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DEPARTMENT OF NATURAL RESOURCES
MINES BRANCH
GEOLOGICAL EXPLORATION SERVICE

GEOLOGY

of the

NACHICAPAU-, HORSESHOE (1/6-SW)-, MARCEL-,
BUTEUX- AND JOGUES (EAST HALF) LAKES AREAS

NEW QUEBEC TERRITORY

Preliminary Report

by

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SERVICE DE LA
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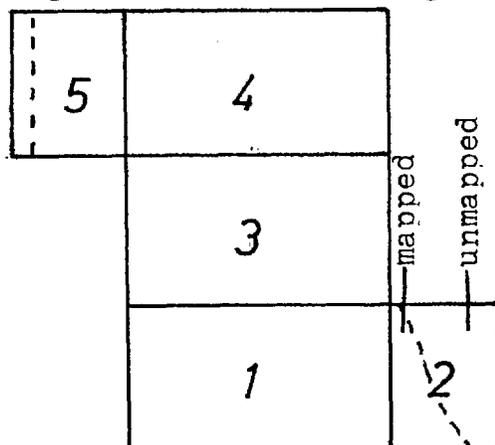
Burkhard Dressler

INTRODUCTION

Location and Access

The map-area is in New Quebec. It lies about 140 miles north-northwest of Schefferville and covers approximately 1150 square miles.

It comprises the following map-sheets:



1) Nachicapau Lake area:

lat: $56^{\circ}30'$ - $56^{\circ}45'$

long: $68^{\circ}00'$ - $68^{\circ}30'$

2) Horseshoe Lake area:

lat: $56^{\circ}30'$ - $56^{\circ}45'$

long: $67^{\circ}50'$ - $68^{\circ}00'$ (approx.)

3) Marcel Lake area: lat: $56^{\circ}45'$ - $57^{\circ}00'$

long: $68^{\circ}00'$ - $68^{\circ}30'$

4) Buteux Lake area: lat: $57^{\circ}00'$ - $57^{\circ}15'$

long: $68^{\circ}00'$ - $68^{\circ}30'$

5) Jogues Lake area: lat: $57^{\circ}00'$ - $57^{\circ}15'$
long: $68^{\circ}30'$ - $68^{\circ}40'$

The only practical means of access to the area is by aircraft. All large lakes are suitable to float- or ski-equipped airplane. The nearest bases are at Fort-Chimo and Schefferville.

Description of the Area

The region around Nachicapau lake and west of Marcel and Erlandson (= Le Moyne) lakes is characterized by north-northwest-trending mountain ridges: the highest elevation in the area is south of Nachicapau lake and is about 1500 feet above sealevel. East of Marcel and Erlandson lakes the area is rather flat.

The entire area drains to Ungava Bay.

Almost all hilltops are barren. The valleys in the mountainous part of the region and the flat areas east of Marcel and Erlandson lakes are covered by subarctic forest. Steep slopes are commonly overgrown with alder or "Labrador Tea".

Previous Work

The region lies within areas mapped by Fahrig (1965) and by Roscoe (1957) at a scale of 1 inch = 4 miles, east of an area mapped by Dressler (1973a, 1973b) at the scale of 1 inch = 1 mile, east of Hashimoto's (1964) Jogues Lake area (1 inch = 1 mile) and north of Dimroth's Castignon Lake (1969, 1 inch = 1 mile) and Romanet Lake (1964, 1 inch = 1 mile) areas.

Small sections of the region have been mapped by mining companies.

Field Work

The present report gives the results of field work carried out during the summer of 1974 and of part of the 1973 summer work.

Outcrops are plentiful in all the area except east of Marcel and Erlandson lakes. Most mapping was done by using air photographs for orientation. East of Marcel and Erlandson lakes, however, compass traverses were run at approximately half-mile intervals.

GENERAL GEOLOGY

The map-area lies entirely within the eugeosyncline of the Labrador Trough. All bedrock is Precambrian in age and belongs to the Kaniapiskau Supergroup.

Most of the area is underlain by volcanic rocks. They include gabbros, basalts, tuffs, agglomerates and minor ultrabasic rocks, rhyodacites and quartz porphyries.

Sedimentary rocks - partly intercalated in the volcanics - are conglomerates, sandstones, greywackes, siltstones, argillites, dolomites, cherts and ironstones.

East of Marcel and Erlandson lakes the area is underlain by metamorphic rocks such as biotite schists, biotite gneisses, amphibolites, marbles and minor quartzites.

At the present stage of information the stratigraphic classification of the rocks - as presented in the following table of formations - is tentative.

