

Geology and Gold Mineralization of the Yamethin Area, Yamethin Township, Mandalay Region

Nay Myo *

Abstract

The research area is situated about 8 miles (12.87 km) east of Yamethin and it occupies the western marginal zone of the Shan Plateau, covering about 24 square miles (62.2 km²). The area is mainly composed of metasedimentary rocks and granites. The metasedimentary rocks include metamorphosed Lower Paleozoic rocks and they are intruded by two types of granite; porphyritic and non-porphyritic biotite granite. The Lebyin Group consists of mudstone, pebbly graywacke and slate unit and exposed in the eastern and northeastern part of the area. The metamorphosed Lower Paleozoic rocks consist of three rock units: M₁ (calc silicate rocks, marble and skarn), M₂ (Metagraywacke and phyllite), and M₃ (mica schists, quartzite and gneisses). The granites are of two types; porphyritic biotite granite and biotite granite. The radiometric dating on granites emplacement is possibly Cretaceous to Early Eocene. Gold and pyrite bearing quartz veins are encountered in slate and mudstone units of Lebyin Group.

Introduction

Location and Size

The study area is situated about 8 miles (12.87 km) east of Yamethin Township, Mandalay Region. It lies between Latitude 20° 24' N to 20° 29' and Longitude 96° 16' E and 96° 22' E. The area is bounded by vertical grids 76 to 85 and horizontal grid 74 to 84 of one inch topographic map sheet No. 93 D/7 of Burma Survey Department (Figure 1). The area extends about 6 miles from east to west and 6 miles from north to south, covering about 24 square miles (62.2 km²).

Accessibility

The study area can be reached by car or by train through the year. One can reach Yamethin by car or by train and to the study area by trolery in dry seasons.

Physiography

The western part of the study area is low land and the eastern and northern parts of the study area are very rugged terrain. Most of the streams run from N to S in direction. The major streams of Ngabindat chaung, Labyu chaung, Kadut Aing chaung are running N-S direction. The Chaungbya chaung runs SE to NW direction (Figure 2).

Previous Works

Chhibber (1934) described the geology of Burma and the mineral resources of Burma (Myanmar). Aung Myint Thein and Myo Min (1973) regarded the geology as the mineral resources in the eastern parts of Pyawbwe, Yamethin and Tatkon Townships. Bender (1983) regarded the metasedimentary rocks of Yamethin in east area as Lebyin Group of Carboniferous age. Tin Tun (1990) stated the geology and mineral resources of Indaing – Nankwe area, Yamethin Township. Mitchell, et al (2004) described that the Modi Taung – Nankwe gold district, slate belt, central Myanmar, mesothermal veins in a Mesozoic orogen.

Aung Zaw Myint (2006) regarded the application of remote sensing techniques with special emphasis on the geology of Modi Taung area, Yamethin Township.

