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Description of Granitoids In Tabular Katangan In Democratic Republic of Congo

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Abstract: *Until now, one admits stratigraphically that, the rocks of Kasenga are post-Kundelungu. Whereas the cartography of our sector of studyrecent detailed mapping, localizedcarried outin the South-eastern part of the territory of Kasenga in the current province of Haut-Katanga, made it evidentpossible to highlight, the occurrence ofa magmatic unit and a sedimentary unitin Kasenga Sector. The magmatic unit is consists of the granitoids ones whereas the sedimentary unit tabularin nature, is composed of a polygenic conglomerate at the base of the formationand a gray siltstone in a fresh state, and reddish in its faded parts at the top. This indicatesthat thesedimentary formations belong to the KatanganSuper Group, in its part of basic complex, and rests on the granitoids ones. The petrographic study under the polarizing microscope (mark ALLTION model NP-400 M and MOTIC PM – 28 SERIES) on the samples of granitoids was carried out. These granitoidsare characterized by the presence of microcline* ***like*** *alkaline feldspar, feldspars with perthites, biotite, plagioclases and sphene like additional mineral.Afterstudying the siltstone we noticed that it also contains alkalinefeldspars of microcline type, and that forces us to admit the source of the granitic sediments.*

Keywords: *Tabular Katangan, granitoids, complexes basic.*

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I. Introduction

The province of the Haut – Katanga, located in the South-eastern part of the Democratic Republic of Congo, includes part of the Central African Copperbelt, which extends from the border ofDemocratic Republic of Congo into Zambia (Hamdy A. El Desouky and al.2008; Fig.1). The central plate of Kundelunguoccurs betweenthe plains of Lufira in the West and the depression of Luapula-Moëro in the East and having an orientation of NS. Along the plain of Luapula, the river bearing the same name flows and forms the border between the plates of Kundelungu(in Katanga, D.R.Congo) and Mporokoso(entirely located in Eastern Zambia (Kipata, 2007)). The geological formations of the foreland of the Katangan belt arenot studied properly and are not understood very well.This research lies within the scope of our study to acquire more knowledgeof the zone of Haut-Katanga in general and the territory of Kasenga in particular where foreland of the Katangan belt is exposed. The current studies on the area (Dumont and Hanon, 1997) specifythat tabular formations in the area shows a transgressive thrust on the Katangan folded structures, and the formations would be post-Kundelungu.

The studied sector occurs in the territory of Kasenga to the SE, i.e. at the edge of river Luapula, with southern latitudes between -10°38' 42 ' ' to -10°40' 35 '' and between the longitudes 28°39' 54' ' to 28°41' 42 '' (Fig.1). The area is approximately at a distance of 270 km NE of Lubumbashi, to more or less 50 kmof Kasenga and occurs in the province of Haut−Katanga.

The aim of this research is to make a petrographic and mineralogical study of geological formations of the sector of study. It was necessary to work out a detailed geological map of the sector concerned as a whole in order to apprehend the contacts of the intrusions and the wall-rocks.

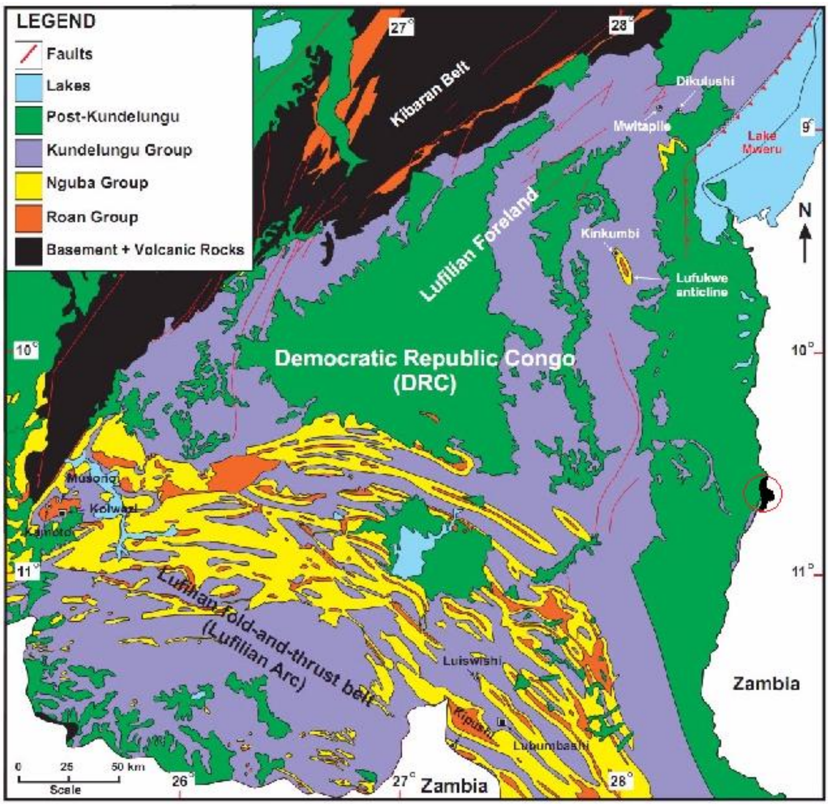

Fig1 Geological map of the Central African Copperbeltand the Northern part of theLufilian Arc. Modified by Lepersonne (1974), El Desouky and Al (2008) and MwabanuaMutabi and Al (2018).

