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Publication Type	Local Publication
Publisher (Journal name, issue no., page no etc.)	Banmaw University Research Journal, 2010, Vol. 2, No. 1
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Preliminary Study on Geology of Khwekha-Helok Area, Kalay and Falam Townships

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ABSTRACT

The study area is situated on the eastern flanks of the Chin Hills, about 20 km southwest of Kalaymyo. This area is generally trending SEE-NWW forming a north-south dipping isoclinals structure. In the study are, there are two main rock units are exposed; metasedimentary rocks and igneous rocks. Among the metasedimentary rocks, the schist unit is dominant that are quartz-rubellite schist, quartz-mica schist, hornblende schist, hornblende-epidote schist. The quartzite is exposed as a minor amount. These metasedimentary rocks are dated as Upper Triassic or older and probably derived from the ophiolite rock suite (basic and pellitic rocks). The igneous rocks units are mainly ultramafic rocks that comprise serpentinite, harzburgite and dunite. These ultramafic rocks intrude the metasedimnetary rocks and the age of intrusion may be late Cretaceous.

I. Introduction

It is situated between Latitude 22º 59´ and 23º 01´ N and Longitude 93º 55´ and 94º 03´ E, and lies one inch topographic map 84 E/ 16.

The Webula Massif forms a prominent topographic feature on the eastern flanks of the Chin Hills, 20km southwest of the Kalaymyo (Fig. 1). Webula ultrabasic massif lies within the eastern part of the Indoburman Ranges. The exposed rock units are rare because of very dense forest and thick soil covers. The regional survey related strong nickel, chromium and sporadic copper anomalies around the ultrabasic Webula Massif (U.N, 1979). The study falls within the Western Ophiolite Belt that is located between Indo-Burman Range and Western Range (Win Swe, 1981; Hla Htay, 2002, 2004).

The main purposes of field works are to be complete the imperfect pervious geological reports and to investigate natural resources in this area. Therefore, in studying this area, we made the geological mapping, classifications, correlations of stratigraphic and the position of the rocks.

II. Regional Geologic Setting

The study area falls within the Western Ophiolite Belt that is located between Indo-Burman Range and Western Ranges (Hla Htay, 2002, 2004) and Naga Hill Line (Hutchison, 1975). This ophiolite belt extends from Naga Hill in the north, through Chin hills of Mwetaung, Webula, Kanpetlet and to Rakhine ranges of Minbu, Mindon, Laymyethna, Ngathaing Chaung in the south forming a narrow linear belt about 1300 km in length and about 20 km in width.

Webula ultrabasic massif lies within the eastern part of the Indoburman Ranges which consists of a tightly folded and highly deformed succession of Triassic age (Pane Chaung Group) comprising sandstones, turbidites and mudstones mostly of flysch facies (Fig. 3) and local metamorphic rock overlain by scattered pillow lavas and ultrabasic bodies. Webula massif is mainly composed, of serpentinite, harzburgite, and dunite. Coarse-grained dark-coloured, harzburgite is the most abundant rock type. Comparison with other ultrabasic bodies in the Ranges suggests that the Webula ultrabasic is a thick sheet lying in possible tectonic contact on the Pane Chaung Group.

A northerly-trending brecciated zone was found within the Webula massif, southwest of Suang Douhlong peak; in addition, joints, fractures and slickensides are also common. In the south, a small extension of ultrabasic body is in tectonic contact with the metamorphic rocks, which comprise quartz-mica schist, piedomontite schist, and amphibolites.