* Associate Professor, Department of Geology, Dagon University

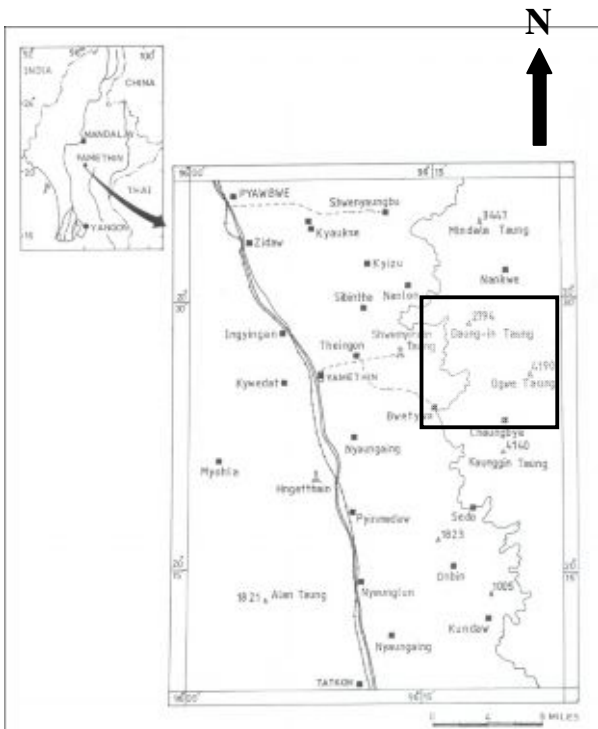


Figure 1. Location Map of the study area



Figure 2. Topographic map of the study area

Regional Geologic Setting

The regional geologic setting of Tatkon, Yamethin and Pyawbwe townships including the study area is shown in Figure 3. Searle and Haq (1964) stated that metamorphic and igneous rocks of the study area correspond to the part of Mogok metamorphic belt. This belt occupies the 10 to 25 km wide, west of the slate belt and continues beneath the alluvial plain to or beyond the Sagaing Fault. This belt consists of metamorphic rocks of phyllite, schist, gneiss and calc-silicate rocks and intruded by calc-alkaline dykes and granites. The slate belt in Central Myanmar consists very largely of argillaceous rocks, and consists of two formations; the Kogwe mudstone and the Polokkale Pebbly wacke of Burmese National Committee (1977).

Rock Sequences

The rock sequences of the study area are shown in Table 1. Igneous rocks of this area can be classified into two major types as porphyritic biotite granite and non-porphyritic biotite granite. Leucogranite, microgranite and pegmatite are found as dykes and veins. Age of granitic emplacement is Cretaceous to early Eocene.

The metamorphosed Lower Paleozoic rocks (Mogok metamorphics) are mainly composed of medium to high grade metamorphic rocks and they are tightly folded. It consists of mica schist, quartz-sericite schist, gneiss, banded gneiss, skarn and calc-silicate rocks.

The Mergui Group (the Slate Belt in Central Myanmar) consists of two formations; The Kogwe Formation of pebbly mudstone and Polokkale pebbly graywacke, Carboniferous in age.