II. Geological Background

The sector of study,from a geological point of view belongs to the southernmost area of the Katangan Belt.There are diverse opinion about the geological sub division of the KatanganBelt since J.Cornet.The cupriferous belt (copperbelt) of central Africa is made up of the sedimentary rocks of neoproterozoicage and are grouped in the Super-group of Katanga (or Katangan).The same containscupro-cobaltiferousmineralizations, uranium-bearing and associated minerals. This Super-group of Katanga extends from Zambia to Congo (fig. 1) having more than 700 kilometers in length and 150 Kilometers in width. This Copperbelt of Central Africa is situatedbetween the craton of Congo and that of Kalahari (Cailteux and Al, 2007). Thus, the Super group of Katanga, approximately 5 to 10 kilometers of thickness is generally subdivided into three groups (table 1) namely Roan, Nguba and Kundelungu on the basis of regional occurrence of two unconformable diamictite zones (Cailteux and Al, 2005; Batumike and Al, 2006; Fig. 2) . The lower diamictiteis" are called grand conglomérat ", and occur at the base of the group of Nguba, and the higher diamictite is called " petit conglomérat ", occurring at the base of the group of Kundelungu (Cailteux and Al, 2005, 2007; Batumike and Al, 2007). The current morphology of the rocks of this Super-group as well as associated mineralization, were guided or controlled bythe tectonic movements related to the lufilianorogenesis and other tectonic movements subsequent to this orogenesis, of which some are associated with the opening of the East-African rift valley (Kampunzu and Cailteux, 1999; Porada and Berhorst, 2000; Selley and Al, 2005; Kipata and Al, 2013).This orogenesis, which operated under several tectonic phases, set up the arch shape of the cupriferous belt and also referred to as the lufilianarc (fig. 1).The Northern and North-Eastern part of this Central African Copperbelt (CAC) was not very much affected by the lufilianorogenesis and is made up of the formations which remained sub-horizontaland at places the same arevery little deformed.This part forms the foreland of Copperbelt of Central Africa and bears the name of tabular Katangan (Fig.2).

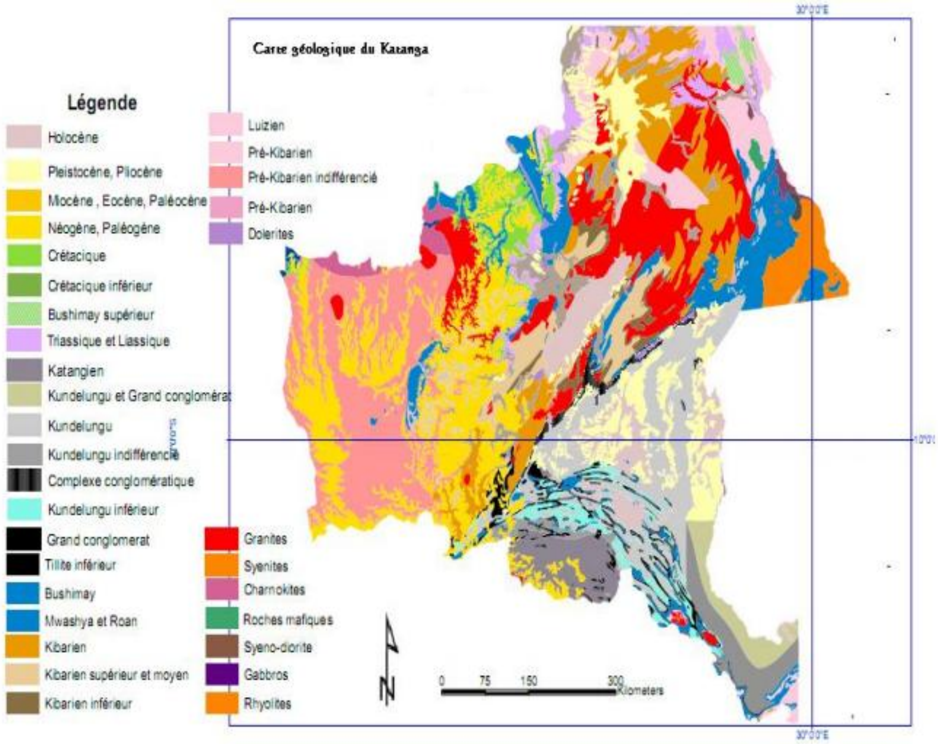

Fig 2: Geological map of Katanga (MRAC: drawn from the geological map and mining of Democratic republic of Congo, royal museum of central Africa, Tervuren, 2005).

TheLufilianarc is subdivided into three fields: the zone of folding - thrusting (also calledLufilian external), the region of magmatic intrusion (or Lufilian intermediate)and the synclinal region or internal area (also called Lufilian intern) (Swardt&Drysdall, 1964; DeSwardt and Al, 1965; Daly and Al, 1984). Tabular Katanganconsists of a series of plates of which the plate of Kundelungu forms an important part.This part represents the forland of the lufilian arc, stuck between the Kibaran'sand the Bangweulu block (Kipata and Al, 2013).

The geotechnical evolution of the lufilianarcis related to the amalgamation of the Supercontinent ofGondwana in the south-central part, and of Africa during Pan African Orogeny(Grantham and Al, 2003; DeWaele and Al, 2008; Westerhof and Al, 2008).The lufilianarcwas formed together with the Zambezi belt during the collision of cratons of Congo and Kalahari, i.e. between 650-600 and 530 Ma, with peak of the activities at 550 Ma and ending at around 530 Ma(Hanson and Al, 1993; Porada&Behorst, 2000; John and Al, 2004; Frimmel and Al, 2011).

After the lufilianorogenesis, the amount of stress/thrust/shearincreased extensively, thus causing the formation of a rift zone of Mweru-Tschangalele oriented to NE (Haest M and al.2009).

Geomorphologically, the sector of study (FULA, KABUSHA and KAMUNFISA) as a whole was consideredas a plate. The erosion of some portions of the plate gives a morphology of hills and ravines in the northern part of the plate. The areas located at left bank of the Luapula river are characterized by an average altitude of 1043 m, having a minimum altitude of 995 m around the left bank of the Luapula river flowing South towards North and in fairly distant hills the altitude reaches a maximum 1063 m .

