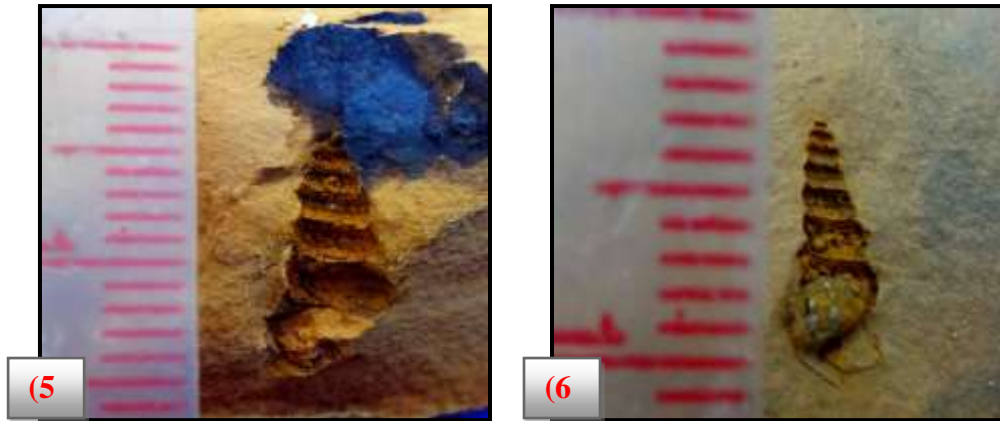
Pelecypods and gastropods occur in the siltstone of this unit (See also Plate I, II & III). It also contains variegated colour silty marl, marly limestone and calcareous mudstone. Yellowish-buff silt and shale are mottled by the ash-white marl, silty marl and argillaceous limestone. In the lower part of the Napeng Formation, these rocks are frequently and highly disturbed and contorted in a most irregular manner.

Thin-medium bedded argillaceous limestone intercalated with shale Unit

The middle part of the Napeng formation is thin- to medium- bedded argillaceous limestone intercalated with yellow to light grey shale unit. The unit mainly consists of light grey to greenish grey, thin- to medium- bedded argillaceous limestone that are intercalated with yellow to grey silty shale or shale (Fig. 7).

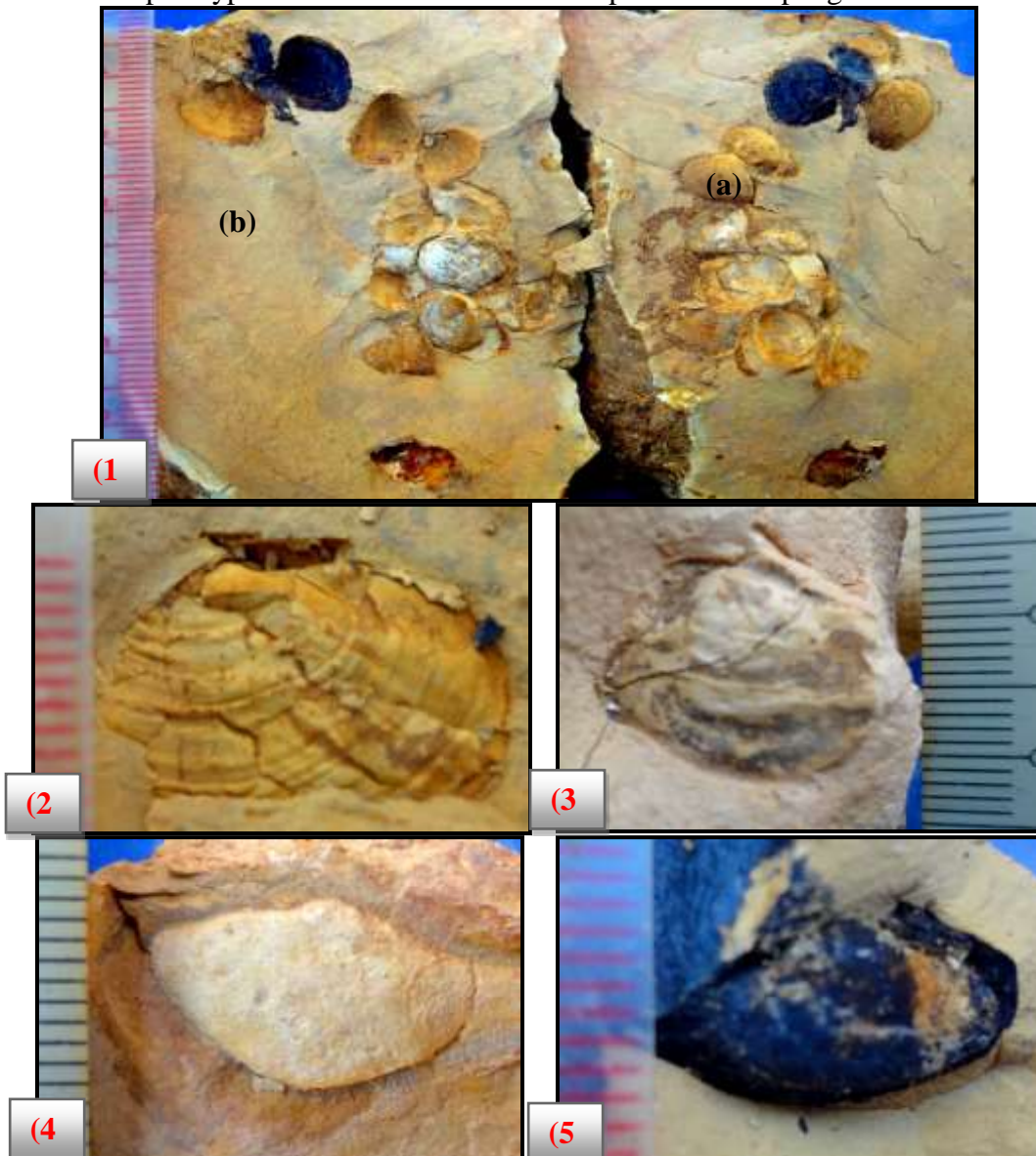
Plate I. Some gastropods collected from the lower part of the Napeng Formation

