

FACIES ANALYSIS OF PYAWBWE FORMATION EXPOSED AT PYAWBWE - MINHLAGYIN AREA, MINBU DISTRICT, MAGWAY REGION, MYANMAR

Khin Hnin Swe¹, Khin San², Toe Toe Yi³, Aye Aye Han⁴, Thida Than⁵

Abstract

Pyawbwe – Minhlagyin area is located in Minbu Township, Magway Region. It is situated between North Latitude 19° 57' to 20° 02' and East Longitude 94° 37' to 94° 43' in one inch topographic maps of 84 L/12 and 85 I/9. The Pyawbwe Formation is characterized by thin to medium bedded, pale brown to bluish grey shale and mudstone with subordinate sandstone interbedded with buff coloured loose sand, laminated to large scaled cross-bedded, greenish grey silty clay and occasionally intercalated with hard sandstone bands. Gypsum, shell beds, lenticular and concretions are also observed. Pyawbwe Formation of the research area consists of at least 11 lithofacies and they are grouped into four lithofacies association: fan delta association, delta plain association, delta front association and prodelta association. Fan delta association is usually coarse grained resulting in higher sedimentation rate. Delta plain association may have occurred in swamp, marsh, lake and distributary channel area where are filled by overbank spilling of fine-grained material from the river during flood stages with quite energy condition. Delta front associations are present distributaries channel, subaqueous levee and distributary mouth bar. Prodelta is an environment where finer particles settle out from suspension and disperse over wide area by basinal processes. The lower part of Pyawbwe Formation is occupied by the wave and tidal influence delta front association. These include wavy laminated sandstone, laminated siltstone and clay, flaser and lenticular bedding of sandstone and shale. The middle and upper parts of Pyawbwe Formation are occupied by delta plain and prodelta. These include massive clay bearing burrow structure, shale intercalated with fossiliferous sandstone and sandstone intercalated with shale bearing gypsum.

Keywords: Minbu Township, Magway Region, Pyawbwe Formation.

^{1.} Demonstrator, Department of Geology, Bago University

^{2.} Professor and Head, Department of Geology, Pakokkku University

^{3.} Lecturer, Department of Geology, Magwe University

^{4.} Dr, Professor, Department of Geology, Bago University

^{5.} Demonstrator, Department of Geology, Bago University

Introduction

Location, size and accessibility

The research area is situated between North Latitude $19^{\circ} 57'$ to $20^{\circ} 02'$ and East Longitude $94^{\circ} 37'$ to $94^{\circ} 43'$. It extends about 10.4 km from east to west and 9.3 km from north to south, covering approximately 96.72 km^2 in area. It is situated in Minbu Township, Magway Region and falls in one-inch topographic maps of 84 L/12 and 85 I/9. The location map of the research area is shown in Figure (1).

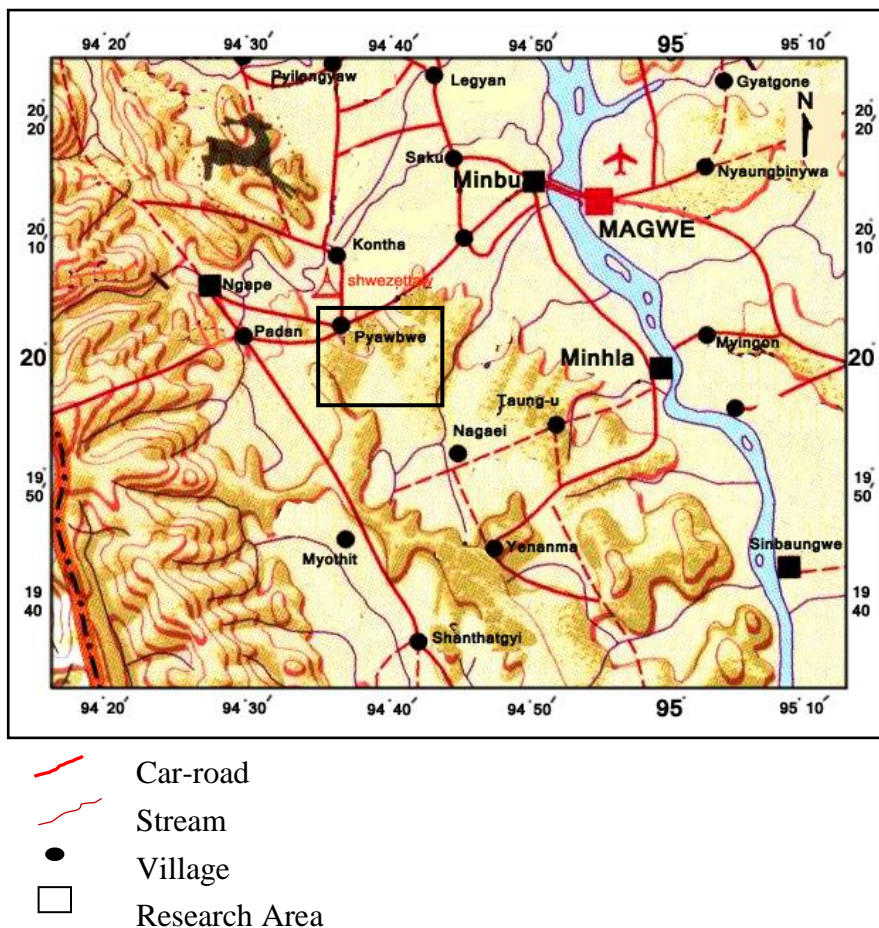


Figure 1: Location map of the Pyawbwe-Minhlagyin Area

Topography

The research area is represented by the rolling terrain topography and ranges of small hills are running from NNW-SSE direction.