The granites outcrop in two forms; in the form of blankets and in the form of a giant batholith, with thickness varyingbetween 5 to 25 m depending on the degree of erosion. When one deviates a little far from Luapula, a flat morphology is encountered. The soil, which constitutes the upper part of the hills, gives a brownish color and is charged with many pebbles of various kinds'formations, i.e.Quartz pebbles, silstone pebbles, sandstone pebbles, etc.

Table 1: Lithostratigraphy of the Katangan succession in Congo (Cailteux and Al, 200a, 2005b, 2007; Batumike et al., 2007).

Age (ma)				Group	Sub-group	Formations & lithology	Environment
~ 320	L. Pz.		Karoo				
542	Early Paleozoic		Katanga Supergroup	Kundelungu	Biano (Ku3)	Red arkoses, conglom., sandstones, shales	Foreland continental clastic, lacustrine to fluvio-deltaic (semi-)arid
530	Neoproterozoic	Ediacaran			Tectonic unconformity (orogenic paroxysm)		
					Ngule (Ku2)	Sandstones, calcareous siltstones & shales, limestones	Epi-continental lagunar to marine
635					Gombela (Ku1)	Carbonated siltstones, shales	
650		Cryogenian			Petit Conglom.	Glacial diamictite	Marinoan glaciation
				Nguba	Bunyeka (Ng2)	Dolomitic sliciclastics	Proto-oceanic rift similar to the Red Sea
710					Muombe (Ng1)	Carbonated slitstones & shales Dolomites & limestones	
750					Grand Conglom.	Glacial diamictite	Sturtian glaciation
				Roan	Mwashya (R4)	Calcareous shales	Fluviatile to lacustrine in continental. rift
					Dipeta (R3)	Dolomitic siltstones, intrusive gabbros	
					Mines (R2)	Stromatolitic dolomitic siltstones	
850					R.A.T. (R1)	Argillaceous dolomitic silts-standstones	
		Tonian	883 ± 10 Ma Nchanga garnite				
1000			Paleo- & Mesoproterozoic				

III. Methodology And Means

To achieve our goal, we proceedon *ground*with a detailed geological mappingaccompanied by a systematic soil geochemical sampling in a grid of 100m X 100m and also sampling of the different rock formations exposed on surface. For that, we used the traditional geological equipment like a geological compass (mark BRUNTON), a GPS (mark Garmin ETREX), a geological hammer, permanent marker, a bar of mine, large hammer of 5 kg to sample the granites, notebooks of ground and sample bags. The data processing was carried out by using software QGIS for the digitization of maps and geological sections.

In *the laboratory, we* have crafted thin sectionsthat have been microscopically observed, using ALLTION model NP-400 M and MOTIC PM – 28 SERIES polarizing microscope.

IV. Local Geology Of Fula, Kabusha And Kamunfisa

During traversing in our study area, two types of geological units were encountered:

- A sedimentary unit: The tabular formations are consisted ofsiltstones, polygenic conglomerates and weathered surfacial formations (mixed soil with pebbles and a granitic matrix)
- A magmatic unit : consisting ofgranitoids.

4.1 SEDIMENTARY UNIT

The sedimentary formations found in this sector are tabular and are consisted of the fine grained sandstone of reddish color in the outcrop, and greyish in unweathered state. That is observable on the rocks exposed in an exploration pit of around3m of depth. During our traverse we never encountered iron rich weathered zones or ferricrete (typical horizons of the laterites) in this sector in spite of the reddish color of the fine grained sandstones, the reason might be due to the presence of ferruginous minerals. The fine grained sandstones present in the zone also show pseudo-lamination at the outcrop, however upon breaking open the fresh surfaces the same are found to be massive. The fine grained sandstones rest on a polygenic conglomerate (Fig3) which constitutes the float rocks of various natures (quartzose, microquartzite etc...) rounded to subrounded in shape, and having sizes from few centimeters to few millimeters occurs in a cement of argilo-sandy nature. Let us announce that, a little more in south-west of the zone of study, one observes granular layering of the float ores which shows the normal polarity of various episodes of sedimentation in this sector (Fig3).

Figure3 A. Outcrop of a polygenic conglomerate, having centimetric rollers which dominate in sandy −argilocement. B Granolas conglomerate, the benches are alleviate of 32 Cm, subhorizontaux, having a variable dip between 5 and 9°.

4.2 FORMATIONS COVERING THE BED ROCK

In this sector, the formations covering the bed rock are divided into two groups, namely:

- Brownish color soil, mixed atcertain places, with the float rocks of fine grained sand stone of quartzitic in nature. This soil is formed due to the weathering of the fine grained sandstone and the conglomerate.
- Sands resulting from the weathering of the granites.

4.3 THE MAGMATIC UNIT

In our sector of study we observe the granitic rocks, which appear in 5 zones of surface exposure, which includes two in Fula, one inKabusha and two in Kamunfisa. These magmatic rocks are found in two levels, on the surface it forms a blanket shape (Fig4) and below it comes in giant batholites (Fig4). These batholiths could have thickness of around 25 meters based on the degree of erosion. The granites of this size are observed in the Southern part ofKabusha and Kamunfisa in which certain granites are exposed in the form of the broad blanket forms. The length can go up to 200 meters and that is observed especially in Fula in the Northern part of the sector. Let us note that the granites encountered have 2 textures; the grained texture which is dominant and other is aplitic, which are least dominant.

Figure4 With. *Granite levelling in the form of a tablecloth with Kabusha,* it is long 250 m and it goes to the river bank Luapula *B giant granite in the form of batholite, reaching + - 15m top*

V. Cartographic Study

In this part of our study, it was a larger question of determining the various lithological units of this sector, which was not studied so well and before and also positioned wrongly in the Katangan Super Group. On the whole 24 geological sections were cut across to cover the area under study. While referring the data collected in each station as a whole of the sector under study, we arrived at the development of a geological map (Fig5).

