

# General Geology of the Singu-Kabwet area, Mandalay Division

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## Abstract

The study area is located between Singu and Kabwet in Mandalay division. It is situated between north latitude 22° 32' to 22° 45' and east longitude 95° 56' to 96° 2' and covers part of 93-B/2 and 84-N/14 one inch topographic maps.

The study area lies in Inner-Burman Tertiary Basin (the Central Cenozoic Belt) of Myanmar. The basin is relatively a low lying province between the Sino-Burman Ranges to the east and the Indo-Burman Ranges to the west. The northeastern margin of the study area is occupied by Eastern Highland which is built up by medium to high-grade metamorphic rocks of Mogok series which extend northward into Yunan. In the Kabwet area, the older lava, or amygdaloidal basalt is interbedded with the Irrawaddian rocks. The southwestern fringe of the study area is bounded by Irrawaddy formation. The younger lava, or Mugearite-basalt is confined to the south of the river Ayeyarwaddy stretching from opposite the village of Kabwet as far as the town of Singu.

**Key words:** Inner-Burman Tertiary Basin, Sino-Burman Ranges, Indo-Burman Ranges, amygdaloidal basalt

## Introduction

The study area is situated between Singu and Kabwet in Mandalay division. It is bounded by north latitude 22° 32' to 22° 45' and east longitude 95° 56' to 96° 2'. This area lies on one inch topographic maps of 93-B/2 and 84-N/14. It covers approximately 100 square miles with 12.5 miles long and 8 miles wide. Some places can be reached by car and the others can be reached by motor-boat. The location map of the study area is shown in figure 1.

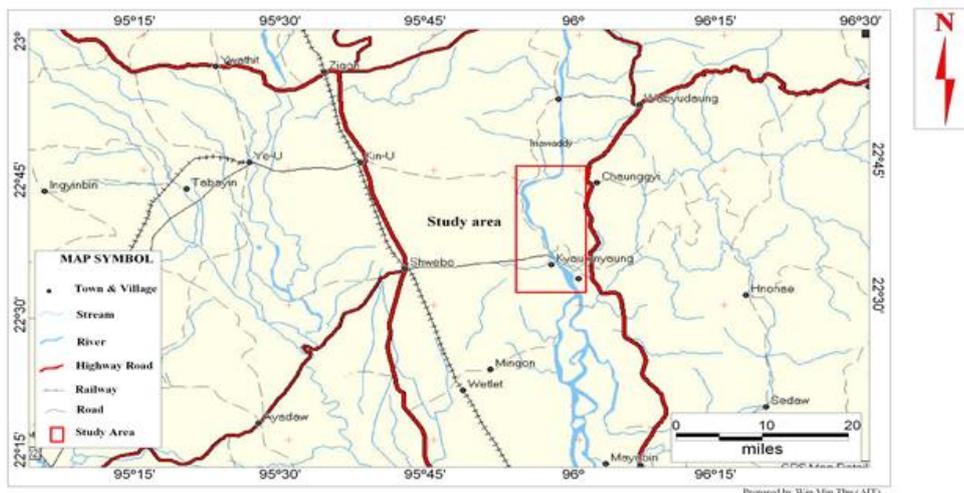


Figure 1. Location Map of the Study Area

## **Regional Geologic Setting**

There are four geotectonic units in Myanmar (Chhibber, 1934 and Bender, 1983). From east to west, they are the Sino-Burman Ranges (the Eastern Highland), the Inner-Burman Tertiary Basin (The Central Cenozoic Belt), the Indo Burman Ranges (the Western Ranges) and the Rakhine Coastal Plain. The study area is in Inner-Burman Tertiary Basin of Myanmar. The basin is relatively a low lying province between the Sino-Burman Ranges to the east and the Indo-Burman Ranges to the west.

