GEOLOGICAL MAPPING OF THE SNELGROVE LAKE - ANDRE LAKE AREA, LABRADOR TROUGH

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INTRODUCTION

In 1976 the Mineral Development Division began a long term mapping and mineral evaluation project on the Labrador trough. Initial field work was carried out in the Andre Lake area with the following objectives:

(1) to define the nature of the poorly known eastern margin of the trough,
(2) to review the stratigraphy of the trough on its eastern margin, and
(3) to access the mineral potential of this part of the trough.

Interest in this area began with the discovery by Retty (1937, 1938) of iron deposits in the Sawyer Lake area to the south. Subsequent mapping by Moss (1942a,b) and Dufresne (1950) was mainly concerned with delineating the extent of the iron formations throughout the area. Wynne-Edwards (1960) later incorporated the area into a regional 1:250,000 map of the eastern margin of the trough.

GENERAL GEOLOGY

The Labrador trough is a 60 km wide belt of Aphebian strata which in the west rests unconformably upon the Archean Ashuanipi Complex and in the east is in fault contact with a heterogeneous assemblage of gneisses referred to as the Eastern Basement Complex. The stata of the trough, collectively termed the Kaniapiskau Supergroup, consist of a lower predominantly sedimentary succession termed the Knob Lake Group and an upper volcanic succession termed the Doublet Group.

EASTERN BASEMENT COMPLEX

UNIT 1 - SUPRACRUSTAL GNEISSES

This is a newly recognized assemblage of quartzofeldspathic gneiss (1a) , biotite gneiss (1b), and amphibolite schist (1c) that locally separates the Kaniapiskau Supergroup from the granodioritic gneisses to the east. The quartzofeldspathic gneisses are fine grained, quartz-plagioclase-biotite paragneisses with a well developed compositional banding; they contain scattered thin bands of quartzite. To the east these gneisses grade into biotite-quartz-plagioclase-orthoclase gneisses which are compositionally banded and contain thin (2-3cm) bands of hornblende-clinozoisite schist. The latter probably represent semi-calcareous horizons in the sedimentary protolith. An isolated occurrence of metaconglomerate was also found in angular float of biotite gneiss.

To the east, the biotite gneisses become progressively migmatitic and grade into the granodioritic gneisses of Unit 2. Both units have been intruded by sheets of pretectonic granite and by veins of post-tectonic pink aplite, microgranite, and granitic pegmatite.

UNIT 2 - LEUCOGRANODIORITE GNEISSES

These are white, quartz-plagioclase-biotite gneisses that contain screens of migmatitic biotite gneiss and pods of amphibolite gneiss. The unit has been intruded by pretectonic leucogranodiorite dikes of several ages. The gneiss is characterized by a pronounced flaggy foliation that is associated with a lenticular biotite fabric and pronounced quartz grain elongation. This fabric is composite and has developed by the isoclinal folding and intense flattening of an earlier gneissic banding.

Although the gneisses are associated with migmatization of the adjacent supracrustals, they also appear to have a more complex crustal history. It is probable that they represent a basement terrain that has been remobilized and migmatized during metamorphism of the supracrustal gneisses.

UNIT 3 - LEUCOGRANITE

To the south of Snelgrove Lake the gneisses have been intruded by a fine grained pink leucogranite. The leucogranite postdates the gneissose foliation of its host but is cataclastically deformed along the contact with the basal units of the Knob Lake Group. The unit is believed to be Archean in age since it does not appear to intrude the Knob Lake Group.

KNOB LAKE GROUP

The Knob Lake Group in the map area may be divided into western and eastern successions as follows:

Western Succession		Eastern Succession	
(West of Snelgrove Lake)		(Andre-Montgomery Lake Area)	
Menihek Fm.	330 m	Menihek Fm.	1000 m
Sokoman Fm.	200 m	-	
Black ferruginous siltstones	216 m	-	
Wishart Fm.	216 m	Wishart Fm.	0-15 m
-		Denault Fm.	0-530 m
Attikamagen Fm.	375 m	Attikamagen Fm.	1700 m
Seward Fm.	2300 m	Orthoquartzite	550 m

The two successions are separated by a re-entrant of basement rocks and a fault that runs from Quartzite Lake to Comeback Lake. The fact that the Denault dolomite is restricted to the eastern succession and that the Sokoman iron formation is restricted to the western succession may indicate that the basin originally deepened to the west. The Montgomery-Andre Lake Area may represent either a local basinal high or the eastern edge of the depositional basin.