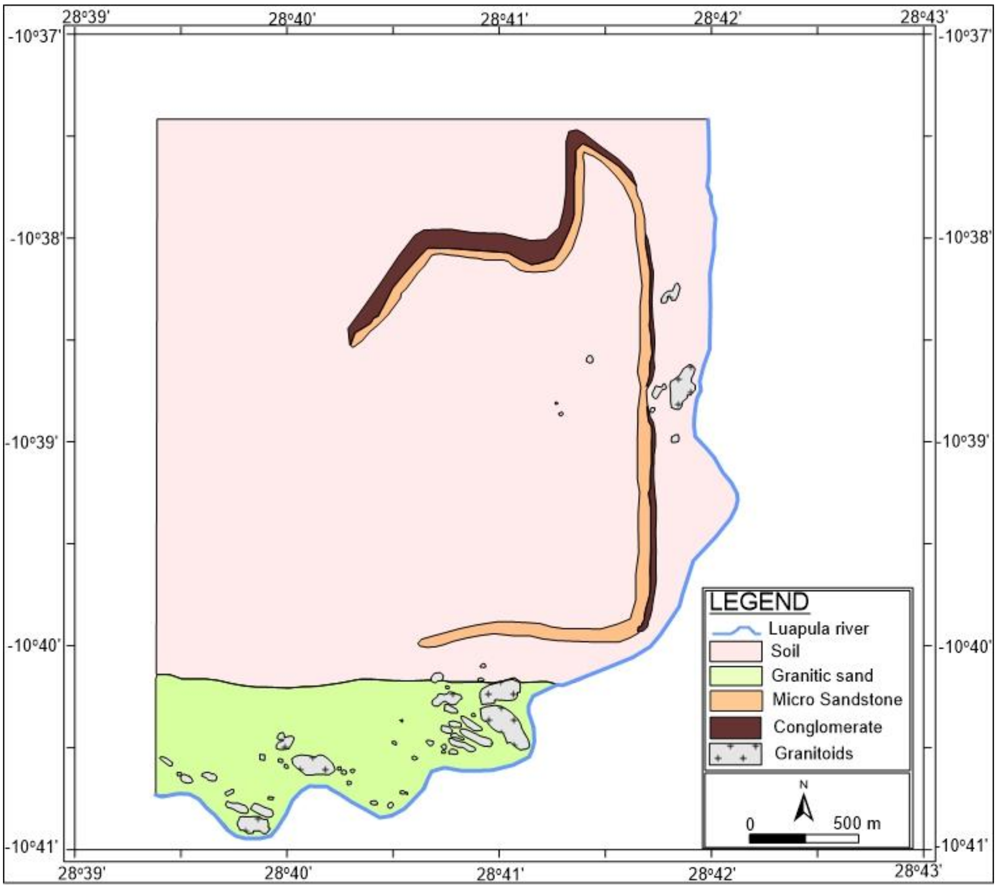

Figure 5 *Geological map of the zone of study*

5.1 ILLUSTRATION OF THE SECTIONS

These three sections (figure. 6,7,8) A, B and C, are illustrative of the general structure of the study area.

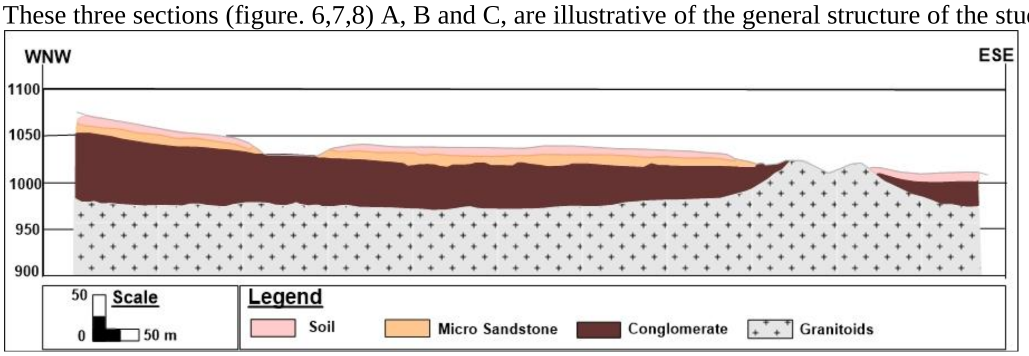

Figure 6 Section A developed in the northern part of the study area (Fula area)

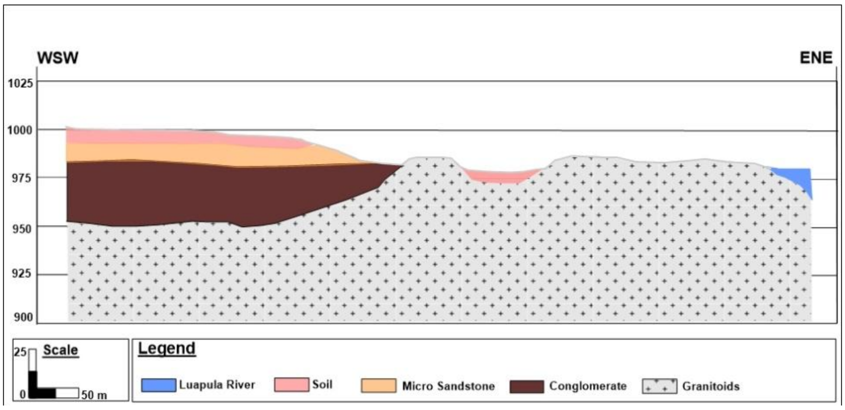

Figure7 Section B developed in the northeast part of the study area (Kamunfisa area)