The northeastern margin of the study area is occupied by Eastern Highland which is built up by medium- to high- grade metamorphic rocks of the Mogok Series which extends northward into Yunan. These metamorphic rocks have been interpreted as Archean age (Chhibber, 1934). The southwestern fringe of the study area is bounded by Irrawaddy Formation.

In the Kabwet area, very decomposed lava, described by Chhibber, 1934 as the "older lava" occurs interbedded with the Irrawaddians and is also involved in the folding. Where it was traced on the western side of the anticlinal fold it dips very steeply, but is much better displayed on the eastern side, where it forms a long and conspicuous scarp. The younger lava, or Mugearite-basalt is confined to the south of the river Irrawaddy. It forms a roughly horizontal sheet resting on the denuded edges of the folded Irrawaddian rocks. The eruption evidently took place through a fissure or fissures and the lava form a well-marked plateau.

## **Previous Works**

Chhibber (1934) investigated the igneous rocks of Kabwet areas, Shwebo District, and Singu lava, Mandalay District. He made fairly detailed studies of basalts in these areas. He also described the origin, the environment of eruption, and the trend of igneous activity of this area. Pascoe (1963) also expressed that the surface of lava plateau of Singu is a flat plain, 150 ft above the Ayeyarwaddy River, with a very gentle slope. The extrusion of the younger lava took place near the Letha Taung. Friedrich Bender (1983) stated the basalts lava from the area around Kabwet and Singu, east of Ayeyarwaddy River with reference to Chhibber (1934). Myint Lwin Thein et al. (1990) stated that Singu basalt is vesicular basalt ejected along the fissures and floods the surroundings. Bertrand et al. (1998) also investigated that the Singu fluid volcanic flows,

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north of Mandalay, that poured out from cracks along the Sagaing fault. Lava flows have been subsequently offset by the dextral motion of the fault. Win Swe et al. (2008) also stated that olivine basalt of Quaternary age extruded the Sagaing Fault zone and formed a low plateau of considerable dimension in Singu area, some 40 miles north of Mandalay. A displacement, ~203-km, was proposed by Myint Thein et al., (1991) on the basis of the off-set of Mogok Metamorphic rocks on the fault between Sagaing and the Indaw-Katha area, 100 to 150 km by Bertrand and Rangin (2003) from the offset of a small basalt plateau at Singu, north of Mandalay, and ~333 km by Curray (2005) on revising his older data together with new information of his own and of others.