Table 1: Tentative Table of Formations

Nachicapau Lake	Aulneau Lake	East of Erlandson and Marcel Lakes	? ← — → ? (Basalts, gabbros, pyroclastics, minor ultrabasic rocks and rhyodacites) Montagnais Group
Quartz-syenite		<u>Metamorphic Series:</u>	
Argillite Siltstone (Agglomerate) Dolomite Agglomerate Dolomite Turbidites, grey-wackes, siltstone, argillite and minor conglomerate	Dolomite and tuff Dolomite Conglomerate, sandstone and argillite Agglomerate	Marble Biotite schist and gneiss Amphibolite Biotite schist and gneiss	
<u>Mistamisk Formation:</u> Gabbros and basalts with intercalated siltstones and argillites.			

The reason for tentatively classifying the sequence - turbidite, dolomite, etc. - as overlying Dimroth's Mistaminsk Formation is the regional structure of the area underlain by this unit. It crops out north of Nachicapau lake. All synclines and anticlines north and south of this lake plunge northward. The rocks of the Mistaminsk Formation, about 10 miles (16 km) south of Nachicapau lake, therefore probably underlie the rocks of the above-mentioned sequence.

PRECAMBRIAN

— KANIAPISKAU SUPERGROUP —

1. Sedimentary Rocks

Sedimentary rocks of the region mainly underlie areas north of Nachicapau lake and between Aulneau and Erlandson lakes.

The following description of the rocks is not in stratigraphic order.

Conglomerates

Two different types of conglomerates have been observed in the area.

- a) East of Aulneau lake the pebbles of the conglomerate mainly consist of angular to subrounded fragments of dolomite, rarely of fine-grained sandstone or of volcanic rocks. Dolomite cobbles are up to 20 x 30 cm, sandstone and volcanic fragments up to 1 x 2 cm in size. All inclusions are commonly densely packed in a dolomitic, silty matrix.
- b) West of Erlandson lake and at Dimroth lake, the fragments consist of gneiss, sedimentary and volcanic rocks. They are mostly unsorted, up to 1 m in size, subrounded and set in a well-foliated, carbonate-chlorite-biotite matrix.

Sandstones

Sandstones are not common in the area. They are white, brown or grey, and mostly medium grained.

Turbidites, Greywackes and Associated Conglomerates

These rocks crop out mainly around Nachicapau lake.

They are characterized by large amounts of silty and subangular sand-sized material, consisting of quartz and feldspar. Convolute bedding, graded bedding and crossbedding are common sedimentary features. The rock fragments in the greywackes are siltstones and sandstones, and 1 to 3 cm in size. In a few places, however, these fragments are of boulder size (diameter \leq 1m), subrounded, and set in a sandy matrix, forming a flysch-type sediment.

Conglomerates interlayered with the turbidites show no sorting or packing of pebbles. Pebbles are commonly subangular to subrounded, up to 15 cm in size, and consist of siltstone, sandstone or fine-grained conglomerate.

Argillites and Siltstones

Argillites and siltstones crop out throughout the area, in regions underlain by sediments, and are also intercalated in the volcanic rocks of the area.

Argillites are commonly black and fissile, siltstones grey and laminated. Near Aulneau lake they contain much pyrite and pyrrhotite, north of Mistaminsk lake much graphite.

Dolomites

Dolomites crop out at Nachicapau lake, north of this lake, and between Aulneau and Erlandson lakes.

Around Nachicapau lake the dolomites commonly are grey, light grey weathering rocks. Pinkish or buff, brown weathering varieties are scarce. Chert layers are common. In a few places sedimentary features such as ripple marks and intraclasts have been noted.

East of Aulneau lake the dolomites are grey to buff and brown weathering. They grade into tuffaceous dolomites and dolomitic tuffs and agglomerates. Containing tuffaceous material the dolomites become dark grey to brownish grey and weather deep rusty brown. "Pure" dolomites contain bands of dolomitic tuff, pure tuffs commonly bands or lenses of dolomite.

Ironstones

Ironstones crop out mainly north of Aulneau lake and form layers 1 to 30 feet (0.3 to 9m) thick; they commonly overlie a pyrite-rich argillite, and are, in turn, overlain by gabbro sills. The ironstones are thinly banded, brown to dark grey, rusty weathering rocks. They consist of quartz, grunerite, carbonate, magnetite, minnesotaite and stilpnomelane.

2. Volcanic Rocks

Volcanic rocks of the Kaniapiskau Supergroup ("Montagnais Group") consist of ultrabasic rocks, gabbros, basalts, rhyodacites, quartz-porphyrines, tuffs and agglomerates. They underlie large sectors of the map-area.