Purposes of study

The purposes of the present investigation are as follows:

- (1) To describe detail geological map of the area
- (2) To carry out the facies analysis of the Pyawbwe Formation
- (3) To study the sedimentary structures of the area
- (4) To interpret the depositional environments and geological history of the area

Methods of study

Tape and compass method, Jacob staff and Brunton Compass method were used to measure thickness of individual beds, joints, folds and faults. The certain locations of outcrops were attained by GPS navigator and checked by intersection method. Both sandstone and shale samples and diagnostic fossils were collected, properly marked and carefully packed for detailed laboratory investigation. The observed datas were plotted on the base map and geological map was drawn by using field data and lithologic evidence. Finally the columnar section of Pyawbwe Formation was drawn manually with convenient vertical scale. The photos taken in the field are chosen for the interpretation of field evidence. Detailed studies of fossils were made to determine probable age of rock unit. The lithofacies were classified according to the facies code modified from (Miall, 1978 in Walker, 1992) on the basis of grain size, primary sedimentary structures and lithologic signatures.

Regional Geologic Setting

The research area is situated in the Central Cenozoic Belt of Myanmar (Maung Thein, 1976), a down faulted block (graben) in which several depositional basins and uplifts are found. The Central Cenozoic Belt can be subdivided into three basins: Chindwin Basin, Minbu Basin and Ayeyarwaddy Embayment; and four uplifts; Kumon Ridge Uplift, Wuntho Uplift, Salingyi

Uplift and Bago Yoma Uplift (Maung Thein, 1983). The basins are indeed broad structural basins (synclinal basins) which are separated from each other by the latitudinal highs, viz., N 22° high and N 19° high. The research area is located in south western part of the Minbu Basin of Central Cenozoic Belt. It has few hills which are of rolling terrain. Structurally, Minbu Basin is a south plunging syncline (Salin Syncline), measuring approximately 200 km in length, north south oriented and about 70 km in width. In the research area, the rocks are Oligocene to Miocene in age. The strata are trending NNW-SSE and dipping towards NE direction. Major tectonic structures are arranged parallel with the regional strike of the strata. The Miocene rocks of Upper Pegu Group are buff and light brown to grey hard sandstones and bluish-grey clay and also consist of fossiliferous sandstone band. Regional geologic setting of the study area and it's environ is shown in Figure (2).

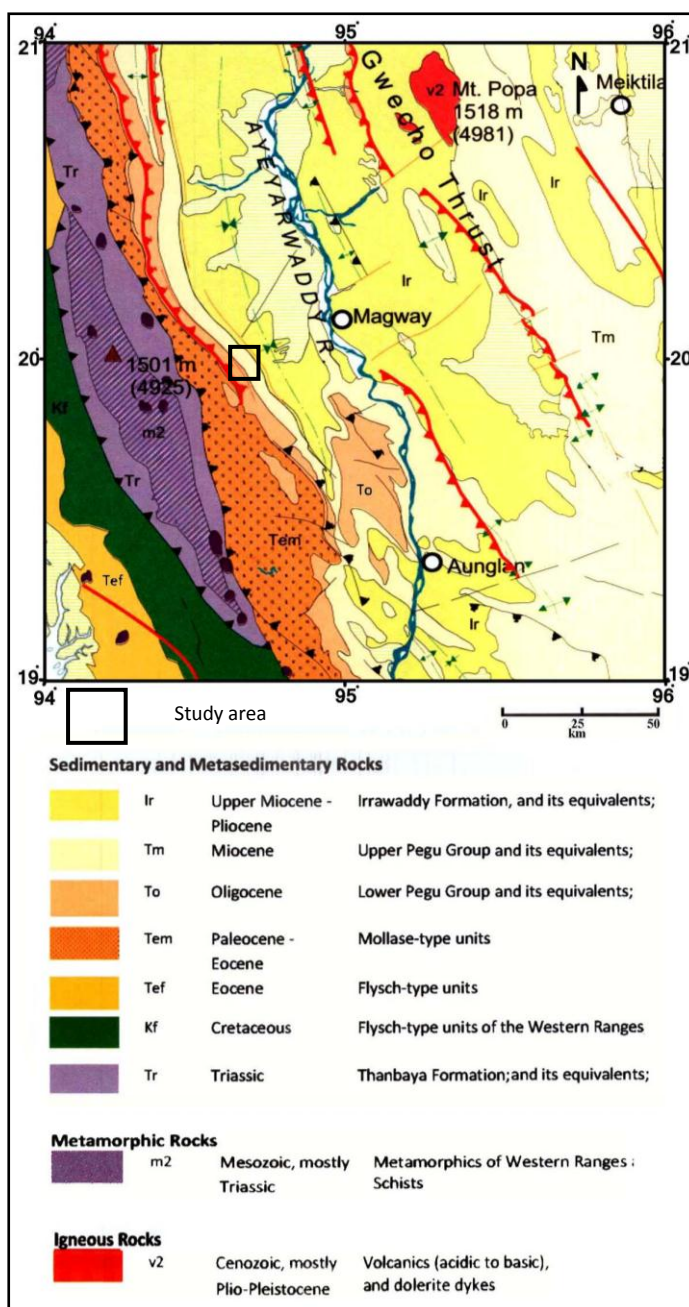


Figure 2: Regional Geologic Setting of the research area and its environs
Source: Geological Map of Myanmar (M.G.S, 2014)

Stratigraphy of Pyawbwe Formation

Name derivation

The term “Pyawbwe Clays” was first introduced by Lepper in 1933 for a succession with crops out near the Pyawbwe village (Lat. 20° 01' N, Long. 94° 38' E) in the Minbu Township, Magway Region. It is constituted of bluish grey sandy clays with subordinate sandstones and some conglomerates and disseminated gypsum plates. Later, Aung Khin and Kyaw Win (1969) gave the name "Pyawbwe Formation" on the basic of the same lithostratigraphic unit.