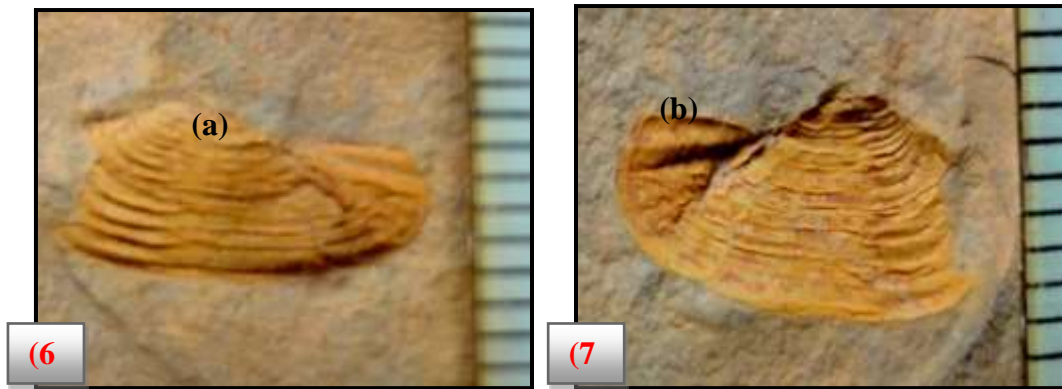




? *Fibula* sp.,
(1) *Procerithiopsis* sp.,
(3-4) *Remera* sp., and
(5-6) *Turritella* sp.,