Ultrabasic Rocks

Ultrabasic rocks of the area form small bodies and have been found at four different places in the map-area.

1) On the major peninsula in Dimroth lake: The fine- to medium-grained rock is greenish grey. In hand-specimen the rock is seen to be composed of biotite or phlogopite, carbonate and chlorite, but no plagioclase. A pegmatitic band contains coarse phlogopite. The rock is close to a volcanic rock that has been almost completely replaced by carbonate.

2 and 3) Similar rocks have been found about 2 miles south of the outlet of Aulneau lake (sp. 17K25A), and about 1 mile (1.6 km) west of Erlandson lake, between Erlandson and Dimroth lakes (sp. 3K11A). Specimens from these two occurrences do not show phlogopite. Chemical analyses are presented in table II.

4) About 1 mile west of Douay lake, a rock crops out that has been termed "lamprophyre" (see table II for chemical analysis; sp. 14K15). It is fine to medium grained and greenish grey. In thin-section it is seen to be composed of garnet, phlogopite, sphene, serpentine, actinolite, chlorite and opaque minerals.

Metagabbros^{x)}

Metagabbros of the area are fine to medium, in places coarse grained. They are greenish grey, green or black and weather brown or

x) "Gabbro": Fine- to medium- or coarse-grained rock of basaltic chemical composition.

Table II: Analyses of Ultrabasic Rocks

	3K11A	17K25A	14K15
SiO ₂	37.55	32.50	35.70
TiO ₂	6.07	3.48	2.98
Al ₂ O ₃	12.40	5.55	7.20
Fe ₂ O ₃	-	7.95	10.40
FeO	-	7.59	4.70
Fe ₂ O ₃ (tot.)	12.11	-	-
MnO	0.15	0.20	0.17
MgO	4.00	15.65	16.25
CaO	15.08	14.30	14.16
Na ₂ O	2.91	0.10	0.17
K ₂ O	1.70	2.22	1.83
H ₂ O ⁺	1.08	3.56	3.70
H ₂ O ⁻	0.10	0.13	0.12
CO ₂	5.82	6.06	1.90
S	1.00	0.02	0.01
P ₂ O ₅	0.27	0.32	0.52
Ni	79	440	340 ppm
Cr	230	430	800
Cu	175	410	n.d.

grey-green. Commonly they are even grained or ophitic. A kind of glomerophyric (=blotchy) gabbro has been observed about two miles east of Dupoisson lake.

The gabbros form commonly eastward-dipping sills that can be followed along strike over long distances. However, subvolcanic or extrusive gabbros are believed to exist too. In many places thick extrusive gabbros overlie completely unmetamorphosed sediments, and the tops of these gabbros exhibit columnar jointing. Gradations from gabbro to basalt were observed along the strike of mountain ridges.

South of Nachicapau lake a few occurrences of gabbro were noted that show inclusions of another gabbro. In this sector of the area, a gabbro intruding an older gabbro was also observed.

Metabasalts

Metabasalts of the area are fine grained or aphanitic. Their colour is dark grey, greenish grey or rarely black. They weather brown or green. Pillowed basalts are common, the pillows being some inches to 10 feet (some cm to 3m) in size.

The basalts form thick and long, north-northwest-trending ridges. However, thin, one to a few feet thick dykes and sills have also been noted in agglomerates and tuffs.

Rhyodacites and Quartz-porphyrines

Rocks, termed rhyodacites and quartz-porphyrines, crop out in the northwestern corner of the Marcel Lake map-sheet. A few rhyodacitic tuffs are associated with them.

The rhyodacites are grey to dark grey, light grey weathering, and aphanitic.

The quartz-porphyrines are fine to medium grained, and light pinkish brown. Porphyritic quartz grains are up to 4 mm in size.

Tuffs and Agglomerates

Two types of tuffs and agglomerates ^{x)} occur in the area.

1) A zone of basaltic pyroclastic rocks extends from Aulneau and Douay lakes to the southern limit of the map-area, east of Nachicapau lake.

These green, commonly aphanitic rocks are strongly sheared. In many places the inclusions of the agglomerates are flattened pancake-like (1x50x50 cm).

2) East of Aulneau lake dolomitic tuffs and minor agglomerates form a large syncline. The rocks are dark grey to brownish grey and weather deep brown.

The origin of these tuffs and agglomerates is unknown. They may have originated by the deposition of explosive-volcanic material in a basin where carbonates were deposited at the same time. Another interpretation explains these rocks as being of an explosive-carbonatitic origin.