Distribution and thickness

The research area consists of the type locality of the Pyawbwe Formation. The rocks of Pyawbwe Formation are well exposed Pyawbwe village and along Padaung Chaung, in central part of the research area. The upper part of Pyawbwe Formation is cropped out near the Kayu Kan village (Kan thar ya ywathit). The lower part of this formation is observed near the Pyawbwe village. The correlation of the stratigraphic units of the research area with those of the other areas is shown in Table (1). Geological map of the research area is shown in Figure (3).

Table 1: Correlation of the stratigraphic unit of the research area with those other area

Age		Taungtalon area, Kyaukse District Myint Thein (1966)	The area between Padan & Kyaukpon Khin Aung Than (1983)	Chindwin Basin Maung Thein (2014)	Minbu Basin	
					Aung Khin & Kyaw Win (1969)	Pyawbwe- Minhlagingin Area (2015)
Pleistocene				Terraces		Maw Gravels
Pliocene		Thittawpya Sandstone		Irrawaddy Formation (Mingin Fm)	Irrawaddy Formation	Irrawaddy Formation
Miocene	L					
	M	Kabo Sandstone	Upper Paga Group	Shwethamin Formation	Obogon Formation	Obogon Formation
		Moza Formation				
	E	Taungtalon Sandstone		Natma Formation	Kyaukkok Formation	Kyaukkok Formation
		Shwetaung Clay		Letkhat Formation	Pyawbwe Formation	Pyawbwe Formation
Oligocene	L		Lower Paga Group	Tonhè Formation	Okhmintaung Formation	Okhmintaung Formation
	E				Padaung Formation	Padaung Formation
					Shwezettaw Formation	Shwezettaw Formation

Explanation



Break in the geologic time



Not exposed



Unconformity



Conformity



Uncertain

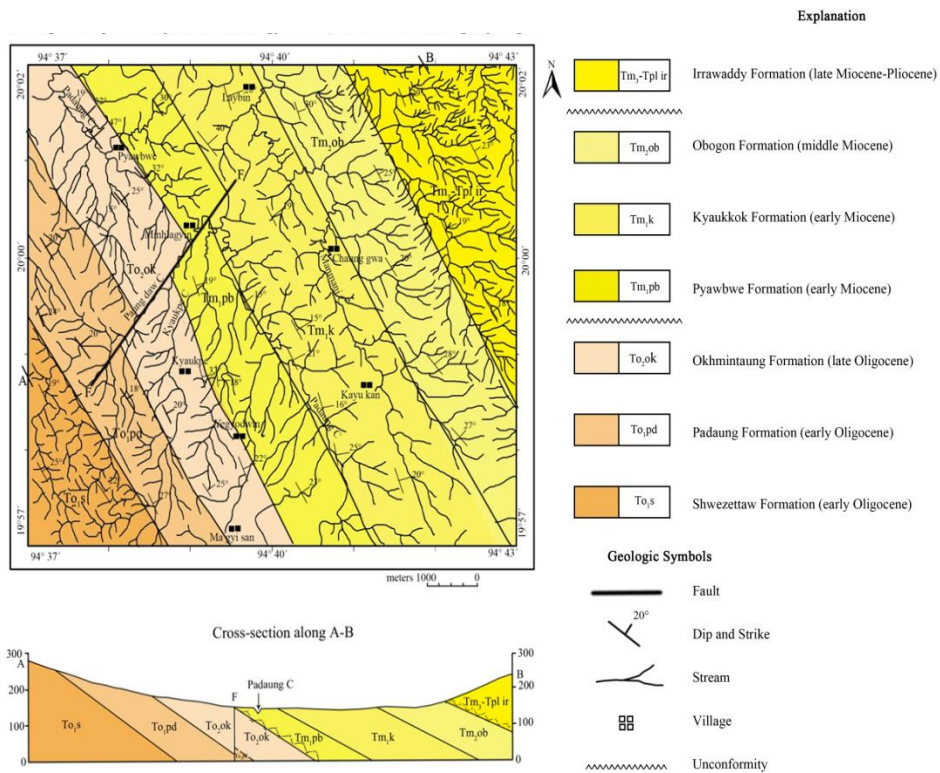


Figure 3: Geological map of the Pyawbwe-Minhlagyin area, Minbu District, Magway Region (Modified after D.G.S.E, 1982)

Lithology

Pyawbwe Formation is characterized by thin to medium bedded, pale brown to bluish grey shale and mudstone with fossiliferous sandstone interbedded (Figure 4) with buff coloured loose sand, laminated to large scaled cross-bedded, greenish grey silty clay and occasionally intercalated with hard sandstone bands. The lower part of this formation is especially thick bedded, fine to medium grained, bluish grey mudstone and shale intercalated with hard sandstone bands. Laminated to thin gypsum layers are numerous occurred on mudstone surface and sometimes shell beds are conspicuous. Lenticular, flaser, burrow and cross bedded structures are well seen along the railway road near the Pyawbwe village. Fossils are widely numerous and

locally present. In the middle part of this formation, the lenticular bedding in alternated sequence of sands and shales are also occurred (figure 5). Dark grey coloured, fine to medium grained indurated sandstone with conglomerate bands are also observed in this part. Iron concretions are occasionally found in this part. The upper part of Pyawbwe Formation comprises thin to medium bedded, fine-grained, light grey to bluish grey shale, and buff coloured silty clays interbedded with pale brown loose sand. The structures show flaser and planar cross beddings. Sometimes the shales in the upper part of Pyawbwe Formation describe fissile nature and hard and compact mudstone concretions are also observed.



Figure 4: Grey coloured, medium bedded, fine grained, hard and fossiliferous sandstone band of the Pyawbwe Formation (Lat. 20° 01' 10" N & Long. 94° 37' 20" E)



Figure 5: Lenticular bedding in alternated sequence of bluish grey shales and buff colour unconsolidated sandstone of Pyawbwe Formation (Lat. 19° 54' 51" N & Long. 94° 42' 57" E)

Nature of contact

The Pyawbwe Formation unconformably overlies upon the Okhmintaung Formation and was conformably overlaid by Kyaukkok Formation. The thickness of sand beds increase upward.