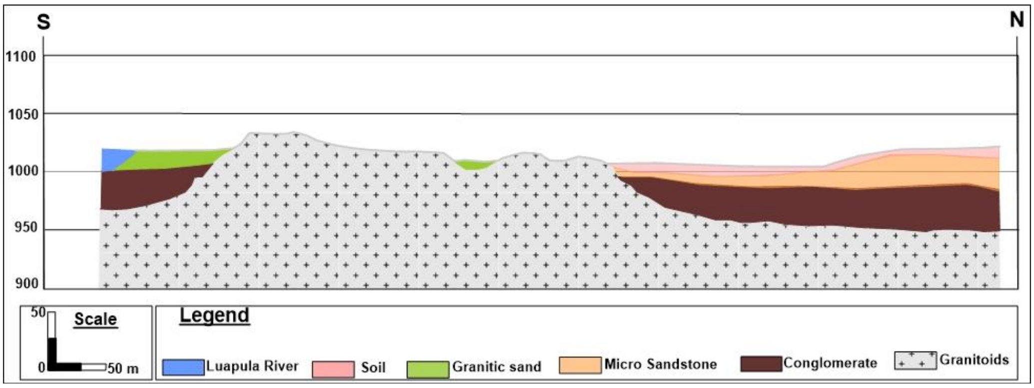

Figure 8 Section C developed in the southern part of the study area (Kabusha area)

After analysis of the geological map and the above sections, we find that this sector comprisesof four formations with the successionsstarting from the base to the top is given as follows:

- The base consisting of the granitoids;
- The polygenic conglomerate which forms the base of the sedimentary sequence is lying on the base;
- The siltstonelies on the polygenic conglomerate; and
- The top cover is the formations comprising sandy soil and pebbles.

The formations constituting the study area, according to the stratigraphic scale of Katangan will fall as the base of the Katangan. Thus, the conglomerate we observed, would be a basic conglomerate of Katangan.

VI. Petrographic Observations

6.1 Methodology

Optical microscopy has been used strongly for the identification of the different mineral phases. In this part, it is a question of determining on a macroscopic and microscopic scale the nature of the various formations encountered at the time of our survey and the studyof the representative samples outcropping in the study area.

6.2 MAGMATICSUNITS

6.2.1 SAMPLE KAM1

The rock (Fig9) is clear and has a grainy texture. It is mainly composed of quartz (white to greyish crystals), feldspars (pink crystals) and biotite (black color). This rock in its outer parts showing yellowish color, which could be because of the presence of iron oxides and hydroxides (limonite), produced by deterioration of iron-bearing minerals, i.e. biotite present in the rock. It is biotitic granite (**Fig** 9).

Figure9: biotitic granite

- **Microscopiques Observations**

Microscopically the rock consists of the following minerals:

- Quartz: xenomorphic, colorless, has low relief and does not present cleavages inunanalyzed-polarized light (**UNPL).**It polarizes in the gray hues of the first order and has a low birefringence (**Fig** 10).
- Plagioclases: fine to medium grained crystals, colorless, xenomorphic, not pleochroic, show cleavages in unanalyzed polarized light**UNPL.** They polarize in the gray of the first order with polysynthetic twins, deteriorating in certain places in sericite. **(Fig10).**
- The microcline: mediumgrained crystals, colorless, dusty and of low relief in unanalysed polarized light **(UNPL),** polarizing in the first-order of light gray hues,change in colour with brightness in analysed polarized light**(APL)**. **(Fig10).**
- Opaque minerals: presence of dark crystals in unanalysed polarized lightand analysed polarized light. **(Fig10).**

- Biotite: elongated brownish colored crystals, shallow – to – medium relief, with strong pleochroism in dark brown or greenish brown with clear cleavage in unanalysed polarized light (**LPNA).** They present a tint of bright polarization, a high birefringence and there is a total absence of lamination, altered in places leaving room for a pale green mineral that has a low relief (**chlorite). (Fig10)**

6.2.2 SAMPLE C8E5

Macroscopically, the rock iscompact; it is pink in colorand it is made up of quartz, feldspar, biotite and black minerals. It is a Biotitic granite (**Fig** 11).

Figure11: Biotitic granite

Microscopic Observations

Microscopically the rock has a grainy texture and consists of the following minerals:

- Biotite: large brown elongated crystals and are not laminated in shape, showing strong pleochroism and having a clear cleavage in unanalysed polarized light(**UNPL).** They have bright polarization tints with high birefringence in analysed polarized light **(APL) (Fig12).**
- Quartz: Colorless and not-pleochroic crystals, their relief is weak and do not show cleavage in unanalysed polarized light(**UNPL).** They polarize in light hues of the first order and do not show twins. **(Fig12).**
- The microcline: colorless crystals with a dustymatrix, of average size and weak relief in unanalyzed polarized light **(UNPL)**. They polarize in the clear colors of first order gray, showing twin with alteration in analyzed polarized light **(Fig12).**

6.2.3 SAMPLE C1E13

Macroscopically, the rock is compact and hololeucocratic; it is pink in color and it is made up of quartz, feldspar and biotite(**Fig**13).

Figure13 : Biotitic granite

Microscopiques Observations

Microscopically the rock has a grainy texture and consists of the following minerals:

- Quartz: Colorless crystals, not pleochroicwith weak relief, novisible cleavagein analyzed polarized light (**UNPL)**. They polarize in the first order gray colors and present a travelling extinction **(Fig14).**
- Plagioclases: colorless crystals, of average size with fine, xenomorphic form, not pleochroic,presenting cleavages in unanalysed polarized light (UNPL). They polarize in the first order gray presenting the polysynthetic twins. **(Fig14).**
- Biotite: crystals of brown color, elongated or laminar form and with smaller relief. They are pleochroic and shows a net cleavage in unanalysed polarized light.**(UNPL).** They have colors of sharp polarization with a strong birefringence in analysed polarized light(APL) **(Fig14).**
- The microcline: colorless crystals with dusty matrix, of medium size and showing a weak relief in unanalysed polarized light**(UNPL)**. They polarize in the first order in clear gray colors and show laminationswithchange in colour with brightness in analysed polarized light**(Fig14).**
- We also observe **feldspars with perthites in which the** white minerals constitute orthoseand blacks minerals by biotite (**Fig** 14).