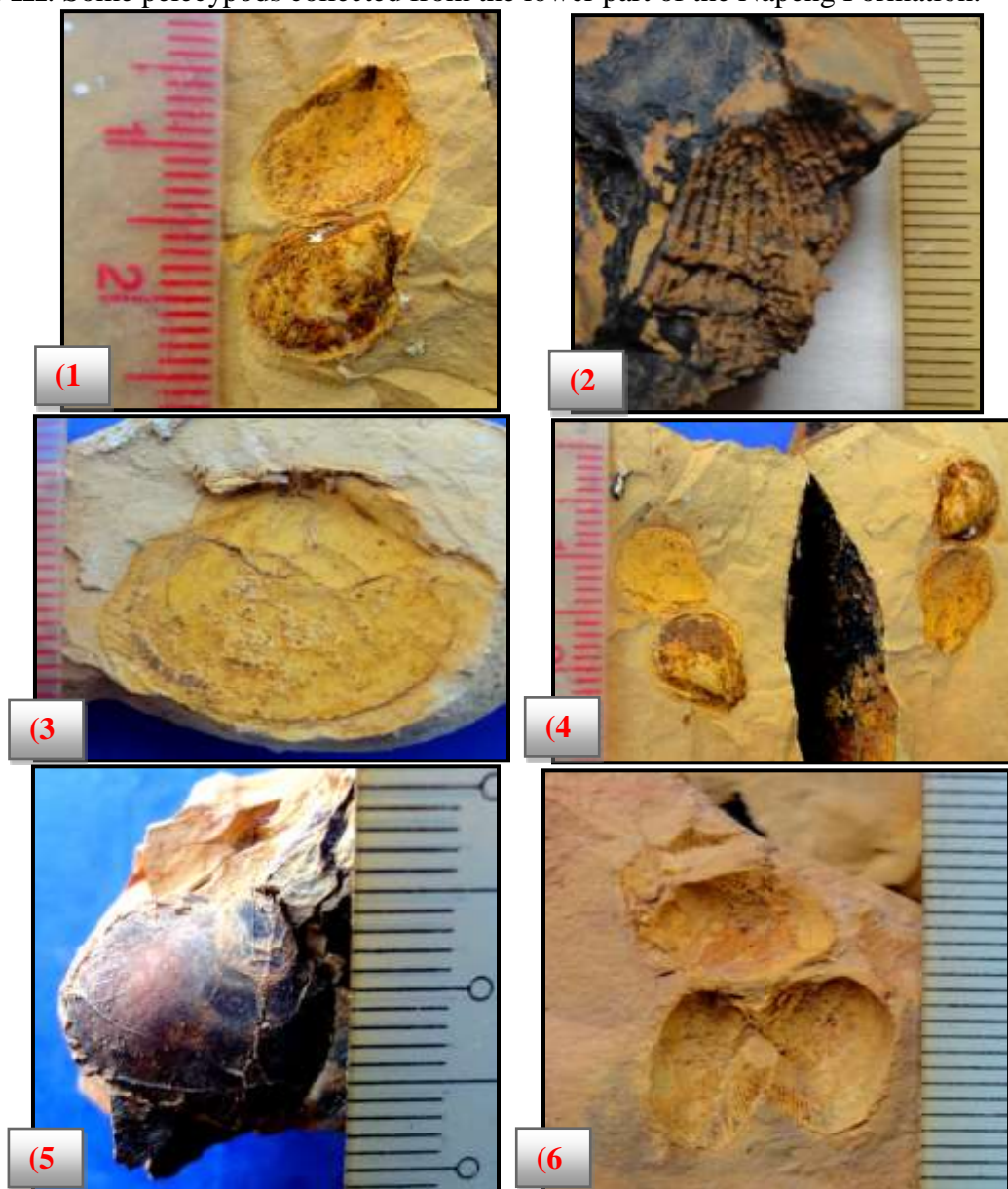
Plate II. Some pelecypods collected from the lower part of the Napeng Formation.

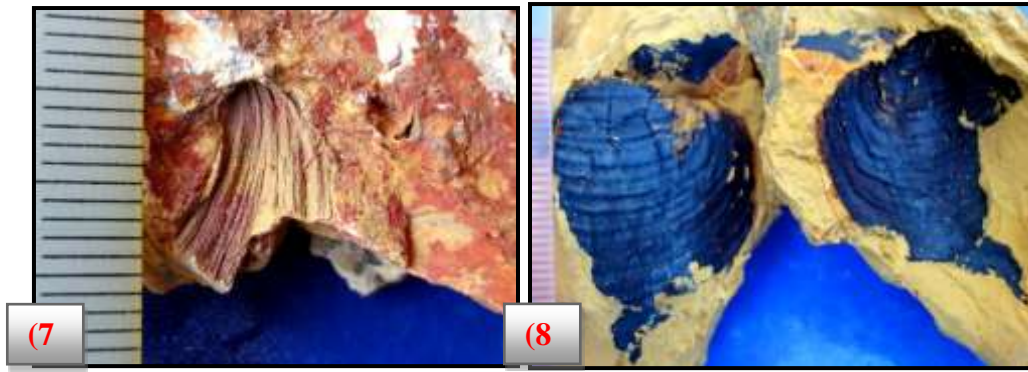




(1) *Astrate* sp. (a) external cast and (b) internal cast, (2-3) *Nicaniella extensa*, (4-5) *Nucula* spp., and (6-7) *Thracia prisca*, (a) external cast and (b) internal cast.

Plate III. Some pelecypods collected from the lower part of the Napeng Formation.





(1) *Placunopsis* sp., (2) *Plagostoma* sp., (3) *Pecten* sp., (4) *Perna obruta*, (5) *Cardium nequam*, (6) ?*Conocardium* sp., (7) *Hoernesia pilosa*, and (8) *Nicaniella extensa*.