Fauna, age and correlation

The Pyawbwe Formation is fossiliferous in the present study area. Gastropods, Pelecypods and foram are the most common fauna in this formation. *Chione*, *Nucula*, *Corbula idonea*, *Conus*, *Liopeplum*, and *Nucella* indicate an Early Miocene age for the Pyawbwe Formation (Figure 6). It can

be correlated with the Letkhat Formation of the Chindwin Basin (Maung Thein, 2014) and Shwetaung Clay in the Taungtalon Area (Myint Thein, 1966).

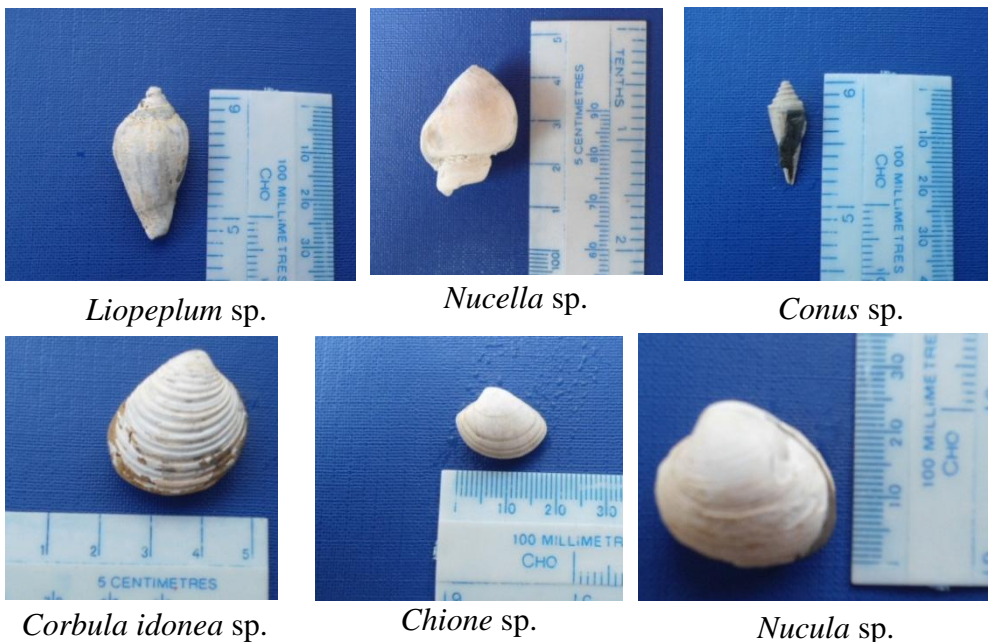


Figure 6: Index fossils in the clay of the Pyawbwe Formation

Facies Analysis of Pyawbwe Formation

General statement

Facies is a body of rock and is defined on the basis of its distinctive lithologic features including colour, bedding, composition, texture, fossils and sedimentary structures (Reading, 1981). Facies associations are more general in nature less influenced by local factors. Thus, a facies association can be used to interpret the regionalized depositional environment. The lithofacies were classified according to the facies code modified from (Miall, 1978 in Walker, 1992) on the basis of grain size, bedding nature, primary sedimentary structure and lithologic signature. They are described in order of decreasing grain size and bedding thickness. The present study area is mainly emphasized on the facies analysis of the Pyawbwe Formation due to lack of enough time.

Lithofacies of Pyawbwe Formation

In the research area, Pyawbwe Formation is exposed near the Pyawbwe village. This formation is mainly composed of shale/clay, sandstone, siltstone and mudstone with a combined thickness of 274.01 m. The stratigraphic measurement of Pyawbwe Formation was carried out along the railway road near the Pyawbwe village. It can be classified into 11 lithofacies according to the lithological and the structural characteristics of Pyawbwe Formation. The facies classification and their environmental interpretation are shown in Table (2). Columnar section of Pyawbwe sequence is shown in (Fig. a, b, c, d, e, f, g & h).

Facies (A) Pebbly Conglomerates

This facies contains pebbles and gravels bearing conglomerates. Grain sizes range from 0.3 cm to 5 cm in this facies. This facies mainly consists of quartz, chert, mud clasts and clay pebbles which are loosely consolidated in a silty clay matrix (Figure 7). Most of them are subangular to round. This conglomerate facies are yellowish brown to buff coloured. This facies is characterized by rhythmically coarsening upward nature.

Interpretation

This facies is interpreted as high energy debris flows by the rapid currents. The conglomerate facies is thought to be deposited in the fan delta environment.

Facies (B) Planar Cross bedded Sandstone

The facies is characterized by medium to large scale cross bedded (Figure 8), buff coloured, thin to medium bedded, medium grained sandstone. In this facies, fossil fragment and burrow structure also occurred.

Interpretation

Planar cross bedding is commonly found in migrating straight crested subaqueous dunes (Miall, 1978) of the active fluvial river channel. This facies is interpreted as distributary channel deposits (delta front).



Figure 7: Subangular to rounded pebble in pebbly conglomerate of Facies (A) (Lat. 20° 1' 17'' N & Long. 94° 37' 51'' E)



Figure 8: Planar cross bedded sandstone of Facies (B) (Lat. 20° 1' 17'' N & Long. 94° 37' 51'' E)

Table (2) Lithofacies Analysis of Pyawbwe Formation exposed at Pyawbwe-MinHlagyin Area