6.2.4 SAMPLES C1E2

Macroscopically the rock is compact and white. It is mainly made up of quartz, feldspars and biotite. It is calco-alkaline*granite* (**Fig**15).

Figure15: *Calco-alkaline granite*

- **Microscopic Observations**

Under the microscope the rock has a grained texture and is composed of:

- Quartz: colorless crystals, xenomorphic, not pleochroic,with weak relief and do not present cleavage in unanalysed polarized light(**UNPL)**. They polarize in the first order gray colors with a low birefringence and present a travelling extinction in analysed polarized light.**(Fig16).**
- Biotite: Crystals are brownish in color, elongated form, weak relief with means and showing a strong pleochroism in the brown dark one or the brown greenish one with a net cleavage in **UNPL.** They have a color of sharp polarization, a high birefringence and deteriorating by place by leaving room to a pale green mineral which has a weak relief (**chlorite) (Fig16).**
- Plagioclases: colorless crystals and not pleochroic,of average size with fine, xenomorphic form and presenting cleavages in **UNPL.**They polarize in the first order gray and present polysynthetic twins. It is interpreted that these crystals deteriorate out of sericite **(Fig17).**
- We also observe **feldspars with perthites (Fig17).**

6.2.5 SAMPLES C8E13

The rock is compact and leucocratic. It is made up of quartz, feldspars,biotite and black minerals. It is a*biotitic granite*(**Fig**18).

Figure18 : *Biotitic granite*

- **Microscopic Observations**

Microscopically the rock is granular in texture and its mineralogical composition is as follows:

- Plagioclases: colorless and not pleochroic crystals, fine grained in size, xenomorphic form and present cleavages in **UNPL.**They polarize in the first order gray colors and present polysynthetic twins. It is interpreted that these crystals alter to sericite **(Fig19).**
- Quartz: colorless crystals, not pleochroic, of weak relief and do not present cleavage in unanalysed polarized light (**UNPL)**. They polarize in the clear colors first order gray and do not show twins**(Fig19).**
- Biotite: brown crystals and pleochroicin nature and are elongated or laminar in form, fine grained and are rare in occurrence. They have less relief and are present in a cleavage net in unanalysed polarized light **(UNPL).** The color of polarization is sharp with a birefringence raised in analysed polarized light(APL) **(Fig19).**
- Sphene: brownish, rare crystals in the rock, show a moderated pleochroism, a very strong relief, seldom visible but with cracked cleavage. **In APL,** they present a very high birefringence and an oblique extinction (**Fig** 19).

6.3 SEDIMENTARY UNITS

6.3.1 SAMPLES **C2E3**

Macroscopically the rock presents a gray coloring, the grainsize is in millimeter order between 1 to 0,02mm and is mainly composed of contiguous grains of feldspar and quartz. It is a siltstone (**Fig**20).

Figure20: *Sitlstone*

- **Microscopic Observations**

Microscopically the rock consists of:

- Quartz: small crystals heterogeneous granules, xenomorphic, weak in relief and are not pleochroic. Theyshow a travelling extinction and polarize the colors to white gray of first order, and do not show twins**(Fig21).**
- The microcline: colorless crystals with dusty matrix, of medium size and their relief is weak in unanalysed polarized light(UNPL). They polarize in the first order clear gray colors, showing the change in colour with brightness in analysed polarized light**(Fig21).**
- **Opaques minerals (Fig21).**

6.3.2 **SAMPLES C1E2**

At the macroscopic level, the rock has a reddish color, the grainsize varies between 1 and 0,02mm diameter. The rock consists of roundedshape of quartz and ferruginous siliceous cement, giving the rock a reddish-brown color. It is a siltstone (**Fig**22).

Figure22 : *Sitlstone*

- **Microscopic Observations**

Microscopically the rock is consisted of ferruginous cement in which one observes:

- Quartz: colorless crystals, not pleochroic with weak relief, not presenting cleavage unanalysed polarized light (**UNPL)**. They polarize in the first order gray colors and present a travelling extinction **(Fig23).**
- The microcline: colorless crystals with dusty matrix, of medium size and weak relief in unanalysed polarized light **(UNPL)**. They polarize in the clear colors first order gray, showing twins with change in colour with brightness in analysed polarized light **(Fig23).**

6.3.3 SAMPLES C2E2

The rock is made up of generally by the pebbles of sandstone and are granitic in nature. The pebbles are rounded to subrounded and are contained in a sandy matrix of reddish brown color material. It is a polygenic conglomerate (**Fig**24).

Figure 24: Polygenic conglomerate

Figure 25: Pebbles drawn from the conglomerate

VII. Discussion And Conclusion

The geological history of the sector of Kasenga is far from being complete. Several uncertainties persist because of the lack of sampling in this part of Haut – Katanga. According to the current state of our knowledge, the geological formations of the foreland of the Katangan belt, are less studied and poorly known.This research is part of the in depth study to acquire knowledge in the arealocated in the North East of Haut-Katanga, mainly in the territory of Kasenga where the formations are exposed the foreland of the Katangan belt. According to Dumont and Hanon (1997), the activity of the coastalfaults of the basin of Katangan foreland would be post-Katangan and would have made it possible to develop of an anti-Karroo paleograben within which the folded and tabular Katangan would be preserved and then then pushed. In this case, the plate of Kundelungu would be a «horst». There is an impressive illustration of one of the block edifice limited by straight faults and currently elevatedto classic horst in its current form of the plate of Kundelungu. The paleograben of the Katangan would be limited to the west by the Manikafault and in the East the boundary would be marked by layers of Karroo – ageluapula, but the passage of the eastern margin would be underlined by signs of basaltic volcanism of Kasenga.

In the Southern part of Katanga, the basic complex stretches on both sides of border between the Democratic Republic of Congo and Zambia, in the form of a multitude of ridges, sometimes isolated sometimes grouped into massifs. They are the domes of Konkola, Luina and Mokambo. These domes are consisted of granitoids, the green rocks and the metasediments (Ngoyi, 1992). These domes are best represented in Zambia, where we distinguish the system of Luapula and of Muva (Mendelson 1961).