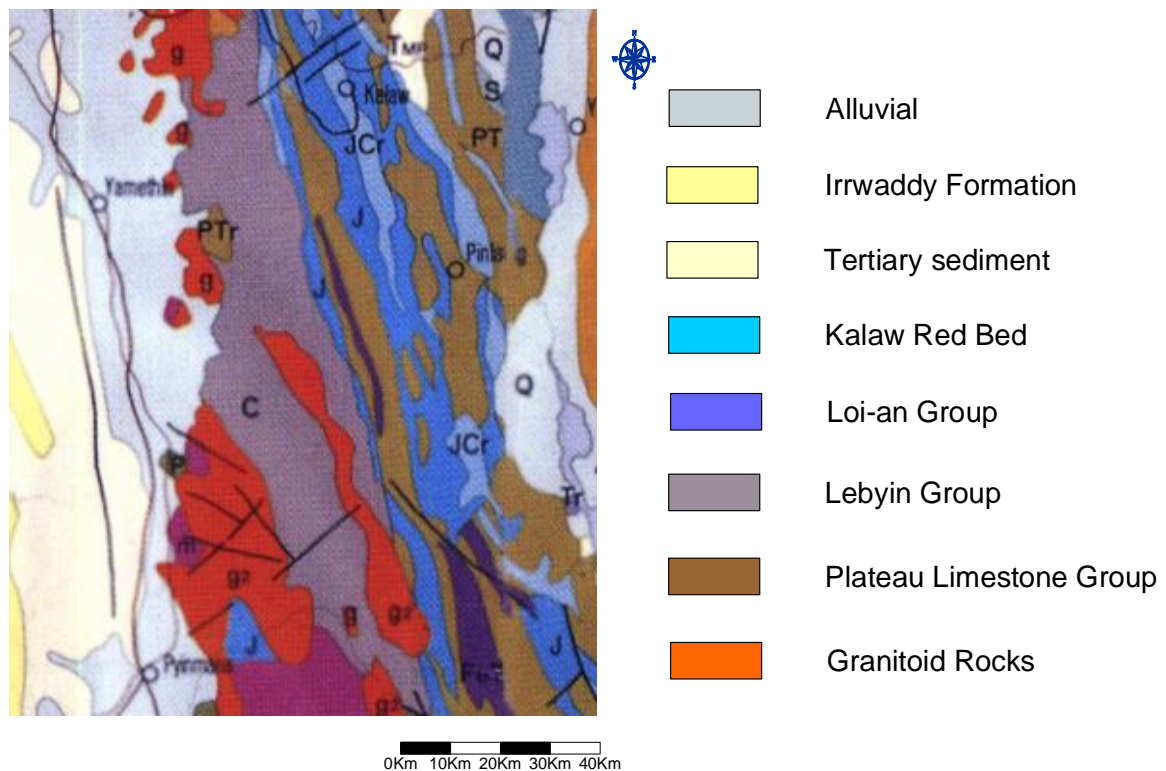


Figure 3. Regional Geological Map of the study area (After Bender 1983)

Gold Mineralization

Tectonic Evolution

The mineralization took place in early Jurassic following collision of Myanmar on the passive western margin of a Greater Shan-Thai continental block with an oceanic arc on the overriding plate to the west.

The Shan Plateau sequences, Slate Belt and Western Myanmar formed a single Greater Shan-Thai continental block in the Permian and Triassic. The Plateau Limestone deposited unconformably on the Mergui Group.

In the Late Triassic an ocean basin to the west of Myanmar was subsiding westward beneath an oceanic or supra-subduction zone island arc (Figure 4).

As the ocean closed, continental derived turbidites were overridden by the ophiolite and thrust eastward onto passive continental margin.

During convergence, the eastern boundary of Mergui Group beneath the Plateau Limestone was activated as Ngapyaw Chaung Thrust.

The Triassic and older Plateau sequences beneath the Mergui Group was tectonically thickened on structurally lower thrusts surfacing progressively further east, resulting in metamorphism of deeper parts of the thrust stack to form the Mogok metamorphics.

The eastward subduction of oceanic lithosphere beneath Myanmar developed the magmatic arc with calc-alkaline dykes and plutons in the Mogok metamorphics and in the overlying slate belt where gold mineralization associated with vein quartz.

Vein Distribution

Most of the quartz veins associated with gold mineralization is all hosted by Kogwe mudstone and slate of Lebyin Group. Auriferous veins occur at Payagon, Ogwe area and upstream of Lebyu chaung. Most of veins trend NNW-SSE in direction (trending approximately 150° or 170°). Each vein system consists of either single vein or multiple parallel veins separated by host rocks. The vein widths are around 1.5 feet and length of vein system demonstrated by aditing and close-spaced trenching is about 70 meter.

There are two generation of quartz; (1) early bulk quartz with white, often massive and barren; and (2) late grey quartz accompanied gold mineralization.

Gold mineralization occurs as disseminated and occupies the border of pyrite grains and fills cracks in pyrite. Variation in gold value reflects the nugget effect of pyrite-gold patches within the high-grade zone.

Within the upper part of the oxide zone, crystalline gold in leached boxworks and vugs, indicates supergene enrichment of pyritic layers.

Behaviour of Minerals and Elements during Gold Mineralization

Mineralization based on (1) bulk rock composition of host rock and (2) low salinity of the ore fluid. Mineralization corresponds to brittle-ductile transition under moderate confining pressure.