Sedimentary Facies		Lithologic Description	Interpretation	Facies Association
Code	Name			
A	Pebbly Conglomerate	Yellowish brown to buff coloured intraformational conglomerate, pebble and gravel, consists of quartz, chert, mud clasts and clay pebble, rhythmically coarsening upward	High energy and rapid current	Fan delta
B	Planar cross bedded Sandstone	Buff coloured, thin to medium bedded, medium grained, large scale cross bedded sandstone, mud concretion, 7 m thick, occasional small scale flaser bedded, fossil fragments, burrow structure	Active distributary channel with tidal current activities	Delta front
C	Medium to thick bedded sandstone	Yellowish brown to buff coloured, medium to thick bedded, medium grained sandstone, thickening upward of sandstone bed	Distributary channel	
D	Thin to medium bedded sandstone intercalated with shale	Yellowish brown to buff coloured, thin to medium bedded, medium grained sandstone intercalated with greenish grey coloured shale, parallel lamination occur gypsum layer, fossil fragment, occasionally lenticular bedding, 0.5-2 m thick gypsum	Swampy and marsh	Delta plain
E	Interbed of Sandstone and shale with lenticular bedding	Yellowish brown to buff coloured, thin to medium bedded, medium grained sandstone, interbedded with greenish grey coloured shale, parallel lamination, lenticular bedding alternated sequence of sand and shale, thickening and coarsening upward nature of sandstone bedded	Distributary distal bar	Delta front

Table 2: Lithofacies Analysis of Pyawbwe Formation exposed at Pyawbwe-Minhlagyin Area (Continued)

Sedimentary Facies		Lithologic Description	Interpretation	Facies Association
Code	Name			
F	Thick bedded, fine grained sandstone	Yellowish brown to buff coloured, thick bedded to massive, fine grained sandstone, friable, 6 m thick, wavy lamination, upper part of Pyawbwe Formation	Levee and crevasse splay deposits bordering the distributary channel	Delta front
G	Interbed of siltstone and shale	Bluish grey coloured, thin to medium bedded siltstone and shale, nodular shale, thinning upward of silt, parallel lamination, little amount of parallel bedded sandstone, upper part of Pyawbwe Formation	River mouth bar	Prodelta
H	Clay intercalated with hard sandstone	Greenish grey to bluish grey clay intercalated with grey to yellowish brown, thin to medium bedded, coarse - grained hard sandstone, iron concretion	Prodelta	
I	Shale intercalated with fossiliferous sandstone	Light grey to greenish grey coloured shale intercalated with yellowish brown to buff coloured, thin to medium bedded, coarse grained fossiliferous sandstone, generally fissile nature shale	Delta front slope	
J	Laminated shale with sandstone intercalation	Light grey to greenish grey coloured, thin to medium bedded shale, show fissile nature, fine grained sandstone intercalation	Swampy and marsh	Delta plain
K	Massive clay with burrow structure	Greenish grey coloured, massive clay, burrow structure, fossil fragments, middle part of Pyawbwe Formation	Delta front slope	Prodelta

Facies (C) Medium to Thick bedded Sandstone

This facies mainly consists of yellowish brown to buff coloured, medium to thick bedded, medium grained sandstone. This facies is characterized by thickening upward nature of sandstone and directly overlies of shale unit (Figure 9).

Interpretation

Sandstone was deposited from traction by a low energy, unidirectional current. This facies is interpreted in distributary channel deposit of delta front by the occurrence of thickening and coarsening upward nature.

Facies (D) Medium grained Sandstone with Shale intercalation

This facies mainly comprise yellowish brown to buff coloured, thin to medium bedded, medium grained sandstone intercalated with greenish grey coloured shale. In this facies, gypsum layers are parallel to the sand and shale bedding planes (Figure 10). These gypsum layers are 0.5 cm to 2 cm in thickness.

Interpretation

This facies is thought to be a delta plain of swampy or marsh environment. The occurrence of gypsum is confined to coastal intertidal setting and to sites where marine water seep into low lying pools and basin.



Figure 9: Thick bedded sandstone directly overlies of shale unit of Facies (C) (Lat. 20° 01' 45'' N to Long. 94° 37' 32'' E)



Figure 10: Yellowish brown coloured, thin bedded sandstone interbedded with shale bearing gypsum layer of Facies (D) (Lat. 19° 57' 00'' N to Long. 94° 40' 44'' E)

Facies (E) Interbeds of Sandstone and Shale with lenticular bedding

It mainly constitutes yellowish brown to buff coloured, thin to medium bedded, medium grained sandstone interbedded with greenish grey coloured shale. This facies show lenticular bedding in alternated sequence of sand and shale (Figure 11). The sand and shale beds also show parallel lamination in this facies.

Interpretation

This facies shows lenticular bedding of sands and shale and parallel lamination in nature. The above character indicates that this facies is interpreted as distributary distal bar of delta front (Reading, 1996).

Facies (F) Thick bedded, fine grained Sandstone

This facies mainly consists of yellowish brown to buff coloured, thick bedded to massive, fine - grained sandstone (Figure 12). This facies is found in the upper part of Pyawbwe Formation near the Kayu Kan village.

Interpretation

This facies is interpreted as levee and crevasse splay deposits bordering the distributary channel, formed in response to broadening and shoaling of the channel in delta front.

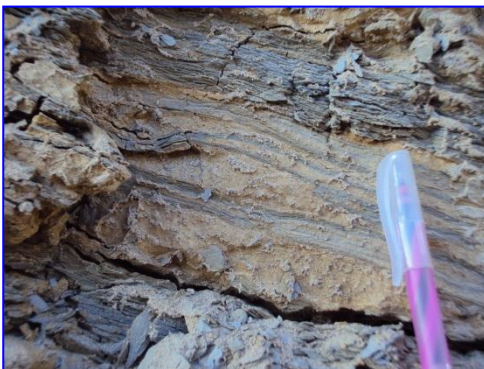


Figure 11: Lenticular bedding alternated sequence of sand and shale of Facies (E) (Lat.19°54' 51'' N to Long. 94°42'57''E)



Figure 11: Yellowish brown to buff coloured thick bedded and fine grained friable sandstone of Facies (F) (Lat.19° 45' 50'' N & Long. 94° 37' 15'' E)

Facies (G) Interbed of Silistone and shale

This facies mainly constitutes bluish grey coloured, thin to medium bedded siltstone and shale (Figure 13). Shale in this facies appears as concretionary and nodular shape. This facies shows thinning upward nature of siltstone and show parallel lamination of shale and siltstone bedding.