The «Muva system" consists mainly of white quartzites and schists and is equivalent to the Kibaran; so it is part of the chains of Irumides butstill there is an insufficientevidence. This assertion has also been supported by several authors, including Fleischer et al. (1976). The «system of Luapula or lower Protérozoic, consists mainly of gneisses, phyllites, quarzites and the micaschists (Mendelson 1961). These metamorphites would have been affected between 2050 and 2100Ma by the orogenesis of tumbide, equivalent to the Ubendienne orogeny (Cahen et al. 1984), and the granitoids which are all associated with the same generation (Ngoyi, 1992).

Granitoids are found in two different geodynamic contexts: - the active continental margins where they are set back fromthe margin – the extensive late-orogenic contexts of the continent/continent collision zones where they are located, following the types, only in the internal parts of these domaines (type1) where both in the internarl and external areas occur. The contexts of active margin, the Granitoids areassociated witha calco-alkaline magmatism, metaluminous with slightly peraluminous, placed in shallow depth, see as subvolcanic. These granitoids are essentially of type I in the classification of Chappell &White (1992) and belong to both the magnetite and ilmeniteseries (Ishahara, 1977). These magmas are derived from the partial saturated melting of the the middle to the collisional zones, the granitoids are generally rich in potassium and silicon but low in calcium. They are also mainly peraluminous with strongly peraluminous; they are essentially S – type in the Chappell &White(1992) classification and belong to theIshiharan (1997)ilmenite series and result from the partial melting of aluminous rocks (standard metapelites) of the medium thick crust, even if a contribution of the major and/or basic sources is possible.

According to the observations of grounds in the study area, from a cartographic point of view, we have highlighted two geological units: the magmatic rocks as well as the sedimentary rocks. The magmatic unit is represented by the granitoids and the sedimentary by the tabular detriticformations made up of the polygenic conglomerate at the base of the sandstone matrix and silstone at the top.

On the petrographic and mineralogical level, the magmatic rocks consist of granites presenting several facies. All magmatic rocks outcropping in the study area highly evolved granitoids (Fig.27) rich in heavy minerals; unlike our predecessors (Dumont and Hanon, 1997), basic magmatic rocks have not been observed in the Kasenga area.

In spite of the previous work, as well as the present study which answered several questions about the Katanganforeland, this one still contains much information to be updated.

The results of this study constitute a sketch of a study of scale which we think of supplementing with studies of chemical elements on the whole magmatic unit that we suppose, on the basis of this petrographic study, being calco-alkaline (Fig.26).

Tableau2: *result of the petrographic and mineralogical study in transmitted light*

ID SAMPLES	NAME OF THE ROCK	CARDINALS MINERALS	ACCESSOIRES MINERALS
MAGMATICS UNITES			
KAM1	**Biotitic granite**	**Quartz, plagioclases, microcline and biotite.**	**-**
C8E5	**Biotitic granite**	**Quartz, plagioclases, microcline and biotite.**	**-**
C1E2	**Calco-alkaline granite**	**Quartz, plagioclases, biotite, we also observe feldspars with perthites**	**-**
C8E13	**Biotitic granite**	**Quartz, plagioclases, microcline and la biotite**	
C1E13	**Biotitic granite**	**Quartz, plagioclases, microcline,biotite, we also observe feldspars with perthites**	**Sphene**
C3E3	**Biotitic and pyroxenic granite**	**Quartz, plagioclases**	**Biotite and pyroxene**
SEDIMENTAIRES UNITS			
C2E3	**Feldspathicsandstone (Arkose)**	**Quartz and microcline**	**Opaques minerals**
C1E14	**Grès feldspathique (Arkose)**	**Quartz and microcline**	

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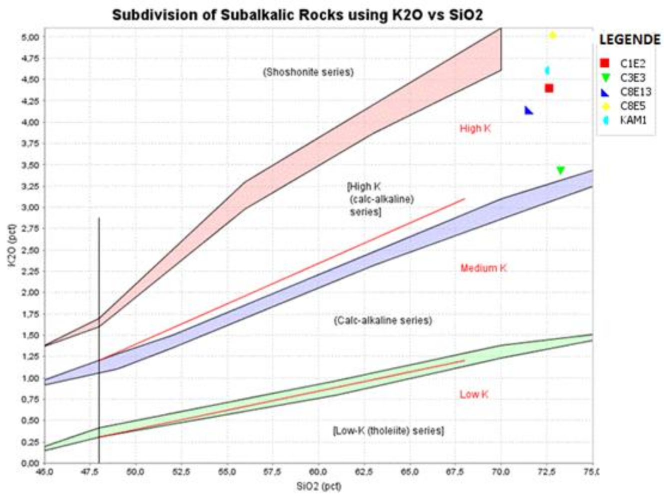


Figure 26: Classification of the magmatic rocks according to Maitre 1989 et al.