Fig. (1) Panoramic view of the Khwekha-Helok area

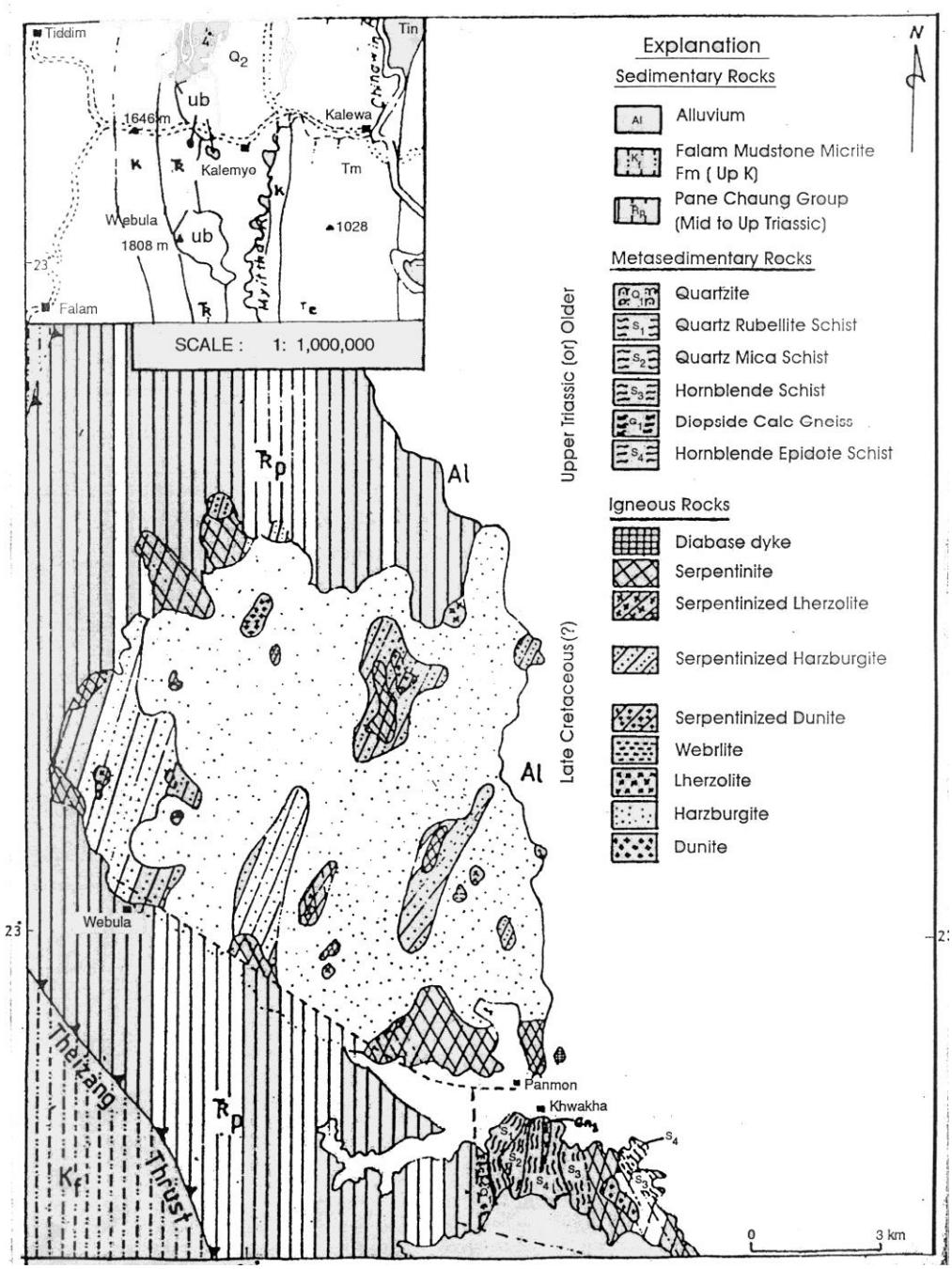

Fig. (2) Geological Map of the Wabula-Khwekha area, Kalay and Falam Townships (After, U.N., 1979)

III. Stratigraphy

The rock units shown in the rock succession are recognized and mapped in this focusing area. They composed mainly of metasedimentary and igneous rocks, formed at the differing geological episodes. Various schist, quartzite and serpentinite bodies are well exposed in Khwekha Taung and Helok Taung. The geological map of the study area is shown in figure (2).

Although more field data would be necessary for confirmation, the rock unit of the study area is shown in table (1).

Table (1) The exposed rock units of Khwekha-Helok area

Rock Units	Geological Age
Sedimentary Rocks Alluvium	Sub-recent
Metasedimentary Rocks Quartzite Quartz-rubellite Schist Quartz-mica Schist Hornblende Schist Hornblende-epidote Schist	Upper Triassic (or) Older
Igneous Rocks Serpentinite Harzburgite Dunite	Late Cretaceous

Sedimentary rocks

1. **Alluvium**

Alluvium almost covered the western part of the area. They lie on the agglomerate, flysch facies and sandstones. The age of the alluvium may be regarded as sub-recent.

Metasedimentary rocks

2. **Quartzite**

Quartzites occur mainly in the western part of the study area. Mineral constituents are mainly quartz (> 95%), and feldspar and mica contain as accessory minerals (< 5%). This rock is hard, compact, and fine-grained. It is grey when fresh and reddish brown when weathered. Milky quartz veins and stringers are seen in the rock units. The flakes of micas are randomly oriented in this rock unit.

3. **Quartz-rubellite Schist**

This rock unit is found in the western part of the Khwekha Taung. It contains essentially quartz, rubellite, mica and feldspar minerals. It shows alternate bands of

light and dark colour that are rich in quartz and feldspar, and rich in mica and rubellite respectively.