Interpretation

It is bedding characters imply that the current were episodic, discrete events of small magnitude. This facies is interpreted as a deposit at some distance beyond the river mouth in the prodelta area.

Facies (H) Clay intercalated with Hard Sandstone

This facies mainly comprises greenish grey to bluish grey, medium bedded clay intercalated with grey to yellowish brown coloured, thin to medium bedded, coarse grained hard sandstone (Figure 14). This hard sandstone shows concretionary shape and varies from 30 cm to 50 cm thick in this facies.

Interpretation

This facies is variety of the lowest energy condition and represent the sediments deposited in prodelta environment.



Figure 13: Parallel laminated siltstone and concretionary nodular shale interbeds of Facies (G) (Lat. 19° 54' 51''N & Long. 94° 42' 57'' E)



Figure 14: Bluish grey coloured medium bedded clay intercalated with grey coloured concretionary shape hard standstone of Facies (H) (Lat. 20° 01' 05'' N to Long. 94° 37' 07'' E)

Facies (I) Shale intercalated with fossiliferous Sandstone

This facies contains light grey to greenish grey coloured shale intercalated with yellowish brown to buff coloured, thin to medium bedded, coarse grained fossiliferous sandstone (Figure 15). Lenticular shape of fossiliferous hard sandstone is occurred in this facies. Shale shows generally fissile nature in this part.

Interpretation

This facies is interpreted onto the delta slope (prodelta) by the occurrence of fossiliferous sandstone.

Facies (J) Laminated Shale with Sandstone intercalation

This facies is mainly composed of light grey to greenish grey coloured, thin to medium bedded shale (Figure 16). These shales show parallel lamination and fissile nature and plant rootlets are richly occurred in this facies. Occasionally, fine grained sandstone is intercalated within these shales.

Interpretation

This facies is interpreted that the depositional environment is a delta plain of swampy or marsh environment. This facies is characterized by laminated shale bearing plant rootlet.



Figure 15: Greenish grey coloured shale intercalated with lenticular shape of fossiliferous hard sandstone of Facies (I) (Lat. 20° 01' 10'' N to Long. 94° 37' 20'' E)



Figure 16: Greenish grey coloured, medium bedded shale showing fissile nature with plant rootlet of Facies (J) (Lat. 21° 1' 31'' N & Long. 94° 37' 43'' E)

Facies (K) Massive Clay with burrow Structure

This facies especially consists of greenish grey coloured, thick bedded to massive clay. Burrow structures and fossil fragments are usually observed in this facies (Figure 17).

Interpretation

This massive nature may be a result of the depositional mechanism on the delta front slope. The deposition of fine-grained sediments indicates the slack water condition formed by low energy depositional process (Reinck and Singh, 1980). Homogeneous bedding might be the result of strong bioturbation activity. So, this facies is found burrow structure and fossil fragments.



Figure 17: Burrow structure in the massive clay of Facies (K) (Lat. 20° 0' 30'' N & Long. 94° 38' 42'' E)

Lithofacies Association of Pyawbwe Formation

The facies of Pyawbwe Formation exposed in Pyawbwe village can be grouped into four lithofacies associations. Columnar section of Pyawbwe sequence is shown in (Figure 18. a, b, c, d, e, f, g & h).

1. Fan delta facies association

Fan Delta association comprises matrix supported conglomerate, pebbly conglomerate (Facies A) and gritty sandstone. These fan delta conglomerate and medium sandstones are deposited in alluvial fan

association. Fan delta association is usually coarse grained resulting in higher sedimentation rate (Miall, 1990).

2. Delta plain facies association

The delta plain association consists of laminated shale (Facies J) and medium bedded sandstone intercalated with shale (Facies D). This facies association may have occurred in swamp, marsh, lake and distributary channel area where are filled by overbank spilling of fine-grained material from the river during flood stages with quiet energy condition (Walker and James, 1992).

3. Delta front facies association

The delta front association represents the combination of facies B, C, E and F. Medium grained sandstone with planar cross-bedding of facies B can be found in distributary channel. Medium to thick bedded sandstone of facies C deposited in distributary channel. Interbeds of sandstone and shale with lenticular bedding of facies E suggest distal bar on the seaward sloping margin of the delta front environment. Thick bedded fine grained sandstone of facies F deposited in delta front. The above characters indicate that this facies association is attributed to tidal influence delta front deposits. In this association, distributaries channel, subaqueous levee, distributary mouth bar and distal bar are present. A distributary channel is a natural stream which leads a part of the sediment and water discharge of a major stream into the sea. The most common sedimentary structure in the distributary channel deposits are cross-bedding, current ripple bedding, and erosional surface. Some parts of the subaqueous levee are exposed as sand flats at low tides. Subaqueous levee deposits are made up of very fine sand slit and mud. Sedimentary structure produced by current action is dominant.

4. Prodelta association

The prodelta is mainly composed of facies G, H, I and K. Prodelta is an environment where finer particles settle out from suspension and disperse over wide area by the basal processes (Reading, 1996). In river-dominated deltas, prodelta mudstones are typically massive, well stratify and may show graded bedding (Walker and James, 1992). Massive clay with burrowing structure (Facies K), well lamination of facies G, clay intercalated with

sandstone (Facies H) and shale intercalated with fossiliferous sandstone (Facies I) suggest that they are the prodelta association.

Depositional environment of Pyawbwe Formation

The Pyawbwe Formation shows the characteristics of fan delta, delta plain, delta front and prodelta. The lower part of Pyawbwe Formation is occupied by the wave and tidal influence delta front associated facies. These include wavy laminated sandstone, laminated silistone and clay, flaser and lenticular bedding of sandstone and shale. The middle and upper parts of Pyawbwe Formation are occupied by delta plain and prodelta. These include massive clay bearing burrow structure, shale intercalated with fossiliferous sandstone, sandstone with planar cross bedding and sandstone intercalated with shale bearing gypsum.