### **Geological Investigation**

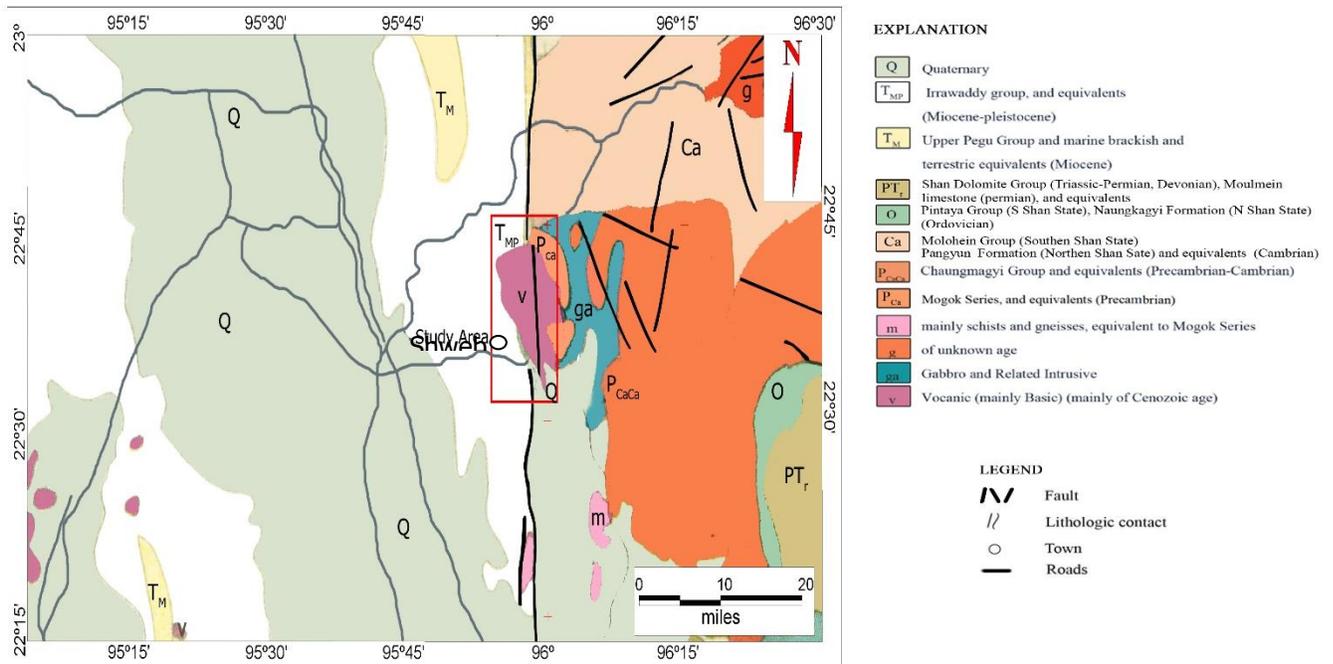
Due to the lack of detailed geological map of the study area, mapping is carried out during the field season and the representative samples of rocks units were collected. The sample localities, lithologic boundaries and distinctive structural positions are located by using GPS. 120 thin-sections prepared from the representative samples collected from the area are studied under the research-type petrographic microscope to yield the information on petrogenetic consideration.

### **Distribution of Rock Units**

The basaltic rocks are well exposed in Letha Taung, Minban Taung, Yemyet village, Shwegyin-Kabwet area, Ngapyin-in village & Yeshin village. The rock sequence of the presented area was established by (Chhibber, 1934). According to him, they have been described (in ascending order) as follow:

- Alluvium (Recent)
- The Younger lava of Singu (Recent)
- "Irrawaddian" sands interbedded with the older lava (Tertiary)
- Mogok Gneisses and Crystalline Limestones. (Archean)

The generalized regional geological map of the study area is shown in figure 2.



Figure(2) The generalized regional geological map of the Singu-Kabwet Area, Mandalay Division (After Bender, 1981)

### Distribution and Stratigraphic Relationship

#### Basement rocks

Basement rocks in this area are Mogok Gneisses and Crystalline Limestones. They are well exposed about one mile Northwest of Nweyon (N 22° 41' and E 96° 00') to Chaunggyi. The age of the basement rocks of the area is Archean (Chhibber, 1934).

#### Irrawaddy Formation

In the study area, the Irrawaddian sandstone is exposed along a stream at the South of Chaungthale village (N 22° 43' 182" and E 95° 58' 871") (Figure 3). This rock unit is also located between Chaungthale and Shwegyin villages. (Figure 4). This formation is composed mainly of light yellow to buff, thick bedded to massive friable sandstones. They are interbadded with a few clay/ mud beds. The age of this formation is Miocene to Pliocene. These Irrawaddian sediments are unfossiliferous.

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Figure (3) Thick bedded to massive Irrawaddian Sandstones expose along a stream at the South of Chaunghale village (N 22°43' 182" and 95° 58' 871")



Figure (4) Medium to thick-bedded sandstones of Irrawaddy Formation between Chaunghale and Shwegyin villages (N 22° 44' 481" and E 95° 58' 376")

### **Older Lava**

The most interesting and remarkable basaltic rocks are exposed near the Shwegyin Village (Figure 5). This rock unit also located near the Ingadi village, the eastern bank of the Irrawaddy River, is the lava which occurs interbedded with the Irrawaddian rocks (Figure 6). These older basaltic rocks are

hard, compact, usually dark grey and fine grained. They commonly show amygdaloidal structure. Some are vesicular.