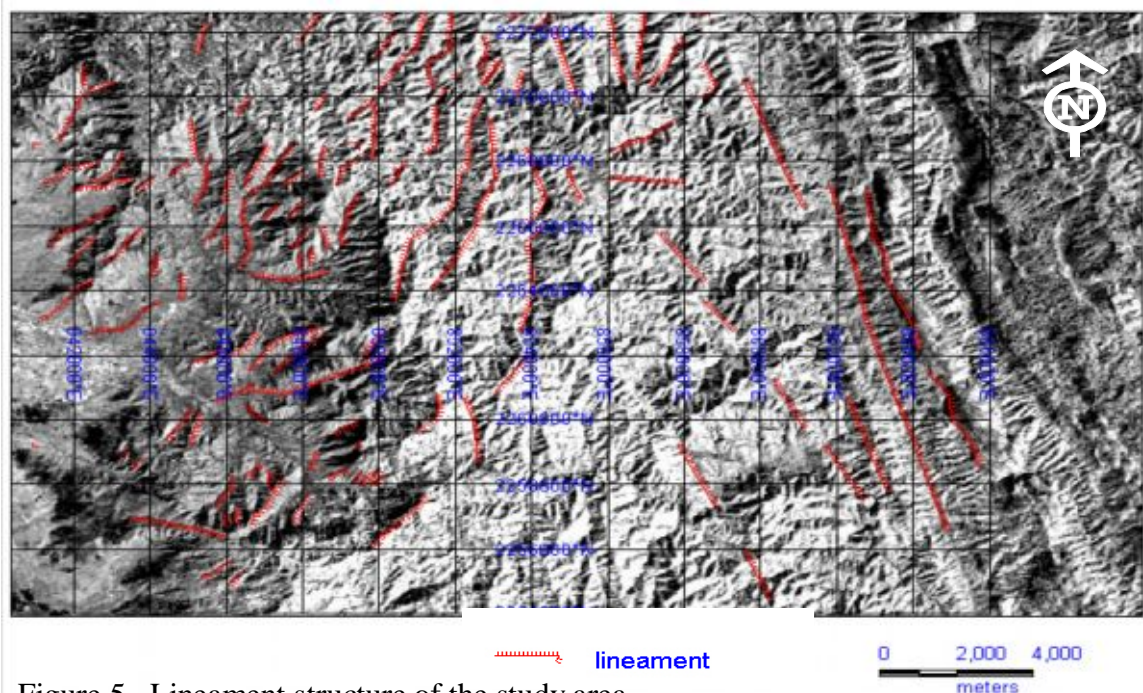


Figure 5. Lineament structure of the study area



Figure 6. Photograph showing mineralized quartz vein in Adit 7.
(Loc. 850806, near Thepyepin area)

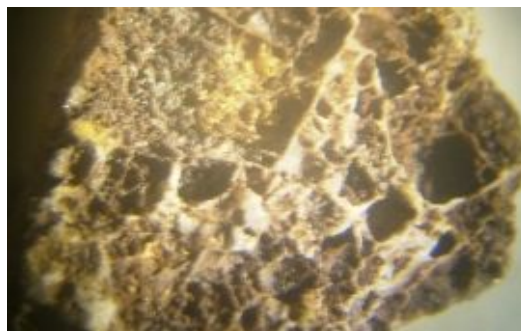


Figure 7. Boxwork texture of quartz vein and some free gold occurs in the cavities.
(Loc. 850827) Payagon village (x 20)

Conclusion

Slate belt provinces are concentrated in oceanic sedimentary units that have been deformed along continental margin. Many deposits are preferentially developed within relatively competent zone. Competent lithology within a few kilometer of the faults may impose structural traps for ore deposition. Intrusion bodies locate within 10-20 km of many deposits. Igneous activity is further evidence of hydrothermal event with the potential to drive ore fluid connection. Syntectonic plutonism within the belt is commonly good indication of thermal event that may have concentrated gold in veins. Slate belt gold deposits are inherent product of continental margin orogenesis. They form at the greenschist/amphibolite facies boundary. The significant volumes of high temperature, sulphur bearing fluids migrate into major conduits and gold bearing vein system will develop. The enrichment of CO₂, S, As, Au in adjacent wall rocks will typically provide the best evidence of nearly ore zone.

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