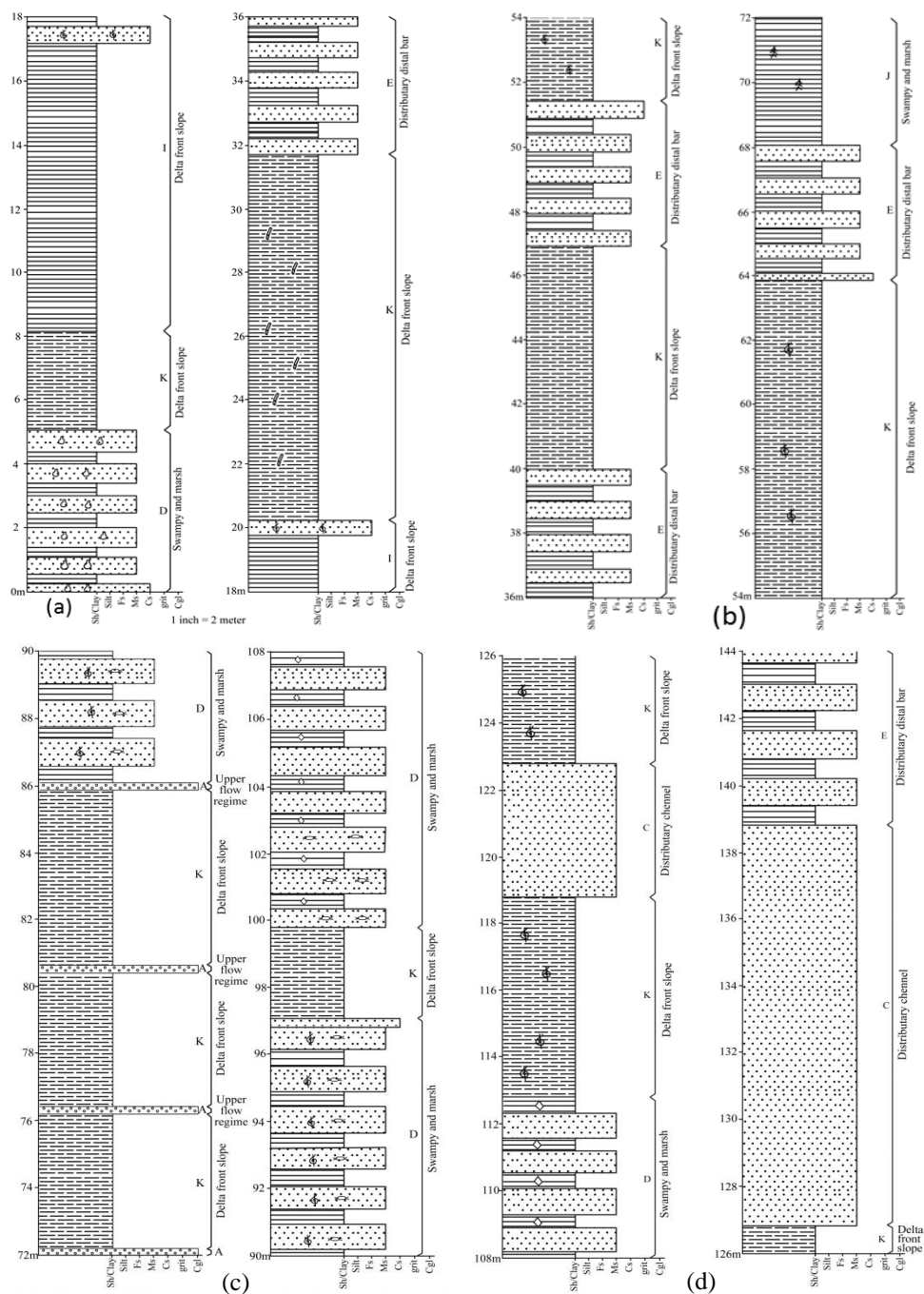


Figure 18: (a,b,c,d) Columnar Lithofacies section of Pyawbwe Formation measured along the railway near the Pyawbwe Village