Figure (5) Numerous floats of basalt along the Irrawaddy river near the Shwegyin village (N 22° 44' 155" and E 95° 52' 897")



Figure (6) Interbedding of basalts and sandstones of Irrawaddy Formation near the Ingadi village (N 22° 38' 231" and E 95° 56' 526")

### **Younger Lava**

The younger lava or Mugearite-basalt is confined to the south of the River Irrawaddy, and extends from opposite the village of Kabwet as far as the town of Singu. It forms a roughly horizontal sheet resting on the denuded edges of the folded Irrawaddian rocks. This younger lava is remarkably fresh and unaltered appearance. The lava plateau is covered with a forest of tall trees and one might be

standing on a flow of lava scarcely yet cool. In places it is very vesicular, elsewhere compact. It is believed that the eruptions of lava occurred through fissures and one of them passed through the highest point of Lethataung (1674 feet), from which the lava slopes (Figure 7). The younger lavas are exposed throughout the study area.



Figure (7) Viewing to northern part of the Letha Taung

In the central part of the study area, the vesicular olivine basalts are well exposed around the Yemyet village, one and half mile west of Mandalay-Mogok car road (Figure 8). They extensively expose along the stream from Yemyet village to the Lethataung (Figure 9). At the top of the Letha Taung and Mhan Taung (1667'), half mile north-east of Letha Taung, these rocks are well exposed (Figure 10). This vesicular olivine basalt is very hard and compact, very fine grained and light grey on fresh surface. The vesicles are filled with soil, calcite and some are empty (Figure 11) (Figure 12).



Figure (8) Outcrops of vesicular basalts on the hills near the Yemyet village



Figure (9) Floats and exposures of vesicular olivine basalt along the stream between Yemyet village and Letha Taung



Figure (10) Outcrops of vesicular olivine basalts at the top of the Letha Taung



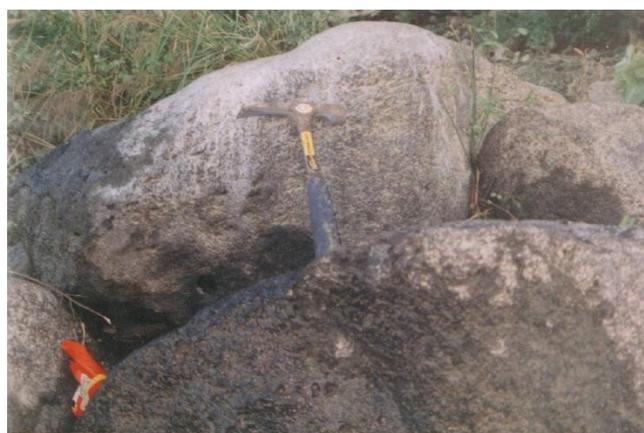
Figure (11) An outcrop of vesicular olivine basalt beside the stream at the base of the Letha Taung



Figure (12) Photograph shows calcite filling in the vesicles of the basalt

In the northern part of the area, the vesicular basalts crop out along the hill ranges from north of the Letha Taung to South of Shwegyin village. A small exposure can be found between Irrawaddy river and Letha Taung. These basalts also crop out along the hill ranges, two miles south-east of Shwegyin village.

In the southern part of the area, these basaltic rocks extensively crop out at Kyaukphyu Taung, Setkya Taung, and Minban Taung. They are well exposed around the Wettogon village. The vesicular basalt also extensively exposes along the Ngapyin-in village to Yeshin village to Minban Taung. This basalt forms as a flow and covers as a flat top at the Minban Taung. This rock is hard and compact. It displays grey to dark-grey color on fresh surface. (Figure 13).



Figure(13) An outcrop of vesicular basalt between Ingadi and Ngapyin-in village

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