3. Metamorphic Series

East of Erlandson and Marcel lakes, biotite schists, biotite gneisses, amphibolites, ^{marbles} ~~marbles~~ and minor quartzites crop out. They are the equivalents of less metamorphosed rocks west of these lakes. (However, west of Erlandson lake some gabbros are amphibolitized and some argillites are replaced by biotite (-garnet) schists.)

x) NB-On the preliminary maps that accompany this report, tuffs and agglomerates are plotted as "tuffs" where agglomerates are of minor importance (and vice versa).

Biotite Schists and Biotite Gneisses

These rocks are fine to medium grained, grey or light grey. In places they are garnetiferous or contain some hornblende. The most common schist and gneisses are metamorphosed shales and quartz-poor. Quartz-rich varieties are believed to be metasiltsstones.

Quartzites

Quartzites are medium grained and were noted at only one place, in the very northeastern part of the region.

Marbles

The marbles of the area are white or grey and fine to medium, rarely coarse, grained. A few layers contain some quartz.

Amphibolites

The amphibolites of the region are fine to medium grained, and dark greenish grey or black. In spite of advanced metamorphism they are, in many places, still recognizable as former gabbros, basalts, agglomerates and tuffs.

4. Post-tectonic Quartz-syenite

Two small exposures of a post-tectonic quartz-syenite were noted. One is on an island in the southeastern bay of Nachicapau lake, the other close by at the eastern shore.

The quartz-syenite is pink and medium grained. In thin-section it is seen to be composed of strongly perthitic potassic feldspar, with a little plagioclase and a little quartz. Biotite makes up less than 1.5% of the rock and is almost completely replaced by

chlorite.

The quartz-syenite shows no foliation, although it sits on a major thrust fault and is in contact with strongly foliated tuffs.

PLEISTOCENE AND RECENT

Glacial deposits are found throughout the map-area. East of Erlandson and Marcel lakes, large areas are completely covered with these deposits. Swamps are very abundant in that part of the region.

STRUCTURAL GEOLOGY

The entire area lies within the eugeosyncline of the Labrador Trough and, in general, all rocks trend north-northwest.

In most of the area, mainly in the northern sector of the region between Aulneau and Erlandson lakes, the structure is very complex due to the interlayering of competent and incompetent rocks and to strong thrusting from the northeast. Folds are commonly overturned.

In less strongly deformed, protected sectors of the map-area - for instance just west of Aulneau lake and north and south of Nachicapau lake - rather wide, almost flat synclines are separated by narrow anticlines or shear zones.

Joints were not studied in detail. However, it is worth while to mention that joints in gabbros that are roughly perpendicular to the general trend of the rocks are, in places, filled with quartz veins, up to one foot thick (0.3 m).

ECONOMIC GEOLOGY

The area is favourable for prospecting, mainly for copper and nickel.

All mineralizations indicated on the preliminary maps that accompany this report are sulfides, mainly pyrrhotite and pyrite. Chalcopyrite is rare.

The sulfides occur disseminated in gabbros, tuffs, siltstones and argillites. Massive sulfides in siltstones were also found.

Two miles east of Dupoisson lake a kind of glomerophyric gabbro contains thin bands rich in sulfides. A grab sample analyzed for copper, nickel and zinc gave: Cu 2400 ppm; Ni 260 ppm; Zn 120 ppm.

In places, hydrothermal quartz veins cutting basalts, gabbros or dolomites are somewhat mineralized with pyrite and minor chalcopyrite. On an island in Nachicapau lake a dolomite is the host rock for these quartz veins. It is highly altered by the hydrothermal fluids but contains only traces of copper (24 ppm).

Most recent exploration activity in the area was, and is being, carried out around Aulneau lake where almost massive sulfides - pyrrhotite, pyrite and traces of chalcopyrite - were found in siltstones and argillites that form a continuation of a mineralized zone mapped by Dressler in 1972 (1973b). South of Aulneau lake (Dressler 1973c), a mineralized mafic gabbro contains schlieren of massive sulfides that are rich in nickel and copper (selected grab sample: Ni 1.0%; Cu 1.9%).

The ironstones of the area are of no economic importance.

Aeromagnetic maps are not yet available for all the area. They show high strike-parallel anomalies east and northeast of Nachicapau lake in regions underlain by tuffs. The anomalies are caused by the rather high amount of magnetite in these rocks.

GEOCHEMISTRY

Concurrently with the geological mapping, about 400 stream-sediment samples were collected from streams encountered on traverses. The samples were sent to the Department's Laboratories Service and are being analyzed for Cu, Zn, Pb, Mo, Ni, Co, W, Mn, Sn, Ag, Au and Sb.

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