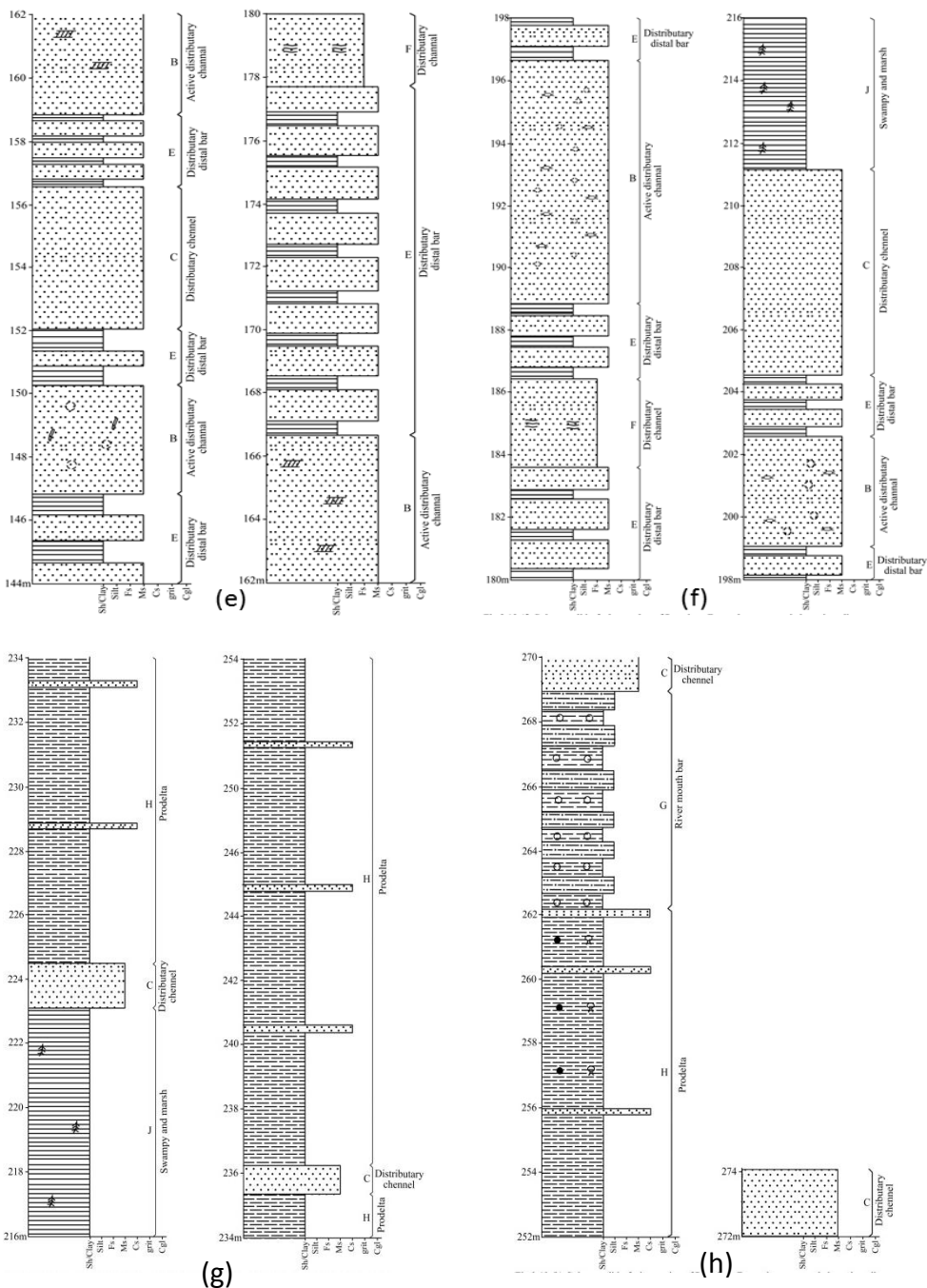




















Figure 18: (e,f,g,h) Columnar Lithofacies section of Pyawbwe Formation measured along the railway near the Pyawbwe Village

EXPLANATION

Lithology		Grain Size	
	Sandstone	Sh/Clay	Shale/ Clay
	Shale	Slt	Silt
	Clay	Fs	Fine Sand
	Sand and Shale	Ms	Medium Sand
	Silt and Clay	Cs	Coarse Sand
	Conglomerate	grit	Grit
		Cgl	Conglomerate
Sedimentary Structure		Other	
	Planar Cross Structure		Fossil fragment
	Flaser Structure		Gastropods
	Wavy Lamination		Gypsum
	Burrow Structure		Mud concretion
	Plant rootlets		Iron concretion
	Pillar Structure		Concretionary nodule

Summary and Conclusions

The research area, Pyawbwe-Minhlagyin area is situated in Minbu Township, Magway Region. It is located between North Latitude 19° 57' and 20° 02' and East Longitude 94° 37' and 94° 43'. The purpose of this research is to interpret the depositional environment of the area by studying the detailed analysis of the lithofacies and lithofacies association. The research area mainly emphasizes on the facies analysis of Pyawbwe Formation for environmental interpretation. The maximum thickness is about 274.01 meter. There are at least (11) lithofacies of Pyawbwe Formation and can be grouped into (4) lithofacies association such as fan delta association, deltal plain association, delta front association and prodelta association. The lower part of Pyawbwe Formation is occupied by the wave and tidal influence delta front

associated facies. The middle and upper parts of Pyawbwe Formation are occupied by delta plain and prodelta.

Acknowledgement

I sincerely thank to Dr. Khin Maung Hla, Professor and Head, Department of Geology, Bago University and Dr. Aye Aye Han, Professor, Pro Pro Rector, Banmaw University for their permission me to present this paper and guidance, encouragement and valuable advice. I am deeply grateful to Dr. Toe Toe Yi, Lecturer, Department of Geology, Pakokku University, for her invaluable guidance and close supervision during field work, research work and the preparation of this dissertation project as good as possible.

References

- Aung Khin and Kyaw Win (1969): Geology and hydrocarbon prospects of the Burma Tertiary Geosynclines: *Union of Burma: Journal of Science and Technology*, v. 2, n. 1, p. 52-73.
- Lepper, G.W. (1933): Geology of the Oil-bearing Regions of the Chindwin-Irrawaddy Valley of Burma and of Assam-Arakan. *World Petroleum Congress*, Paper No.169.
- Maung Thein (1976): A preliminary synthesis of the Geological Evolution of Burma with reference to the Tectonic Development of South East Asia. *Geological society of Malaysia, Bulletin*, 6, p. 87-116.
- Maung Thein (1983): The Geological Evolution of Burma: Unpub. Departmental Report, Mandalay University.
- Maung Thein (2014): Revised Correlation table of the Stratigraphic Units of Myanmar, Geology Department, University of Yangon (For Academic purposes only), Myanmar.
- Miall, A. D. (1990): Principles of Sedimentary Basin Analysis. 2nd Ed. New York; Springer. Verlag. 668pp.
- Reading, H. G. (1981): *Sedimentary Environments and Facies*. Oxford, Blackwell Sci. Publications.
- Reading, H. G. (1996): *Sedimentary Environment: Processes, Facies and Stratigraphy*, 3rd Ed; Blackwell Science Ltd.557pp.
- Reineck, H. E. & I. B. Singh. (1980): *Depositional Sedimentary Environments*. 2nd Ed.; springer-vetlag, New York. 549 pp.
- Walker, R.G. and N.P. James (1992): *Facies Models: Response to Sea level change*. Geotext-1: Geological Association of Canada.