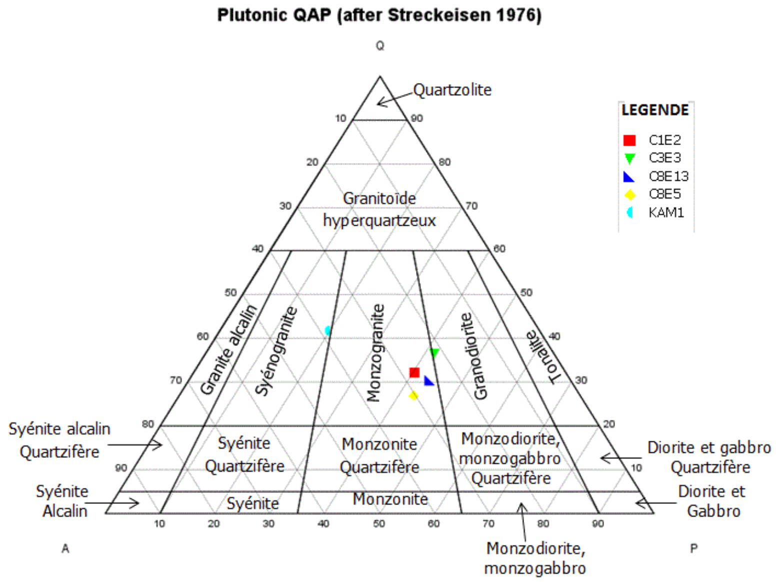
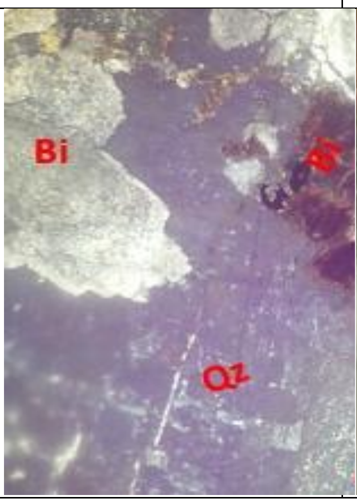
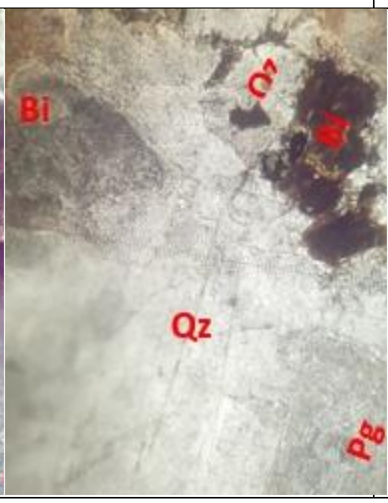
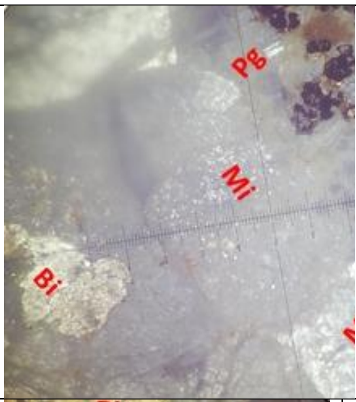
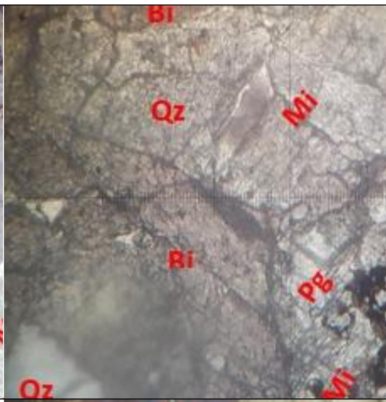
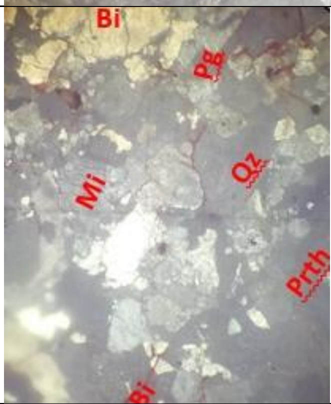
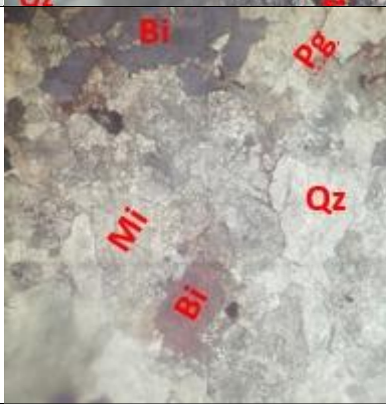
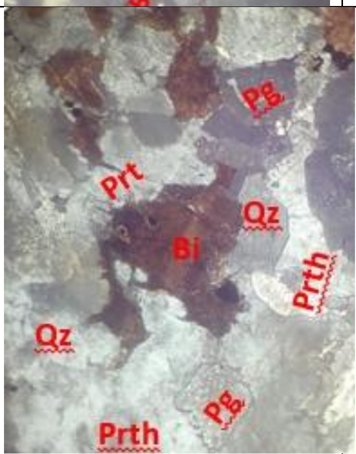
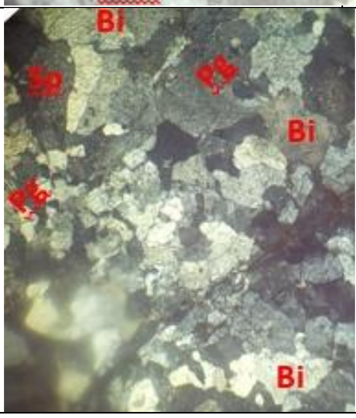
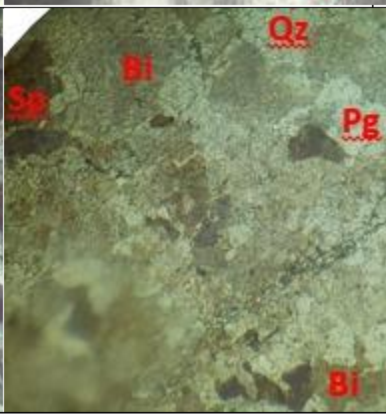


Figure27 diagram of classification of the magmatic rocks according to Streckeisen 1979

ABREVIATIONS
Bi : Biotite
Qz : Quartz
Pg : Plagioclases
Mi : Microcline
Mx Op : Opaques minerals
Prt=Prth : perthites
Sp: sphene

	APL	UNPL	Figure
C8E5			Figure 12

KAM 1			Figure 10
C1E1 3			Figure 14
C1E2			Figure 23
C8E1 3			Figure 19

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