4. **Quartz-mica Schist**

Quartz-mica schist is mainly found on the western part of Khwekha Taung. The essential mineral constituents are quartz, mica and feldspar. This rock unit is dark grey in appearance and fine- to coarse-grained (Fig. 4). This rock unit shows thinly lineation.

5. **Hornblende Schist**

These rocks are mainly found in the middle and northern part of Helok Taung. Mineral constituents are hornblende, quartz, feldspar, mica and other accessory minerals. This rock has thinly lineation. This unit shows alternate bands of light and dark colour. Dark bands are rich in hornblende, biotite, and light bands are rich in quartz and feldspar. On fresh surface, this rock displays light grey.

6. **Hornblende-epidote Schist**

These rocks are mainly found in Helok Taung. Mineral constituents are hornblende, epidote, mica, quartz, feldspar and other accessory minerals. This rock has also thinly lineation (Fig.5).

Protolith and Probable Age

On the basic of the metamorphic mineral assemblage, these metamorphic rocks are derived from the basic rocks and pellitic rocks (ophiolite). The metamorphic rocks fall within the greenschist to amphibolites facies. The age of the metasedimentary rocks is assigned to Upper Triassic or Older (U.N., 1979).

Igneous rocks

Webula massif is mainly composed of serpentinite, harzburgite, and dunite (Fig. 6). These rocks are exposed as nearly circular in shape. These ultrabasic bodies intrude the Triassic of older metasedimentary rocks. The outcrop of serpentinite intrusion occurred near the west of Hakhalay. Coarse-grained dark-coloured harzburgite is the most abundant rock type.

7. **Serpentinite**

A serpentinite body is exposed in eastern part to middle part of Khwekhwa Taung. They show varying degrees of non-foliated form and dark green to black. This rock consists of serpentine and texture may be lamellar or with zonation. It is formed by the late stage hydrothermal alteration of ultramafic rocks. Anhydrous magnesium

and calcium-magnesium silicate minerals such as olivine, pyroxene, peridotite and picrite are found. The rocks are commonly found in ophiolite complexes.

8. **Dunite**

Dunite occurs comparatively few in this region. This is a massive, fine-grained phaneritic rocks, always more or less serpentinitized. It colour varying from yellowish green to dark green. The rocks mainly consist of olivines that are more than 95% of the whole rock. Light yellow, fine-grained dunite, frequently affected by serpentinization, and contains chromite grains. Chromites occurrences are found in dunite and serpentinite as podiform.

9. **Harzburgite**

Harzburgites are coarse-grained and dark colour and which contain olivine, enstatite and chromite. Olivine (60%), orthopyroxene and serpentine are its main mineral constituents. Basal harzburgite is usually considered as residual mantle material from which oceanic basaltic magama was bled (Dickinson, 1972 in Hutchison, 1975).

Probable Age, Mode of occurrence and emplacement

The intruded ultramafic rocks are dated as the late Cretaceous and they were generated as magmatic rock in or before the Jurassic, but emplaced at their present position as cold bodies in the Late Cretaceous (U.N., 1979).

IV. Geological Structures

Webula ultramafic massif lies within the eastern parts of the Indoburman Ranges which consist of a tightly folded and highly deformed. The general structural trend of the present area is approximately running in the SEE-NWW direction. However, this general trend swings to NE-SW due to the intrusion of serpentinite rock respectively. The prominent structural features are found to be dipping towards NE at an average dip of 50°.

In some places, the minor structures such as foliation and lineation are rather found in rock exposures. These rocks were regionally folded into tight isoclinals folds. They were also subjected to allow to very low grade regional metamorphism and locally associated with ultramafic rocks.

Fig. (3) Folded flysch sandstone of Pane Chaung Group at the base of the Wabula Taung

Fig. (4) Quartz mica schist at Khwekha Taung

Fig. (5) Hornblende-epidote schist at Khwekha Taung

Fig. (6) Massive ultramafic body extruded into the metasedimentary rock units exposed at Helok Taung

V. Economic Geology

The various rock units of the Khwekha-Webula area are economically very important for the uses of the human beings. The usefulness of the rock units of the study area are reported as the followings.

1. Copper is one of the very essential minerals in modern industry, Most wires and electrical equipment are mode of pure copper, and alloy copper is used chiefly as brass and bronze.

2. Nickel-Chromite is very useful for made of aeroplane, ship and also used for produces of steel and cast irons.

The geomorphological conditions in Webula are not favourable for the formation of nickel silicate or laterite deposits, and the well-exposed and scattered chromite occurrences are too small to be of economic interest. The high copper values are associated with chromite and do not indicate any discrete copper mineralization.

Acknowledgements

We would like to thank to Rector Prof. Myint Swe, University of Kalay, for his kind permission to field trip. We want to special thanks to personals for their valuable supporting throughout our field trip.

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