UNIT 4 - THE SEWARD FORMATION

The Seward Formation has been subdivided into lower, middle and upper members. The lower member (4a) is a coarse arkose that varies locally to granule conglomerate. The clasts consist of quartz and felsic detritus with rare pebble sized fragments of leucogranitic gneiss; all are set in a fine grey-green matrix of epidote and chlorite alteration products. Cross bedding (sets 1-2 m long) is consistently developed throughout the member and gives paleocurrents directed to the east. The arkose is in fault contact with the basement and does not appear to have been affected by any of the intrusive events seen in the basement rocks. Since it contains much granitic detritus it may have originally rested unconformably upon the basement.

The middle member (4b) is a purplish quartz granule conglomerate with a clast content composed chiefly of highly rounded, milky white quartz granules. The unit is texturally more mature than the underlying arkose and has a more arenaceous sandstone matrix. Tabular and trough cross bedding well developed on sets 15-40 cm long indicate that paleocurrents flowed to the north and north-northwest.

The upper member (4c) is a plane laminated, purple, siltstone intercalated with minor amounts of white feldspathic sandstone. The contact with the overlying Attikamagen Formation is not exposed but is probably conformable. A small island at the north end of Snelgrove Lake is underlain by white calcarous sandstone that may represent either the top of the Seward or the base of the Attikamagen Formation.