Fig. (7) Argillaceous limestone intercalated with yellow to grey silty shale or shale in the middle part of the Napeng Formation

It is also contain light grey-grey hard and compact, highly brecciated limestone with iron-patches and crisscross patterns. The stratigraphic succession of the middle part of Napeng Formation is shown in Fig. (8).

Thick- bedded Limestone Unit

The upper part of the Napeng Formation is thick-bedded to massive limestone unit. This unit mainly constitutes light grey to grey, hard and compact, fine-grained, thick bedded or massive, well-bedded limestone (Fig. 9 A & B). Sometimes, these limestones are intercalated with shale and siltstone.



Fig. (2.19) (A & B) Thick, well-bedded limestone in the upper part of the Napeng Formation

Distribution

The outcrops of Napeng Formation are fairly common in the area of low hills of the western and southeastern parts of the area.

The exposure is observed at Napong-Ayethayar car-road section, in the vicinities of Napeng village, Nam-pyen village, Loi-hkum village, Hpa-Lung village and Na-mon village. Thin- to medium- bedded argillaceous limestone intercalated with yellowish- light grey shale containing uncommon small scale cross-bedding are well exposed at Napeng-Nawngleng car-road section, western part of the Loi-hsa, west of Loi-kaw and northwest of Namon village.

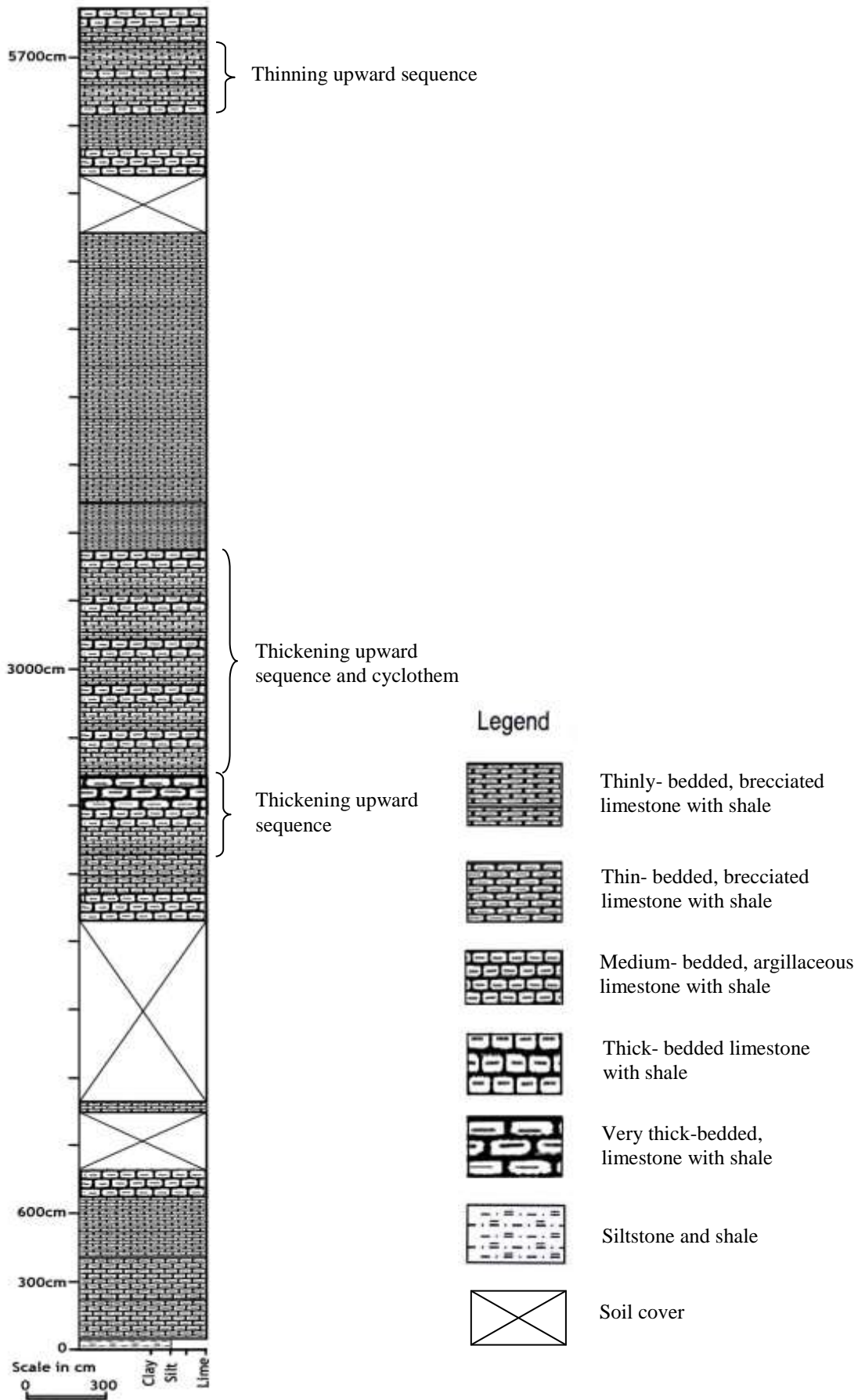


Fig. (8) The stratigraphic succession of the middle part of the Napeng Formation (Section measured along Napeng – Nawngleng car- road section)

Thick-bedded limestone unit also occur at the upper part of the Napeng-Nawngleng car road section, upper part of Napong-Hpalung car-road section and at the hills between Loi-hsahte and Loi-kaw villages. Stratigraphic thickness of the study area is about several hundreds of meter.

Fauna, Age and Correlation

On the lithological and faunal basis, Napeng Formation is distinguishable from the underlying Nwabangyi Dolomite Formation, in which chiefly of pelecypods and gastropods bearing yellowish-buff, a block of siltstone, silty shale are observed at half mile west of Napeng village. The pelecypods and gastropods are collected from a block of silty rock in the Napeng Formation and shown in plate I, II and III.

Pelecypods - *Astrate* sp.

Conocardium sp.

Hoernesia pilosa sp.

Placunopsis sp.

Plagostoma sp.

Nucula sp.

Pecten sp.

Cardium nequan

Nicaniella extensa

Thracia prisca

Perna obruta

Gastropods- *Fibula* sp. (?)

Procerithiopsis sp.

Remera sp.

Turritella sp.