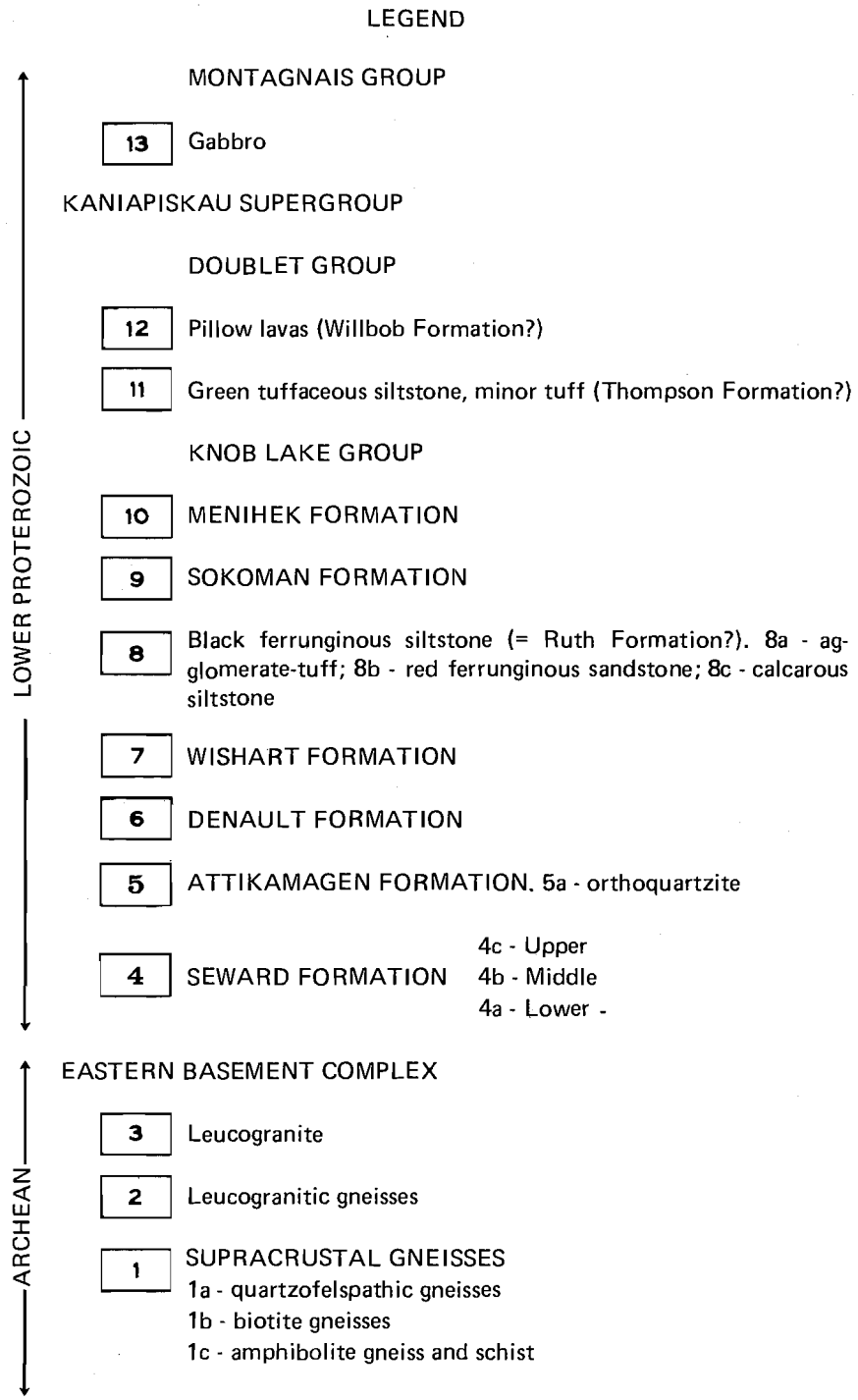
ATTIKAMAGEN FORMATION

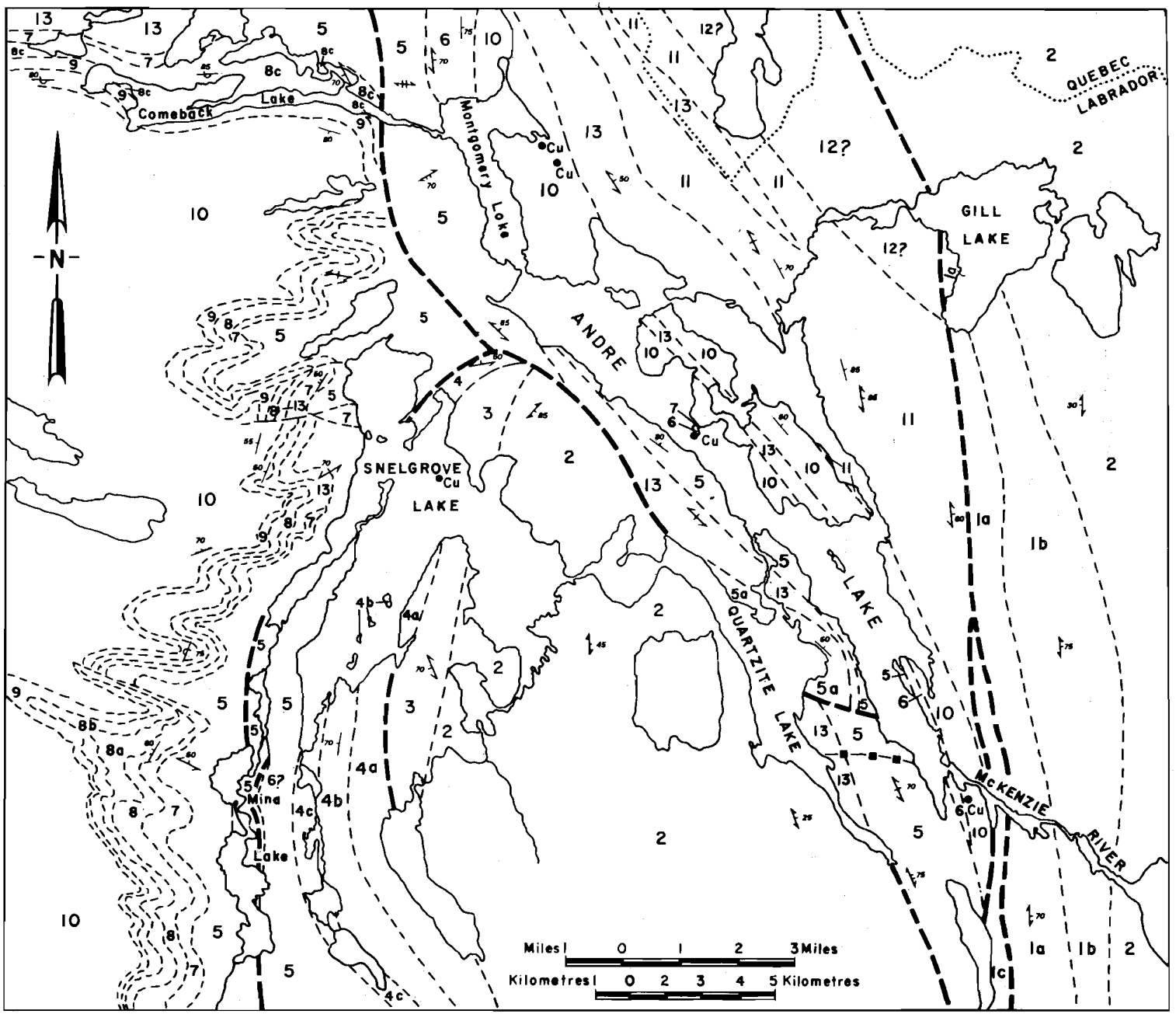
This is a monotonous sequence of thinly bedded grey shales and feldspathic siltstones. West of Mina Lake the formation contains a lens of buff cross-bedded limestone that may represent either a local facies change or a fault slice of Denault formation. In the eastern succession the Attikamagen shales are underlain by an extremely pure, fine grained orthoquartzite (Unit 5a) which is interbedded with minor amounts of grey sandstone. The unit is not developed west of Quartzite Lake and it is possible that it represents a facies equivalent of either the upper Seward Formation or the Lower Attikamagen Formation.