On the basis of lamellibranch genera, Healey (1908) stated that the Napeng Formation indicated Late Triassic age (Rhaetic). Some of the important lamellibranch fauna are *Pteria contorta*, *Gervillia praecursor*, *Alectryonia haidingeriana*, *Myophoria napengensis* and *Pecten quotidianus*. Bronnimann et al., (1975) describe that the involutid foraminiferal fauna (such as *Involutina gaschei*, *Involutina tenuis* and *Trocholina pernodiscoides*) especially small miliolids and Nodosariids are not only the first definite record of UpperTriassic foraminifera from Burma, but also the first in the whole of Asia outside Iran.

In the study area, the age of the Napeng Formation designated as Late Triassic (Rhaetic) age on the basis of stratigraphic position and faunal content. There is no direct contact between the Napeng Formation and the overlying Hsipaw Redbeds. Thus, Jurassic Redbeds might be rest unconformably on the Napeng Formation.

Discussion

Napeng- Namon area is situated about 7 miles south-east of Kyaukme, northern Shan State. The stratigraphic succession of the Napeng-Namon area are

2. Napeng Formation (Late Tirassic) 1. Nwabangyi Dolomite Formation (? Late Permian-Middle Triassic)

Nwabangyi Dolomite Formation is mainly composed of whitish grey to grey, medium to thick bedded, highly brecciated dolomitized turbidite limestone, clastic limestone (calcarenite and calcirudite), highly brecciated dolomites, dolomitic limestone with locally developed oolitic limestone and light grey to dark grey, thick bedded to massive, fine-grained limestone. On the basis of lithologic character and faunal assemblages, Nwabangyi Dolomite Formation indicates? Late Permian to Middle Triassic. It may be accumulated in the slope apron, to warm, moderately agitated, shallow marine environment passing upward into tidal flat (or rimmed-shelf carbonate platform with shallowing upward). This unit is unconformable contact with overlying Napeng Formation.

Napeng Formation is mainly consisted of yellow to buff highly fossiliferous siltstone, such as pelecypods and gastropods, siltstones variegated shale, clay, marl, marly, limestone, arenaceous limestone, calcareous mudstone, argillaceous limestone intercalated with shale and silty shale and thick bedded argillaceous limestone. The lithologic character, faunal assemblages and sedimentary structure indicate that Napeng Formation is Late Triassic (Rhaetic) and it may be possibly deposited in shallow marine, tidal flat.

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