DENAULT FORMATION

The Denault Formation exhibits considerable lithological variation along its strike. In the Montgomery Lake area it is a thick stromatolitic dolomite with abundant veins of discordant chert. In Andre Lake the formation is a thin, highly fissile, micaceous limestone. To the south, around McKenzie River, it becomes increasingly impure and is interbedded with mafic tuffs.

The full Denault section is exposed in the Marion Lake area to the north (Donaldson, 1966) where the stromatolitic dolomite is overlain by micaceous limestone.


LEGEND
MONTAGNAIS GROUP
13 Gabbro
KANIAPISKAU SUPERGROUP
DOUBLET GROUP
12 Pillow lavas (Willbob Formation?)
11 Green tuffaceous siltstone, minor tuff (Thompson Formation?)
KNOB LAKE GROUP
10 MENIHEK FORMATION
9 SOKOMAN FORMATION
8 Black ferrunginous siltstone (= Ruth Formation?). 8a - agglomerate-tuff; 8b - red ferrunginous sandstone; 8c - calcarous siltstone
7 WISHART FORMATION
6 DENAULT FORMATION
5 ATTIKAMAGEN FORMATION. 5a - orthoquartzite
4 SEWARD FORMATION
4c - Upper
4b - Middle
4a - Lower -
LOWER PROTEROZOIC
EASTERN BASEMENT COMPLEX
3 Leucogranite
2 Leucogranitic gneisses
1 SUPRACRUSTAL GNEISSES
1a - quartzofelspathic gneisses
1b - biotite gneisses
1c - amphibolite gneiss and schist
ARCHEAN



Geology of the Andre Lake Area

Figure 1.

WISHART FORMATION

In the western succession the Wishart Formation is typically a thickly bedded orthoquartzite interbedded with minor amounts of grey sandstone and shale. In the east the formation is composed of grey chert and fine orthoquartzite. The top of the eastern part of the formation is formed by a seven meter thick pebble conglomerate composed of quartzite and limestone clasts set in a silicic matrix.

BLACK FERRUGINOUS SILSTONES

The Wishart Formation is overlain by a distinctive unit of thinly bedded black shales and siltstones rich in fine hematite and magnetite. They are believed to be equivalent to the Ruth Formation (Harrison, 1952) of the Schefferville area. However, Zajac (1974) has proposed that the term Ruth Formation be dropped and that the ferruginous siltstones be included within the Sokoman Formation. The black siltstones become increasingly tuffaceous to the south where they are overlain by an agglomerate (8a). To the north in the Comeback Lake region they lens out and give way to a ferruginous, calcareous siltstone (8c).

SOKOMAN FORMATION

This is a thinly bedded sequence of blue-grey, hematite-magnetite bearing cherts and siltstones. They are commonly speckled with 1-2 mm rounded fragments of jasper that are of pelloid or intraclast origin. A fine jasperiferous lamination is occasionally visible in the siltstones. The contact with the overlying Menihek Formation is transitional via blue-black and maroon shales.

MENIHEK FORMATION

In the eastern part of the area the Menihek Formation consists of thinly bedded grey shales and siltstones that closely resemble the Attikamagen Formation. In the western succession the shales have a green color and are interbedded with minor amounts of green tuffaceous siltstone.

DOUBLET GROUP

The Menihek Formation is overlain to the east by an interbedded succession of green, chloritic siltstones and quartzites and black slate (Unit II) that is predominantly of volcaniclastic origin. This succession is provisionally correlated with the Thompson Lake Formation of Frarey and Duffell (1964). To the northeast these rocks give way to swampy ground that, by extrapolation from the north, is probably underlain by pillow lavas of the Willbob Formation. Facing directions from the pillow lavas indicate the Doublet Group youngs to the northeast. It has not been possible to recognize the extension of the Murdock Group (chlorite schist, pyroclastics) through the area as shown by Wynne-Edwards (1960).This is largely due to non-exposure but it is also suspected that the Group may pinch out or be faulted out north of the map area.

MONTAGNAIS GROUP

Both the Knob Lake and Doublet Groups have been intruded by numerous sills of pretectonic gabbro that increase in thickness and frequency to the east.

The sills are composed of fine to coarse grained sub-ophitic gabbro which is largely non-porphyritic and has clinopyroxene as the only mafic phase. Some of the larger sills east of Andre Lake are differentiated into lower melanogabbro, middle normal gabbro, and upper leucogabbro divisions.

STRUCTURE AND METAMORPHISM

The area west of Snelgrove Lake is dominated by a series of east-west trending folds that plunge steeply to the west and are associated with a weak S_1 cleavage. The area east of the lake is dominated by northwesterly trending folds associated with a strong S_1 cleavage. The two structural domains are separated by a fault that runs from Mina Lake to Comeback Lake. It is believed that the structures west of the fault were rotated into an east-west trend by a combination of high angle reverse and sinistral strike-slip fault movement. A crenulation cleavage (S_2) developed in the Comeback-Montgomery Lakes area is probably related to this deformation. Another S_2 crenulation cleavage is locally developed along the major NW - SE trending faults (e.g. Quartzite Lake) and is believed to be related to reactivation of these faults.

Metamorphism is weak over much of the area but increases to the east where the rocks of the Doublet Group have strong S_1 chlorite fabrics. To the southeast the grade of metamorphism increases with the formation of garnet-biotite-muscovite-albite schists and phyllites at the southeast end of Andre Lake. The garnet isograd is recognizable in the field but the biotite isograd is at present only poorly defined.

MINERALIZATION

The area has several known copper showings at Montgomery Lake (Moss,1942) and McKenzie River (Kozela, 1960). Mineralization is in the form of finely disseminated chalcopyrite associated with pyrite and pyrrhotite. The mineralization is usually found in the upper Menihek Formation and is often associated with fault brecciation and siderite veining.

A copper showing was found on the small island at the north end of Snelgrove Lake where chalcocite and malachite are present as small veinlets in brecciated calcareous sandstone and silicic limestone. The orthoquartzite of Unit 5a is frequently stained with malachite on joint and bedding surfaces but no primary mineralization has been found.

A scintillometric survey of the Seward Formation revealed several spot highs (less than 1 m^2 extent) of uranium activity of up to 10x background in the lower Seward (4a) member.

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